East Anglia TWO Offshore Windfarm

Appendix 14.6

East Anglia TWO MGN 543 Checklist

Environmental Statement
Volume 3

Applicant: East Anglia TWO Limited
Document Reference: 6.3.14.6
SPR Reference: EA2-DWF-ENV-REP-IBR-000906_006 Rev 01
Pursuant to APFP Regulation: 5(2)(a)

Author: Royal HaskoningDHV
Date: October 2019
Revision: Version 1

East Anglia TWO Offshore Windfarm

MGN 543 Checklist

(Appendix 14.6)

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Presented to	ScottishPower Renewables
Date	4th June 2019
Revision Number	01
Document Reference	A4393-SPR-NRA-1 App 14.6

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Revision Number	Date	Summary of Change
00	10th August 2018	Initial Draft
01	4th June 2019	Update following summer 2018 survey

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Abbreviations Table

Abbreviation	Definition
AIS	Automatic Identification System
ALARP	As Low as Reasonably Practicable
ATBA	Area to be Avoided
AtoN	Aid to Navigation
CAA	Civil Aviation Authority
CCTV	Closed Circuit Television
CoS	Chamber of Shipping
DSC	Digital Selective Calling
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
ESRI	Environmental Systems Research Institute
ETRS	European Terrestrial Reference System
FSA	Formal Safety Assessment
GIS	Geographical Information System
GLA	General Lighthouse Authority
GMDSS	Global Maritime Distress and Safety System
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO	International Maritime Organization
m	Metre
MCA	Maritime and Coastguard Agency
MEHRA	Marine Environmental High Risk Area
Met Mast	Meteorological Mast
MGN	Marine Guidance Note
MHWS	Mean High Water Springs
NRA	Navigation Risk Assessment
OREI	Offshore Renewable Energy Installation
SAR	Search and Rescue

Abbreviation	Definition
SOLAS	International Convention for the Safety of Life at Sea
SPR	ScottishPower Renewables
TH	Trinity House
TOA	Technical and Operational Analysis
UK	United Kingdom
VHF	Very High Frequency
VTS	Vessel Traffic Service
WGS	World Geodetic System

1 Introduction

The Maritime and Coastguard Agency's (MCA) Marine Guidance Note (MGN) 543 includes a checklist of issues which should be considered within the Navigational Risk Assessment (NRA) for an offshore windfarm. Additionally, the MCA has developed a separate methodology checklist based upon the Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms (MCA, 2015).

This appendix provides a completed MGN 543 checklist and methodology checklist to demonstrate that the NRA and subsequent impact assessment undertaken in *Chapter 14 Shipping and Navigation* of the Environmental Impact Assessment (EIA) report is compliant with the MCA requirements for Offshore Renewable Energy Installations (OREI).

Each point raised within the checklists has been referenced to where it has been addressed within *Chapter 14 Shipping and Navigation* or the supporting appendices including the NRA (*Appendix 14.2*).

2 MGN 543 Checklist

Table 2.1 presents the MGN 543 Checklist with comments including details of where in the NRA each issue has been addressed.

Table 2.1 MGN 543 Checklist

Issue: OREI Response	Yes/No	Comments
Annex 1: Consideration on Site Position, Structures, and Safety Zones		
1. Site Installation and Coordinates		
Developers are responsible for ensuring that formally agreed co-ordinates and subsequent variations of site perimeters and individual OREI structures are made available, on request, to interested parties at relevant 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 with latitude and longitude coordinates in World Geodetic System (WGS) 84 (European Terrestrial Reference System (ETRS) 89) datum.	✓	ScottishPower Renewables (SPR) will make the formally agreed coordinates, and any subsequent variations, available to interested parties at the relevant project stages.
2. Traffic Survey		
All vessel types	✓	All vessel types have been recorded and analysed in *section 12* of the NRA.
At least 28 days duration, within either 12 or 24 months prior to submission of the Environmental Statement (ES)	✓	The survey periods cover 28 days during 2017, with the summer data updated with a 2018 survey as detailed in *section 12* of the NRA.

Issue: OREI Response	Yes/No	Comments
Multiple data sources	✓	Both Automatic Identification System (AIS) and Radar data was collected, as detailed in *section 12* of the NRA.
Seasonal variations	✓	The survey periods consist of 14 days of during summer 2017 and 14 days during winter 2017, with the summer data updated by a 2018 survey as detailed in *section 12* of the NRA.
MCA Consultation	✓	The approach undertaken with regards to marine traffic data was agreed with the MCA. Details of consultation undertaken with the MCA are provided in *section 5* of the NRA.
General Lighthouse Authority (GLA) Consultation	✓	The approach undertaken with regards to marine traffic data was agreed with Trinity House (TH). Details of consultation undertaken with TH are provided in *section 5* of the NRA.
Chamber of Shipping (CoS) Consultation	✓	Details of consultation undertaken with the CoS are provided in *section 5* of the NRA.
Recreational and fishing vessel organisations consultation	✓	Details of consultation undertaken with recreational and fishing vessel organisations are provided in *section 5* of the NRA.
Port and navigation authorities consultation, as appropriate	✓	Details of consultation undertaken with port and navigation authorities are provided in *section 5* of the NRA.
Assessment of Cumulative and Individual Effects of (as appropriate):		
i. Proposed OREI site relative to areas used by any type of marine craft	✓	The marine traffic survey analysis in *section 12* of the NRA accounts for all vessel types.
ii. Numbers, types and sizes of vessels presently using such areas	✓	The marine traffic survey analysis in *section 12* of the NRA includes assessment of vessel numbers, types and sizes.

Issue: OREI Response	Yes/No	Comments
iii. Non-transit uses of the areas, e.g., fishing, day cruising of leisure craft, racing, aggregate dredging, etc.	✓	The marine traffic survey analysis in *section 12* of the NRA includes non-transit uses such as fishing vessels and recreational craft.
iv. Whether these areas contain transit routes used by coastal or deep-draught vessels on passage.	✓	Main commercial routes are outlined in *section 14* of the NRA.
v. Alignment and proximity of the site relative to adjacent shipping lanes	✓	Main commercial routes are outlined in *section 14* of the NRA with post windfarm deviations discussed in *section 15* of the NRA.
vi. Whether the nearby area contains prescribed routeing schemes or precautionary areas	✓	International Maritime Organization (IMO) routeing measures in proximity to the East Anglia TWO windfarm site are discussed in section 8 of the NRA.
vii. Whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes	✓	IMO routeing measures in proximity to the East Anglia TWO windfarm site are discussed in section 8 of the NRA.
viii. Proximity of the site to areas used for anchorage, safe haven, port approaches and pilot boarding or landing areas.	✓	Anchorage areas and ports in relation to East Anglia TWO are outlined in section 8 of the NRA.
ix. Whether the site lies within the jurisdiction of a port and/or navigation authority.	✓	Ports are outlined in section 8 of the NRA.
x. Proximity of the site to existing fishing grounds, or to routes used by fishing vessels to such grounds.	✓	The marine traffic survey analysis in section 12 of the NRA includes analysis of fishing vessel activity.
xi. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.	✓	Military practice areas are outlined in section 8 of the NRA. No such areas were identified for the area.
xii. Proximity of the site to existing or proposed offshore oil / gas platform, marine aggregate dredging, marine archaeological sites or wrecks, Marine Protected Area or other exploration/exploitation sites	✓	Exploration/exploitation sites are outlined in section 8 of the NRA and include Oil and Gas infrastructure, marine aggregate dredging areas, Marine Environmental High Risk Areas (MEHRA) and wrecks.

Issue: OREI Response	Yes/No	Comments
xiii. Proximity of the site to existing or proposed OREI developments, in co-operation with other relevant developers, within each round of lease awards.	✓	Other nearby offshore windfarm projects are outlined in section 8 of the NRA. The cumulative screening of projects is provided in section 19.
xiv. Proximity of the site relative to any designated areas for the disposal of dredging spoil or other dumping ground.	✓	No designated spoil areas or grounds were identified in the baseline assessment undertaken in section 8 of the NRA.
xv. Proximity of the site to aids to navigation (AtoN) and/or Vessel Traffic Services (VTS) in or adjacent to the area and any impact thereon.	✓	AtoN are outlined in section 8 of the NRA, with no relevant VTS for the development identified.
xvi. 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 and nearby or consented OREI sites not yet constructed.	✓	Vessel to vessel collision modelling has been undertaken in section 18 of the NRA.
xvii. With reference to xvi. above, the number and type of incidents to vessels which have taken place in or near to the proposed site of the OREI to assess the likelihood of such events in the future and the potential impact of such a situation.	✓	Historical maritime incidents are outlined in section 11 of the NRA.
3. OREI Structures – the following should be determined:		
a. Whether any feature 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, anchoring and emergency response.	✓	Impacts associated with the wind turbines and auxiliary platforms are assessed in *Chapter 14 Shipping and Navigation*.

Issue: OREI Response	Yes/No	Comments
b. Clearances of wind turbine blades above the sea surface are not less than 22 metres (m) above Mean High Water Springs (MHWS).	✓	A minimum 22m clearance above MHWS is included as an embedded mitigation in section 21 of the NRA.
c. Underwater devices i. changes to charted depth; ii. maximum height above seabed; and iii. under keel clearance.	✓	A Cable Burial Risk Assessment is included as an embedded mitigation in section 21 of the NRA and will consider under keel clearance.
d. The burial depth of cabling and changes to charted depths associated with any protection measures.	✓	A Cable Burial Risk Assessment is included as an embedded mitigation in section 21 of the NRA and will consider burial depths.
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:		
a. Navigation within or close to the site would be safe: i. by all vessels; ii. by specified vessel types, operations, and/or sizes; iii. in all directions or areas; iv. in specified directions or areas; and v. in specified tidal, weather or other conditions.	✓	Navigational safety impacts are assessed in *Chapter 14 Shipping and Navigation*. Tidal and weather conditions are considered as part of the collision and allision modelling in section 18 of the NRA.
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; iv. prohibited in specified areas or directions; v. prohibited in specified tidal or weather conditions; or simply vi. recommended to be avoided.	✓	An application for safety zones during construction major maintenance and decommissioning is included as an embedded mitigation in section 21 of the NRA.

Issue: OREI Response	Yes/No	Comments
c. Exclusion from the site could cause navigational, safety or routeing problems for vessels operating in the area e.g. by preventing vessels from responding to calls for assistance from persons in distress	✓	Vessel displacement and emergency response impacts are assessed in *Chapter 14 Shipping and Navigation*.
Relevant information concerning a decision to seek a safety zone for a particular site during any point in its construction, extension, operation or decommissioning should be specified in the ES accompanying the development application	✓	An application for safety zones during construction major maintenance and decommissioning is included as an embedded mitigation in section 21 of the NRA.
Annex 2: Navigation, collision avoidance and communications **1. The Effect of Tides and Tidal Streams : It should be determined whether:**		
a. 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.	✓	Tidal conditions are considered as part of the collision and allision modelling in section 18 of the NRA.
b. 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.	✓	Tidal conditions are considered as part of the collision and allision modelling in section 18 of the NRA.
c. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.	✓	Tidal streams are considered in section 9 of the NRA.
d. The set is across the major axis of the layout at any time, and, if so, at what rate.	✓	Tidal streams are considered in section 9 of the NRA.
e. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream.	✓	Allision impacts are assessed as part of the collision and allision modelling in section 18 of the NRA and includes tidal dominant scenarios.

Issue: OREI Response	Yes/No	Comments
f. The structures themselves could cause changes in the set and rate of the tidal stream.	✓	Tidal streams are considered in section 9 of the NRA.
g. 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	✓	Given the water depths in the region containing the East Anglia TWO windfarm site, no impacts relating to siltation, sediment or scouring are anticipated.
2. Weather It should be determined whether:		
a. 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.	✓	Weather conditions and visibility are considered as part of the collision and allision modelling in section 18 of the NRA.
b. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence or sheer.	✓	Impacts on vessels under sail have been addressed in section 18 of the NRA.
c. 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 above.	✓	Wind and tidal conditions and engine failure scenarios are considered as part of the collision and allision modelling in section 18 of the NRA.
3. Collision Avoidance and Visual Navigation It should be determined whether:		
a. The layout design will allow safe transit through the OREI by Search and Rescue (SAR) helicopters and vessels.	✓	The worst case layout is presented in section 4.3 and includes at least one line of orientation designed for the safe transit of SAR assets.
b. The MCA's Navigation Safety Branch and Maritime Operations branch will be consulted on the layout design and agreement will be sought.	✓	The final layout design will be agreed with the MCA. Details of consultation undertaken to date with the MCA are provided in section 5 of the NRA.

Issue: OREI Response	Yes/No	Comments
c. The layout design has been or will be determined with due regard to safety of navigation and SAR.	✓	The final layout design will be agreed with the MCA and will consider safety of navigation and SAR.
d) i. The structures could block or hinder the view of other vessels under way on any route; and 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.	✓	As presented in *Table 5.1* of the NRA, a request to scope out the consideration of impacts of turbines on communications, navigations and radar was submitted at a meeting with MCA in April 2017. A subsequent letter was submitted to MCA on the 25th April, 2017. A formal agreement to this request was received on the 11th May, 2017.
4. Communications, Radar and Positioning Systems - To provide researched opinion of a generic and, where appropriate, site specific nature concerning whether:		
a. The structures could produce radio interference such as shadowing, reflections or phase changes, and emissions with respect to any frequencies used for marine positioning, navigation and timing or communications, including the Global Maritime Distress and Safety System (GMDSS) and AIS, whether ship borne, ashore or fitted to any of the proposed structures, to: i. Vessels operating at a safe navigational distance; ii. Vessels by the nature of their work necessarily operating at less than the safe navigational distance to the OREI, e.g. support vessels, survey vessels, SAR assets; and iii. Vessels by the nature of their work necessarily operating within the OREI.	✓	Following discussions with the MCA, impacts relating to communications, Radar and positioning systems have been scoped out of the assessment. Consultation regarding this is outlined in section 5.

Issue: OREI Response	Yes/No	Comments
b. The structures could produce Radar reflections, blind spots, shadow areas or other adverse effects: i. Vessel to vessel; ii. Vessel to shore; iii. VTS Radar to vessel; and iv. Racon to/from vessel	✓	
c. The structures and generators might produce sonar interference affecting fishing, industrial or military systems used in the area.	✓	
d. The site might produce acoustic noise which could mask prescribed sound signals.	✓	
e. Generators and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.	✓	
5. Marine Navigational Marking It should be determined:		
a. How the overall site would be marked by day and by night throughout construction, operation and decommissioning phases, taking into account that there may be an ongoing requirement for marking on completion of decommissioning, depending on individual circumstances.	✓	Suitable lighting and marking of the East Anglia TWO windfarm site is included as an embedded mitigation in section 21 of the NRA. Lighting and marking will comply with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) guidance and be finalised in consultation with TH and the MCA.
b. 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.	✓	Suitable lighting and marking of the East Anglia TWO windfarm site is included as an embedded mitigation in section 21 of the NRA. Lighting and marking will comply with IALA guidance and be finalised in consultation with TH and the MCA.

Issue: OREI Response	Yes/No	Comments
c. 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.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA and will be finalised in consultation with TH and the MCA.
d. If the site would be marked by additional electronic means, e.g. Racons.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA and will be finalised in consultation with TH and the MCA.
e. If the site would be marked by an AIS transceiver, and if so, the data it would transmit.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA and will be finalised in consultation with TH and the MCA.
f. If the site would be fitted with audible hazard warning in accordance with IALA recommendations.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA and will be finalised in consultation with TH and the MCA.
g. If the structure(s) would be fitted with aviation lighting, and if so, how these would be screened from mariners or guarded against potential confusion with other navigational marks and lights.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA and will be finalised in consultation with TH, the MCA and the Civil Aviation Authority (CAA).
h. Whether the proposed site and/or its individual generators complies in general with markings for such structures, as required by the relevant GLA in consideration of IALA guidelines and recommendations.	✓	Suitable lighting and marking of the East Anglia TWO windfarm site is included as an embedded mitigation in section 21 of the NRA. Lighting and marking will comply with IALA guidance and be finalised in consultation with TH and the MCA.
i. 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.	✓	The availability criteria for AtoN will be finalised in consultation with TH. AtoN will be monitored and maintained to ensure the availability criteria is met.

Issue: OREI Response	Yes/No	Comments
j. The procedures that need to be put in place to respond to casualties to the aids to navigation specified by the GLA, within the timescales laid down and specified by the GLA.	✓	Monitoring and response protocol will be agreed post consent with TH.
k. The ID marking will conform to a spreadsheet layout, sequential, aligned with SAR lanes and avoid the letters O and I.	✓	The ID marking system will be agreed post consent with the MCA, TH and the CAA.
l. Working lights will not interfere with AtoN or create confusion for the Mariner navigating in or near the OREI.	✓	The potential for interference with AtoN and Mariner confusion will be considered in the Lighting and Marking Plan (LMP) which will be agreed with the MCA, TH and the CAA post consent.
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 included or acknowledged for the following stages and to MCA specifications:		
i. Pre-consent: The site and its immediate environs extending to 500m outside of the development area shall be undertaken as part of the licence and/or consent application. The survey shall include all proposed cable route(s).	✓	To be provided by the Applicant.
ii. Post-construction: Cable route(s)	✓	To be provided by the Applicant.
iii. Post-decommissioning of all or part of the development: Cable route(s) and the area extending to 500m from the installed generating assets area.	✓	To be provided by the Applicant.
Annex 3: MCA template for assessing distances between windfarm boundaries and shipping routes "Shipping Route" template and Interactive Boundaries – where appropriate, the following should be determined:		
a. The safe distance between a shipping route and turbine boundaries.	✓	Post windfarm routeing is presented in section 15 of the NRA and follow the MGN 543 Shipping Route template.

Issue: OREI Response	Yes/No	Comments
b. The width of a corridor between sites or OREIs to allow safe passage of shipping.	✓	Cumulative post windfarm routeing and the creation of a corridor is discussed in section 19 of the NRA and follow the MGN 543 Shipping Route template.
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 EIA. The specific measures to be employed will be selected in consultation with the MCA and will be listed in the developer's ES. These will be consistent with international standards contained in, for example, the International Convention for 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:	✓	Embedded mitigation measures which have been assumed to be in place for the EIA are provided in section 21.
i. Promulgation of information and warnings through notices to mariners and other appropriate maritime safety information dissemination methods.	✓	Promulgation of information via Notice to Mariners and other appropriate media is included as embedded mitigation measures in section 21 of the NRA.
ii. Continuous watch by multi-channel Very High Frequency (VHF), including Digital Selective Calling (DSC).	✓	Marine traffic coordination is included as an embedded mitigation measure in section 21 of the NRA.
iii. Safety zones of appropriate configuration, extent and application to specified vessels.	✓	An application for safety zones during construction major maintenance and decommissioning is included as an embedded mitigation in section 21 of the NRA.

Issue: OREI Response	Yes/No	Comments
iv. Designation of the site as an area to be avoided (ATBA).	✓	The East Anglia TWO windfarm site will not be designated as an ATBA; however an application for safety zones during construction major maintenance and decommissioning is included as an embedded mitigation in section 21 of the NRA.
v. Provision of AtoN as determined by the GLA.	✓	Associated marking of the East Anglia TWO windfarm site is included as embedded mitigation in section 21 of the NRA.
vi. Implementation of routeing measures within or near to the development.	✓	IMO routeing measures in proximity to the East Anglia TWO windfarm site are discussed in section 8 of the NRA.
vii. Monitoring by Radar, AIS, Closed Circuit Television (CCTV) or other agreed means.	✓	Future monitoring is outlined in section 22 of the NRA.
viii. Appropriate means for OREI operators to notify, and provide evidence of, the infringement of safety zones.	✓	Information regarding the means of notifying and providing evidence of safety zone infringement will be included in the Safety Zone Application to be submitted post-consent.
ix. Creation of an Emergency Response Cooperation Plan (ERCoP) with the MCA's SAR Branch for the construction phase onwards.	✓	The development and implementation of an ERCoP for the construction, operation and maintenance and decommissioning phases is included as an embedded mitigation measure in section 21 of the NRA and will be finalised in consultation with the MCA.
x. Use of guard vessels, where appropriate.	✓	The use of guard vessels when deemed appropriate following risk assessment is included as an embedded mitigation measure in section 21 of the NRA.
xi. Any other measures and procedures considered appropriate in consultation with other stakeholders.	✓	All embedded mitigation measures are outlined in section 21 of the NRA. Where considered necessary to reduce risks to As Low as Reasonably Practicable (ALARP), additional mitigation is outlined in *Chapter 14 Shipping and Navigation*.

Issue: OREI Response	Yes/No	Comments
Annex 5: Standards, procedures and operational requirements in the event of SAR, maritime assistance service counter pollution or salvage incident in or around an OREI, including generator/installation control and shutdown.		
The MCA, through Her Majesty's Coastguard, is required to provide SAR and emergency response within the sea area occupied by all OREIs in United Kingdom (UK) waters. To ensure that such operations can be safely and effectively conducted, certain requirements must be met by developers and operators.		
a. An ERCoP will be developed for the construction, operation and decommissioning phases of the OREI.	✓	The development and implementation of an ERCoP for the construction, operation and maintenance and decommissioning phases is included as an embedded mitigation measure in section 21 of the NRA.
b. The MCA's guidance document Offshore Renewable Energy Installation: Requirements, Advice and Guidance for SAR and Emergency Response for the design, equipment and operation requirements will be followed.	✓	MCA guidance has been followed throughout the ES and will continue to be throughout post consent.

3 Methodology Checklist

Table 3.1 presents the checklist for the *Methodology for Assessing the Marine Navigational Safety & Emergency Response Risks of Offshore Renewable Energy Installations*. Again comments are included detailing where in the NRA each issue has been addressed.

Table 3.1 Methodology Checklist

Section	Yes/No	Comments
A1: Reference Sources - Lessons learned.	✓	Lessons learned from previous offshore windfarm projects and other sea users are detailed in section 7 of the NRA.
B1: Base case traffic densities and types.	✓	Marine traffic survey analysis including vessel densities and type breakdowns are provided in section 12 of the NRA.
B2: Future traffic densities and types.	✓	Post windfarm traffic details are provided in section 16 including potential traffic increases by vessel type.
B3: The marine environment :		
B3.1 Technical and operational analysis (TOA)	✓	Design parameters are provided in section 4 of the NRA and *Chapter 5 Project Description*.
B3.2 Generic TOA	✓	Design parameters are provided in section 4 of the NRA and *Chapter 5 Project Description*.
B3.3 Potential accidents	✓	Hazards identified were included in the Hazard Log which is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*.
B3.4 Affected navigational activities	✓	Affected receptors from a shipping and navigation perspective have been identified as part of the NRA process.
B3.5 Effects of OREI structures	✓	Impacts associated with the windfarm structures are assessed in *Chapter 14 Shipping and Navigation*.
B3.6 Development phases	✓	Impacts are assessed separately for each of the construction, operation and maintenance and decommissioning phases in *Chapter 14 Shipping and Navigation*.

Section	Yes/No	Comments
B3.7 Other structures and features	✓	Other structures which may be included in the final design such as Offshore Electrical Platforms. Accommodation Platforms and Operational Meteorological Masts (Met Mast) are outlined in section 4 of the NRA.
B3.8 Vessel types involved	✓	The marine traffic survey identifies the vessel traffic by type in section 12 of the NRA.
B3.9 Conditions affecting navigation	✓	The existing environment and Metocean data has been considered in section 8 and section 9 of the NRA, respectively.
B3.10 Human actions	✓	Vessel routeing has been assessed in section 14 and section 15 of the NRA and other third party vessel activity has been assessed in section 12 of the NRA.
C1: Hazard Identification	✓	Hazards identified were included in the Hazard Log which is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*.
C2: Risk Assessment	✓	Impacts have been risk assessed in *Chapter 14 Shipping and Navigation*.
C3: Influences on level of risk	✓	Factors influencing risk have been incorporated into the Hazard Log which is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*.
C4: Tolerability of risk	✓	The definitions used within the Formal Safety Assessment (FSA) to determine the tolerability of risk are provided in section 3 of the NRA and *Chapter 14 Shipping and Navigation*.
D1 : Appropriate risk assessment	✓	Risk assessment has been undertaken using the methodology outlined in section 3 of the NRA.
D2 : MCA acceptance for assessment techniques and tools	✓	Risk assessment has been undertaken using the methodology outlined in section 3 of the NRA and has been agreed with the MCA.

Section	Yes/No	Comments
D3: Demonstration of results	✓	Hazards identified were included in the Hazard Log which is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*. The results of the impact assessment are provided in *Chapter 14 Shipping and Navigation*.
D4 : Area traffic assessment	✓	Marine traffic survey analysis is provided in section 12 of the NRA.
D5 : Specific traffic assessment	✓	Marine traffic survey analysis specific to the East Anglia TWO windfarm site is provided in section 12 of the NRA.
E1 : Risk control log	✓	The Hazard Log is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*.
E2 : Marine stakeholders	✓	Details of consultation undertaken with marine stakeholders are provided in section 5 of the NRA.
F1 : Hazard identification checklist	✓	Hazards identified were included in the Hazard Log which is summarised in section 20 of the NRA and presented in full in *Appendix 14.3*.
F2 : Risk control checklist	✓	All embedded mitigation measures are outlined in section 21 of the NRA. Where considered necessary to reduce risks to ALARP, additional mitigation is outlined in *Chapter 14 Shipping and Navigation*.