

East Anglia THREE

Appendix 15.1

Annex 3

**Navigational Risk Assessment
MGN Checklist**

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MCA MGN 371 Checklist
East Anglia THREE Offshore Windfarm
Appendix 15.1
Annex 3
MGN Checklist

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1. Introduction

1. This Appendix presents the Marine Coastguard Agency (MCA) checklist based on the requirements set out in Marine Guidance Note (MGN) 371 which was the guidance set by the MCA during the NRA preparation.
2. Reference notes/remarks are made within the table based on which sections of the Navigational Risk Assessment (NRA), or other documents, address the issue noted in the MGN 371 checklist.

2. MGN 371 Compliance Checklist

Table 1 MGN 371 Compliance Checklist for the Proposed East Anglia THREE Windfarm

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
Annex 1 : Considerations on Site Position, Structures and Safety Zones			
<p>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.</p>			
2. Traffic Survey			
All vessel types	✓		<p>Section 10: Maritime Traffic Surveys – 10.2: Survey Details & Section 13: Validation Survey 2014. <i>Tracking of all vessel types was achieved by recording AIS and Radar data.</i></p>
Four weeks duration, within 12 months prior to submission of the Environmental Statement	✓		<p>Section 10: Maritime Traffic Surveys – 10.2: Survey Details & Section 13: Validation Survey 2014. <i>Baseline Survey period comprised 30 days AIS/Radar survey from September 2012 to May 2013, as detailed in Section 10.2. Validation Survey period comprised 10 days AIS/Radar survey from January/February 2014.</i></p>
Seasonal variations	✓		<p>Section 10: Maritime Traffic Surveys – 10.2: Survey Details & Section 13: Validation Survey 2014. <i>Surveys have been carried out in Autumn (September 2012), spring (May 2013), summer</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>(July/August 2013) and winter (January/February 2014), to take account seasonal variations in traffic patterns.</i>
Recreational and fishing vessel organisations	✓		Section 10: Maritime Traffic Surveys & Section 13: Validation Survey 2014. <i>Periods and seasonal variations of data used in the Maritime Traffic Surveys were chosen following consultation with representative recreational and fishing vessel organisations, as well as analysis of fishing data.</i>
Port and navigation authorities	✓		Section 10: Maritime Traffic Surveys & Section 13: Validation Survey 2014. <i>Periods and seasonal variations of data used in the Maritime Traffic Surveys were chosen following consultation with port and navigation authorities.</i>
Assessment			
a. Proposed OREI site relative to areas used by any type of marine craft.	✓		Section 11: Survey Analysis & Section 13: Validation Survey 2014. <i>Summarises the results of the Maritime Traffic Surveys.</i> Section 15: Recreational Craft Activity. <i>Examines recreational vessel activity in the area based on the Maritime Traffic Survey and available desktop information.</i> Section 16: Commercial Fishing Vessel Activity. <i>Reviews fishing vessel activity in the area based on the Maritime Traffic Surveys.</i> Section 18: Future Case Commercial Vessel Routeing. <i>Considers the impact on</i>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>commercial shipping navigation based on the Maritime Traffic Surveys.</i>
b. Numbers, types and sizes of vessels presently using such areas	✓		<p>Section 10: Maritime Traffic Surveys. <i>Summarises the results of the Maritime Traffic Surveys, including the numbers (Section 11: Survey Analysis), types (11.2: Survey Data by Vessel Type) and sizes (11.3: Vessel Size) of vessels.</i></p> <p>Section 15: Recreational Craft Activity. <i>Examines recreational vessel activity in the area based on the Maritime Traffic Survey and available desktop information.</i></p> <p>Section 16: Commercial Fishing Vessel Activity. <i>Reviews fishing vessel activity in the area based on the Maritime Traffic Surveys.</i></p>
c. Non-transit uses of the areas, e.g. fishing, day cruising of leisure craft, racing, aggregate dredging, etc.	✓		<p>Section 15: Recreational Vessel Activity. <i>Examines recreational vessel activity in the area based on the Maritime Traffic Survey and available desktop information.</i></p> <p>Section 16: Commercial Fishing Vessel Activity. <i>Reviews fishing vessel activity in the area based on the Maritime Traffic Surveys.</i></p> <p>Section 7: Existing Environment – 7.8: Aggregates Dredging Areas. <i>Investigates the proximity of the site to marine aggregate dredging areas.</i></p> <p>Section 11: Survey Analysis – 11.2: Survey Data by Vessel Type. <i>Examines other operational vessel activity, including</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p><i>aggregates dredgers, based on the Maritime Traffic Surveys.</i></p> <p>Section 7: Existing Environment – 7.11: Ship to Ship Transfers and Section 20: Offshore Cable Corridor Maritime Traffic Survey– 20.4: Offshore Cable Corridor Anchored Vessels.</p> <p><i>Investigates ship to ship oil transfers in the area.</i></p>
<p>d. Whether these areas contain transit routes used by coastal or deep-draught vessels on passage.</p>	✓		<p>Section 11: Survey Analysis.</p> <p><i>Determines whether these areas contain transit routes used by coastal or deep-draught vessels on passage, by examination of draught details in Maritime Traffic Survey data.</i></p>
<p>e. Alignment and proximity of the site relative to adjacent shipping lanes</p>	✓		<p>Section 11: Survey Analysis, and Section 18: Future Case Commercial Vessel Routeing.</p> <p><i>Studies alignment and proximity of the site relative to adjacent shipping lanes, by analysis of Maritime Traffic Survey data.</i></p>
<p>f. Whether the nearby area contains prescribed routeing schemes or precautionary areas</p>	✓		<p>Section 7: Existing Environment – 7.2: IMO Routeing Measures.</p> <p><i>States whether the area contains prescribed routeing schemes or precautionary areas, from analysis of Hydrographic Charts.</i></p>
<p>g. Whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes</p>	✓		<p>Section 7: Existing Environment – 7.2: IMO Routeing Measures.</p> <p><i>States whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes, from analysis of Hydrographic Charts.</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
<p>h. Proximity of the site to areas used for anchorage, safe haven, port approaches and pilot boarding or landing areas.</p>	✓		<p>Section 7: Existing Environment – 7.4: Chartered Anchorage Areas and Section 20: Offshore Cable Corridor Maritime Traffic Survey– 20.4: Offshore Cable Corridor Anchored Vessels. <i>Examines the proximity of the site to areas used for anchorage, from analysis of Hydrographic Charts and AIS data</i></p> <p>Section 7.3: Navigational Aids. <i>Examines the proximity to pilot boarding or landing areas, from analysis of Hydrographic Charts.</i></p>
<p>i. Whether the site lies within port limits, etc. jurisdiction of a port and/or navigation authority.</p>	✓		<p>Section 7: Existing Environment – 7.5: Ports. <i>Examines whether the site lies within the limits of jurisdiction of a port and/or navigation authority, by information from Hydrographic Charts.</i></p>
<p>j. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.</p>	✓		<p>Section 16: Commercial Fishing Vessel Activity. <i>Reviews the fishing vessel activity at the site based on the maritime traffic surveys.</i></p>
<p>k. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.</p>	✓		<p>Section 7: Existing Environment – 7.7: Ministry of Defence (MOD) Exercise Areas and Explosives Dumping Grounds – Water Based. <i>Analysis of SeaZone Hydrographic GIS files and Hydrographic Charts to determine proximity to military areas.</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
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	✓		<p>Section 7: Existing Environment – 7.6: Oil and Gas Infrastructure. <i>Uses GIS files from Oil & Gas UK Deal to assess proximity to oil / gas platforms, wells, license blocks and fields.</i></p> <p>Section 7: Existing Environment – 7.8: Marine Aggregates Dredging Areas. <i>Analyses GIS files from the Crown Estate to determine proximity to marine aggregate dredging sites.</i></p>
m. Proximity of the site relative to any designated areas for the disposal of dredging spoil	✓		<p><i>Not applicable.</i></p>
n. Proximity of the site to aids to navigation and/or Vessel Traffic Services (VTS) in or adjacent to the area and any impact thereon.	✓		<p>Section 7: Existing Environment – 7.3: Navigational Aids. <i>Examined Hydrographic Charts and Admiralty Sailing Directions NP28 for positions of navigational aids and to determine proximity to VTS.</i></p>
o. Researched opinion using computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of ‘choke points’ in areas of high traffic density.	✓		<p>Section 23: Allision and Collision Risk Modelling Overview, Section 24: Base No Windfarm Model Results, Section 25: Future Case No Windfarm and Section 26: Future Case with Windfarm. <i>Used computer simulation techniques to assess present-day vessel activity and future-case with windfarm activity, with vessels being displaced following construction. Examined encounters, vessel-to-vessel collisions, vessel allision with structure, fishing vessel allision and recreational vessel allision.</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
<p>p. Type(s) of simulation used in analysis Limitation of system(s)</p>	✓		<p>Section 23: Allision and Collision Risk Modelling Overview and Appendix D: Risk Models Overview. <i>Discusses simulations used in the analysis. All the quantified risk assessments were carried out using Anatec’s COLLRISK software which conforms to the DECC methodology as outlined in Annex D3 in the Guidance. In line with this, Anatec makes the declaration that the models used within this work have been validated and are appropriate for the intended use.</i></p>
3. OREI Structures			
<p>a. Whether any features of the OREI, including auxiliary platforms outside the main generator site and cabling to the shore, could pose any type of difficulty or danger to vessels underway, performing normal operations, or anchoring.</p>	✓		<p>Section 3: Project Details – 3.3: Structure Details. <i>Outlines the Rochdale Envelope, including the number of OREI structures and auxiliary platforms. 3.4: Offshore Cable Corridor. Examines options for cabling to shore.</i></p> <p>Section 18: Future Case Commercial Vessel Routeing. <i>Considers the impact of the OREI on vessels steaming on passage.</i></p> <p>Section 15: Recreational Vessel Activity: <i>Assesses the impact of the OREI on vessels engaged in recreational activities.</i></p> <p>Section 16: Commercial Fishing Vessel Activity: <i>Assesses the impact of the OREI on vessels engaged in fishing or transiting to fishing grounds.</i></p> <p>Section 26: Future Case With Wind Farm Risk (Base Case). <i>Assesses the impact that the</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p><i>OREI will have upon vessel-to-vessel collisions, vessel allision with structure (powered and drifting) fishing vessel allisions and recreational vessel allisions.</i></p> <p>26.5: Risk Results Summary and 26.6 Consequences. <i>Present a summary of results from modelling used to assess whether any features of the OREI could pose any type of difficulty or danger to vessels underway, performing normal operations, or anchoring.</i></p>
Clearances of wind turbine blades above the sea surface <i>not less than 22 metres</i>	✓		<p>Section 3: Project Details – 3.3: Structure Details. <i>Minimum clearances between sea level conditions at MHWS and wind turbine rotors will be not less than 22m and will meet MCA guidance.</i></p>
Least depth of current turbine blades	✓		<i>Not applicable.</i>
The burial depth of cabling	✓		<p>Section 20: Offshore Cable Corridor Maritime Traffic Survey – 20.5 Effects for Offshore Cable Corridor. <i>Assessment of cable route. Cables will be buried / protected appropriately taking into account fishing and anchoring practices.</i></p>
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)	✓		<p>Section 21: Emergency Response. <i>Determines whether any feature of the installation could create problems for emergency rescue services.</i></p> <p>21.1 Search and rescue. <i>Assesses SAR helicopter assets and RNLI lifeboat stations in the vicinity, and response times to the site. Determines whether the</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p><i>installation could create problems for SAR helicopters and lifeboats.</i></p> <p>21.2: Salvage and Towing. <i>Examines options for salvage in the vicinity of the site.</i></p> <p>21.3: Emergency Response Co-operation Plan (ERCoP) <i>Examines features to be incorporated to ERCoP.</i></p> <p>21.4: Marine Pollution and Counter Pollution <i>Examines options for pollution response in vicinity of the site.</i></p>
<p>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.</p>	✓		<p>Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP). <i>States that EAOW will meet the MCA’s requirements in terms of standards and procedures for generator shutdown and other operational requirements in the event of this being required in an emergency.</i></p>
<p>4. Assessment of Access to and Navigation Within, or Close to , an OREI: To determine the extent to which navigation would be feasible within the OREI site itself by assessing whether:</p>			
<p>a. Navigation within or close to the site would be safe:</p>			
<p>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</p>	<p>✓ ✓ ✓ ✓ ✓</p>		<p>Section 18: Future Case Commercial Vessel Routeing. <i>Assesses whether navigation within or close to the site would be safe for commercial vessels.</i></p> <p>Section 15: Recreational Craft Activity. <i>Assesses whether navigation within or close to the site would be safe for recreational vessels, including passing between turbines.</i></p> <p>Section 16: Commercial Fishing Vessel Activity.</p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p>Assesses whether navigation within or close to the site would be safe for fishing vessels, including passing between turbines and allision risk modelling.</p> <p>Section 25: Future Case No Windfarm & Section 26: Future Case with Windfarm.</p> <p>Uses a variety of models to assess whether navigation within or close to the site would be safe for all vessels. The models take into account tidal and weather conditions.</p>
b. Navigation in and/or near the site should be:			
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> ✓ ✓ ✓ ✓ ✓ ✓ 		<p>Section 18: Future Case Commercial Vessel Routeing.</p> <p>Assesses whether navigation within or close to the site should be prohibited or recommended to be avoided by commercial vessels.</p> <p>Section 15: Recreational Craft Activity</p> <p>Assesses whether navigation within or close to the site should be prohibited or recommended to be avoided by recreational vessels.</p> <p>Section 16: Commercial Fishing Vessel Activity.</p> <p>Assesses whether navigation within or close to the site should be prohibited or recommended to be avoided by fishing vessels.</p> <p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm.</p> <p>Uses a variety of models to assess whether navigation</p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>within or close to the site should be prohibited or recommended to be avoided by all vessels. The models take into account tidal and weather conditions.</i>
c. Exclusion from the site could cause navigational, safety or routing problems for vessels operating in the area. eg by causing a vessel or vessels to follow a less than optimum route	✓		<p>Section 18: Future Case Commercial Vessel Routing. <i>Assesses whether exclusion from the site could cause navigation, safety or routing problems for commercial vessels operating in the area.</i></p> <p>Section 15: Recreational Craft Activity. <i>Assesses whether exclusion from the site could cause navigation, safety or routing problems for recreational vessels operating in the area.</i></p> <p>Section 16: Fishing Vessel Activity. <i>Assesses whether exclusion from the site could cause navigation, safety or routing problems for fishing vessels operating in the area.</i></p>
Relevant information concerning a decision to seek a “safety zone” for a particular site during any point in its construction, operation or decommissioning should be specified in the Environmental Statement accompanying the development application	✓		<p>Section 4: Embedded Mitigations. <i>Presents relevant information concerning a decision to seek a ‘safety zone’ for the Project during any point in its construction, operation or decommissioning.</i></p>
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	✓		<p>Section 3: Project Description – 3.2: East Anglia THREE Boundary. <i>States the depth of water in which the proposed installation is situated.</i></p> <p>Section 8: Metocean Data –</p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
do not exist at low water conditions, and vice versa.			<p>8.4: Tide. <i>Examines various states of the tide in the area.</i></p> <p>Section 11: Survey Analysis and Section 13: Validation Survey 2014: <i>Assesses current maritime traffic flows and operations in the general area. Surveys accounted for a range of tidal conditions.</i></p> <p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm. <i>Models take into account tides in the vicinity.</i></p>
ii. The set and rate of the tidal stream, at any state of the tide, has a significant effect on vessels in the area of the OREI site.	✓		<p>Section 8: Metocean Data – 8.4: Tide. <i>Examines various states of the tide in the area.</i></p> <p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm. <i>Models take into account tides in the vicinity.</i></p>
iii. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.	✓		<p>Section 8: Metocean Data – 8.4: Tide. <i>Assesses tidal streams in the area.</i></p>
iv. The set is across the major axis of the layout at any time, and, if so, at what rate.	✓		<p>Section 8: Metocean Data – 8.4: Tide. <i>Assesses tidal streams in the area.</i></p>
v. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream.	✓		<p>Section 8: Metocean Data – 8.4: Tide. <i>Assesses tidal streams in the area.</i></p> <p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and</p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p>Section 26: future Case with Windfarm. <i>Drifting vessel allision models take into account tides in the area.</i></p> <p>Section 15: Recreational Craft Activity – 15.6: Recreational Vessel Blade and Mast Allision. <i>Assesses whether machinery failure could cause recreational vessels to be set into danger.</i></p>
vi. The structures themselves could cause changes in the set and rate of the tidal stream.	✓		<p>Section 8: Metocean Data – 8.5: Potential Effects on Waves and Tidal Streams. <i>Summarises study to assess changes in the set and rate of the tidal stream.</i></p>
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 wind farm area or adjacent to the area	✓		<p>Section 8: Metocean Data – 8.6: Sedimentation/Scouring Impacting Navigable Water Depths in the Area. <i>Summarises study to assess potential for siltation, deposition of sediment or scouring, affecting navigable water depths in the wind farm area or adjacent to the area.</i></p>
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.	✓		<p>Section 8: Metocean Data <i>Presents Metocean statistics in the area.</i></p> <p>Section 11: Survey Analysis and Section 13: Validation Survey 2014: <i>Assesses routeing of vessels which might pass in close proximity to the site.</i></p> <p>Section 18: Future Case Commercial Vessel Routeing. <i>Assesses whether the site in normal, bad weather or restricted visibility conditions could present difficulties or</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<p><i>dangers to commercial vessels which might pass in close proximity to it.</i></p> <p>Section 15: Recreational Craft Activity <i>Assesses whether the site in normal, bad weather or restricted visibility conditions could present difficulties or dangers to sailing vessels which might pass in close proximity to it.</i></p> <p>Section 16: Commercial Fishing Vessel Activity. <i>Assesses whether the site in normal, bad weather or restricted visibility conditions could present difficulties or dangers to fishing vessels which might pass in close proximity to it.</i></p> <p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm. <i>Models take into account weather in the vicinity.</i></p>
<p>ii. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.</p>	✓		<p>Section 15: Recreational Vessel Activity– 15.5: Impacts of Structures on Wind Masking/Turbulence or Sheer. <i>Assesses whether wind masking, turbulence or sheer could create problems in the area for vessels under sail.</i></p>
<p>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</p>	✓		<p>Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm. <i>Drifting Vessel Allision. Model assesses whether vessels could drift into danger.</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
3. Visual Navigation and Collision Avoidance: <i>It should be determined whether:</i>			
i. The structures could block or hinder the view of other vessels under way on any route.	✓		Section 27: Communication and Position Fixing – 27.11: Effects on Visual Collision/Allision Avoidance. Assesses whether the structures could block or hinder other vessels' view.
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	✓		Section 27: Communication and Position Fixing – 27.11: Effects on Visual Collision/Allision Avoidance. Assesses whether the structures could block or hinder the view of navigational aids or landmarks.
4. Communications, Radar and Positioning Systems : <i>To provide researched opinion of a generic and, where appropriate, site specific nature concerning whether:</i>			
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.	✓		Section27: Communication and Position Fixing – 27.1 Impact of Marine Radar, 27.2: VHF Communications (including DSC), 27.3: VHF Direction Finding, 27.4: Navtex Systems, 27.4: AIS, 27.6: GPS, 27.7: Structures and Generators affecting Sonar Systems in Area and 27.8: Electromagnetic interference on Navigation Equipment: Assesses impact of structures upon VHF communications, Navtex, VHF direction finding, AIS, GPS, Sonar Systems and electromagnetic interference on Navigation Equipment.
ii. The structures could produce radar reflections, blind spots, shadow areas or other adverse effects: a. Vessel to vessel; b. Vessel to shore; c. VTS radar to vessel; d. Racon to/from vessel.	✓ ✓ ✓ ✓		Section27: Communication and Position Fixing – 27.1 Impact of Marine Radar Determines whether the structures could produce Radar reflections, blind spots, shadow areas or other adverse effects,

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>including an assessment of the impacts on vessels using the DWRs.</i>
iii. The OREI, in general, would comply with current recommendations concerning electromagnetic interference.	✓		Section27: Communication and Position Fixing – 27.8: Electromagnetic interference on Navigation Equipment: <i>Noted that the OREI would comply with current recommendations concerning electromagnetic interference.</i>
iv. The structures and generators might produce sonar interference affecting fishing, industrial or military systems used in the area.	✓		Section27: Communication and Position Fixing - 27.7:Structures and Generators affecting Sonar Systems in Area <i>Indicates no evidence has been found regarding sonar interference.</i>
v. The site might produce acoustic noise which could mask prescribed sound signals.	✓		Section27: Communication and Position Fixing – 27.9: Noise Impact. <i>Determines acoustic noise masking sound signals from the site.</i>
vi. Generators and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.	✓		Section27: Communication and Position Fixing – 27.8: Electromagnetic Interference on Navigation Equipment. <i>States no impact is anticipated.</i>
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.	✓		Section 5: Marine Navigational Markings. <i>Outlines how the overall site will be marked.</i>
ii. How individual structures on the perimeter of and within the site, both above and below the sea surface, would be marked by day and by night.	✓		Section 5: Marine Navigational Markings – 5.3: Marking of Individual Structures and 5.4: Proposed Markings. <i>Describes how individual</i>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>structures will be marked.</i>
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	✓		<i>Large surface structures, therefore not applicable.</i>
iv. If the site would be marked by one or more radar beacons (Racons)	✓		Section 5: Marine Navigational Markings. <i>Describes marking of site. Any additional Aids to Navigation, such as Racons, will be agreed in consultation with Trinity House once the final wind turbine layout has been selected.</i>
v. If the site would be marked by an Automatic Identification System (AIS) transceiver, and if so, the data it would transmit.	✓		Section 5: Marine Navigational Markings. <i>Describes marking of site. Any additional Aids to Navigation will be agreed in consultation with Trinity House once the final wind turbine layout has been selected.</i>
vi. If the site would be fitted with a sound signal, and where the signal or signals would be sited	✓		Section 5: Marine Navigational Markings. <i>Describes marking of site. Any additional Aids to Navigation will be agreed in consultation with Trinity House once the final wind turbine layout has been selected.</i>
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	✓		Section 5: Marine Navigational Markings – 5.4: Proposed Markings. <i>Considers aviation marks.</i>
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	✓		Section 5: Marine Navigational Markings. <i>Considers compliance with markings as required by GLA / MCA.</i>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
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.	✓		Section 5: Marine Navigational Markings – 5.5: Superintendence and Management. <i>Considers markings as required by GLA.</i>
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.	✓		Section 5: Marine Navigational Markings – 5.5: Superintendence and Management. <i>Considers markings as required by GLA.</i>
6. Hydrography: In order to establish a baseline, detailed and accurate hydrographic surveys are required to IHO Order 1a standard multibeam bathymetry with final data being supplied as a digital full density data set, and erroneous soundings flagged as deleted but include in the data set. A full report detailing survey methodology and equipment should accompany the surveys.			
Annex 3: MCA template for assessing distances between wind farm boundaries and shipping routes			
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 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)3 and Resolution A.671(16)4 and could include any or all of the following:	✓		Section 4: Embedded Mitigations. <i>Discusses promulgation of safety zone information, safety zones for the Project, and infringement of safety zones and presents a list of mitigation measures and monitoring.</i> Section 21: Emergency Response. <i>Discuss emergency response related safety and mitigation measures, and ERCoP (21.3: Emergency Response Co-operation Plan (ERCoP))</i> <i>Discusses EAOW's proposals for its own resources to aid in SAR.</i> Section 20: Risk Mitigation Measures and Monitoring.

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
i. Promulgation of information and warnings through notices to mariners and other appropriate media.	✓		Section 4: Embedded Mitigations. <i>Mitigation measure adopted by Project.</i>
ii. Continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).	✓		Section 30: Future Monitoring <i>Discusses future monitoring under consideration.</i>
iii. Safety zones of appropriate configuration, extent and application to specified vessels	✓		Section 4: Embedded Mitigations. <i>Discusses safety zones for the Project.</i>
iv. Designation of the site as an area to be avoided (ATBA).	✓		<i>Not applicable.</i>
v. Implementation of routeing measures within or near to the development.	✓		<i>Not applicable.</i>
vi. Monitoring by radar, AIS and/or closed circuit television (CCTV).	✓		Section 30: Future Monitoring <i>Discusses future monitoring under consideration.</i>
vii. Appropriate means to notify and provide evidence of the infringement of safety zones or ATBA's.	✓		Section 4: Embedded Mitigations. <i>Discusses infringement of safety zones.</i>
viii. Any other measures and procedures considered appropriate in consultation with other stakeholders.	✓		Section 21: Emergency Response – 21.1: Search and Rescue <i>Discusses SAR related safety and mitigation measures.</i> Section 4: Embedded Mitigation and Section 30: Future Monitoring. <i>Details mitigation measures adopted and under consideration.</i>
ix. Creation of an Emergency Response Cooperation Plan with the relevant Maritime Rescue Coordination Centre (from construction phase onwards)	✓		Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP). <i>ERCoP will be in place pre-construction.</i>

Annex 5: Standards and procedures for wind turbine generator shutdown in

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
the event of a search and rescue, counter pollution or salvage incident in or around a wind farm.			
1. Design Requirements: The OREI should be designed and constructed to satisfy the following design requirements for emergency rotor 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.	✓		<p>Section 5: Marine Navigational Markings. <i>Describes marking of WTGs and other OREI individual structures.</i></p> <p>Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP). <i>List of design features to be incorporated.</i></p>
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. 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. 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)	✓		<p>Section 5: Marine Navigational Markings. <i>Describes identification characters and lighting.</i></p> <p>Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP). <i>List of design features to be incorporated.</i></p>
iii. For aviation purposes, OREI structures should be marked with hazard warning lighting in accordance with CAA guidance and also with unique identification	✓		<p>Section 5: Marine Navigational Markings. <i>Considers aviation marks. CAA guidance will be followed.</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
<p>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 500ft (150 metres) above the highest part of the OREI structure.</p>			
<p>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.</p>	✓		<p>Section 21: Emergency Response. <i>Design will meet MCA requirements.</i></p>
<p>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.</p>	✓		<p>Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP). <i>Discusses OREI Central Control Room.</i></p>
<p>vi. Throughout the design process for an OREI, appropriate assessments and methods for safe shutdown should be established and agreed, through consultation with MCA Navigation safety Branch, Search and rescue Branch and other emergency support services.</p>	✓		<p>Section 21: Emergency Response. <i>Discusses shutdown methods.</i> Section 4: Embedded Mitigation and Section 30: Future Monitoring <i>Details mitigation measures adopted and under consideration.</i></p>
<p>vii. The OREI control mechanisms should allow the Control Room Operator to fix and maintain the position of the 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.</p>	✓		<p>Section 21: Emergency Response. <i>Discusses shutdown methods.</i></p>
<p>viii. Nacelle hatches and other OREI enclosed spaces in which personnel are working should be capable of being opened from the outside. This</p>	✓		<p>Section 21: Emergency Response. <i>Design will meet MCA</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
will allow rescuers (e.g. helicopter winch-man) to gain access to the tower if tower occupants are unable to assist and when sea-borne approach is not possible.			<p>requirements.</p> <p>Section 4: Embedded Mitigation and Section 30: Future Monitoring</p> <p>Details mitigation measures adopted and under consideration.</p>
ix. 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.	✓		<p>Section 21: Emergency Response.</p> <p>Design will meet MCA requirements.</p> <p>Section 4: Embedded Mitigation and Section 30: Future Monitoring.</p> <p>Details mitigation measures adopted and under consideration.</p>
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	✓		No applicable.
2. Operational Requirements			
i. The Central Control Room, or mutually agreed single point of contact, should be manned 24 hours a day.	✓		<p>Section 21: Emergency Response – 21.3: Emergency Response Co-operation Plan (ERCoP).</p> <p>Operational feature of the project.</p>
ii. The Central Control Room, or mutually agreed single point of contact, should have a chart indicating the Global Positioning System (GPS) position and unique identification numbers of each of the WTGs in the wind farm, or individual devices in other types of OREI.	✓		<p>Section 21: Emergency Response.</p> <p>States that the Project will meet the MCA's requirements in terms of standards and procedures for generator shutdown and other operational requirements in the event of a</p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>search and rescue, counter pollution or salvage incident in or around the site.</i>
iii. All MRCCs will be advised of the contact telephone number of the Central Control Room, or mutually agreed single point of contact.	✓		Section 21: Emergency Response <i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i>
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.	✓		Section 21: Emergency Response <i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i>
v. All search and rescue helicopter bases will be supplied with an accurate chart of all the OREI and their GPS positions.	✓		Section 21: Emergency Response <i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i>
vi. The Civil Aviation Authority shall be supplied with accurate GPS positions of all OREI structures for civil aviation navigation charting purposes	✓		Section 21: Emergency Response. <i>States that the Project will meet the MCA's requirements in terms of standards and procedures for generator shutdown and other operational</i>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
			<i>requirements in the event of a search and rescue, counter pollution or salvage incident in or around the site.</i>
3. Operational Procedures			
<p>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 the wind farm, or when the MRCC receives a report that persons are in actual or possible danger in or near 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/SC 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.</p>	✓		<p>Section 21: Emergency Response <i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i></p>
<p>ii. The control room operator, or single point of contact, should immediately initiate the shut-down procedure for those WTGs as requested by the MRCC and maintain the WTG in the appropriate shut-down position, again 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.</p>	✓		<p>Section 21: Emergency Response <i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i></p>
<p>iii. The appropriate procedure to be followed in respect of other OREI types, designs and configurations will be determined by these MCA branches on a case by case basis, in</p>	✓		<p>Section 21: Emergency Response. <i>States that the Project will meet the MCA's requirements in terms of standards and</i></p>

Issue: OREI RESPONSE	Yes	No	Reference notes/Remarks
consultation with appropriate stakeholders, during the Scoping and Environmental Impact Assessment processes			<i>procedures for generator shutdown and other operational requirements in the event of a search and rescue, counter pollution or salvage incident in or around the site.</i>
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 the MCA	✓		<p>Section 21: Emergency Response.</p> <p><i>States that the Project will meet the MCA's requirements in terms of 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 the site.</i></p>

Offshore Renewable Energy Installations

Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms (Compliance with recommended DTI Methodology)

General Comments:

Section	Yes	No	Reference notes/Remarks
A1: Overview and guidance on navigation safety issues.	✓		Section 2: Regulations and Guidance.
A2: Overview of FSA.	✓		Section 2: Regulations and Guidance.
A3: Lessons learned.	✓		Entire NRA takes into account Lessons Learned within the offshore industry.
B1: Base case traffic densities and types.	✓		Sections 11-16: Survey Analysis, Changes to Routeing Measures within Dutch Waters, Validation Survey 2014, Commercial Ferry Operators and Activity, Recreational Craft Activity, Commercial Fishing Vessel Activity.
B2: Future traffic densities and types.	✓		Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm.
B3: The marine environment :			
B3.1 Technical & operational analysis	✓		Section 3: Project Description.
B3.2 Generic TOA	✓		Sections 11-16: Survey Analysis, Changes to Routeing Measures within Dutch Waters, Validation Survey 2014, Commercial Ferry Operators and Activity, Recreational Craft Activity, Commercial Fishing Vessel Activity.
B3.3 Potential accidents	✓		Sections 18 & 19: Future Case Commercial Vessels Routeing and Future Case 90 th Percentile Route Analysis. Sections 25 & 26: Future Case No Windfarm and Future Case with Windfarm.

Section	Yes	No	Reference notes/Remarks
B3.4 Affected navigational activities	✓		Section 18 and Section 19: Future Case Commercial Vessel Routeing and Future Case 90 th Percentiles.
B3.5 Effects of wind farm structures	✓		Section 24: Base Case No Windfarm, Section 25: Future Case No Windfarm and Section 26: future Case with Windfarm.
B3.6 Development phases	✓		Section 15: Recreational Craft Activity – 15.7: Effects on Recreational Craft, Section 16: Commercial Fishing Vessel Activity – 16.4: Effects on Fishing Vessels (Safe Navigation) and Section 30: Future Monitoring – 30.4: Decommissioning Plan.
B3.7 Other structures & features	✓		Sections 7 and 28: Existing Environment, and Cumulative and In-Combination Effects.
B3.8 Vessel types involved	✓		Sections 11 - 16: Survey Analysis, Changes to Routeing Measures within Dutch Waters, Validation Survey 2014, Commercial Ferry Operators and Activity, Recreational Craft Activity, Commercial Fishing Vessel Activity.
B3.9 Conditions affecting navigation	✓		Sections 8 and 27: Metocean Data and Communication and Position Fixing.
B3.10 Human actions	✓		Section 18: Future Case Commercial Vessel Routeing
C1: Hazard Identification	✓		Section 18: Future Case Commercial Vessel Routeing Annex 15.1.1: Hazard Log Report.
C2: Risk Assessment	✓		Section 18: Future Case Commercial Vessel Routeing Annex 15.1.1: Hazard Log Report.
C3: Hazard log	✓		Annex 15.1.1: Hazard Log Report.
C4: Level of risk	✓		Section 18: Future Case Commercial Vessel Routeing Annex 15.1.1: Hazard Log Report.
C5: Influences on level of risk	✓		Sections 3, 7.5, 11-16, 18, and 21.

Section	Yes	No	Reference notes/Remarks
			<i>Project Description, Ports, Survey Analysis, Changes to Routeing Measures in Dutch Waters, Validation Survey 2014, Commercial Ferry Operators and Activity, Recreational Craft Activity, Commercial Fishing Vessel Activity. Emergency Response.</i>
C6: Tolerability of residual risk	✓		Section 18: <i>Future Case Commercial Vessel Routeing</i> Annex 15.1.1: Hazard Log Report.
D1 : Appropriate risk assessment	✓		Sections 8, 9, 11-16, 2, 27.1 and 28: <i>Metoccean Data, Maritime Incidents, Survey Analysis, Changes to Routeing Measures within Dutch Waters, Validation Survey 2014, Commercial Ferry Operators and Activity, Recreational Craft Activity, Commercial Fishing Vessel Activity, Search and Rescue, Impact on Marine Radar Systems, Cumulative and In-Combination Effects.</i>
D2 : MCA approval for assessment tools and techniques	✓		Section 18: <i>Future Case Commercial Vessel Routeing</i>
D3: Demonstration of results	✓		Annex 15.1.1: Hazard Log Report.
D4: Area traffic assessment	✓		Sections 3, 11, 13, 18, 23, 27.1 and 28: <i>Project Description, Survey Analysis, Validation Survey 2014, Future Case Commercial Vessel Routeing, Allision and Collision Risk Modelling, Impact on Marine Radar Systems, Cumulative and In-Combination Effects, and Additional Navigational Issues.</i> Annex 15.1.1: Hazard Log.
D5: Specific traffic assessment	✓		Sections 3-6, 18 and 21: <i>Project Description, Embedded Mitigations Marine Navigational Markings, Consultation, Future Case Commercial Vessel Routeing,</i>

Section	Yes	No	Reference notes/Remarks
			<i>Emergency Response.</i> Annex 15.1.1: Hazard Log Report.
E1: Risk control log	✓		Annex 15.1.1: Hazard Log Report.
E2: Cost benefit assessment	✓		<i>Cost benefit assessment will be carried out if required.</i>
E3: Assessment of equity to stakeholders	✓		<i>Assessment of equity to stakeholders will be carried out if required.</i>
F1: Tolerability of risk claim	✓		Annex 15.1.1: Hazard Log Report.
G1: Hazard identification checklist	✓		Annex 15.1.1: Hazard Log Report.
G2: Risk control checklist	✓		Annex 15.1.1: Hazard Log Report.
G3: MCA MGN 371 compliance checklist	✓		Annex 15.1.3