

18 WIND FARM SHIPPING AND NAVIGATION

18.1 INTRODUCTION

1. This Section of the ES evaluates the likely significant effects of the Wind Farm on shipping and navigation. It covers the impacts on shipping and navigation in relation to commercial, recreation, and fishing vessels. The assessment has been undertaken by Anatec and includes an assessment of cumulative effects.
2. This Section of the ES is supported by the following document:
 - Annex 18A: Navigation Risk Assessment (NRA). Figures and data from the NRA are included in the chapter as required.
3. This Section includes the following elements:
 - Assessment Methodology and Significance Criteria;
 - Baseline Conditions;
 - Development Design Mitigation;
 - Assessment of Potential Impact;
 - Mitigation Measures and Residual Impacts;
 - Summary of Impacts;
 - Monitoring and Enhancements;
 - Assessment of Cumulative Impacts;
 - Statement of Significance; and
 - References.

18.1.1 GUIDANCE DOCUMENTS

18.1.1.1 Key Guidance

4. The primary guidance used during this assessment was the Maritime and Coastguard Agency (MCA) Marine Guidance Notice 371 (MGN 371 M+F) Offshore Renewable Energy Installations (OREIs) Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2008).
5. The MGN 371 guidance contains recommendations on site positions, structures and safety zones of Offshore Renewable Energy Installations in the following annexes of the MCA document (OREI) Considerations on Site Position, Structures and Safety Zones (Annex 1), Navigation, Collision Avoidance and Communications (Annex 2) and Safety and Mitigation Measures (Annex 4).

18.1.1.2 Other Guidance

6. Other forms of guidance used in this assessment are as follows:
 - Department for Energy and Climate Change (DECC) Methodology for Assessing the Marine Navigational Safety Risks of Offshore Windfarms (DECC, 2005);
 - MCA Marine Guidance Notice 372 (MGN 372 M+F) Offshore Renewable Energy Installations (OREIs) Guidance to Mariners Operating in the Vicinity of UK OREIs – Section 2.7 effects of wind farms and wind turbines on routing and Section 4 safety zone and exclusion zones (MCA, 2008);

- DECC Guidance Notes on Safety Zones (DECC, 2007);
- Search and Rescue (SAR) Framework Chapter 1 MCA and Chapter 4 Royal National Lifeboat Institution (RNLI) (MCA, 2002); and
- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) (IMO, 2002).

18.1.13 *Other Key Reference Materials and Data*

7. Other key reference materials and data used in this assessment are as follows:

- International Association of Marine Aids to Navigation and Lighthouses (IALA) Recommendations 0-139 (The Marking of Man-Made Offshore Structures, Edition 1) (IALA, 2008);
- North Hoyle Trials (MCA, 2005) and (QinetiQ, 2004);
- Kentish Flats Trials (BWEA, 2007);
- Beatrice Wind Turbine Impact on Radio Frequency Navigation and Safety Systems (QinetiQ, 2006);
- UK Coastal Atlas (RYA, 2010);
- UK Admiralty Charts issued by United Kingdom Hydrographic Office (UKHO).
- Maritime Incident Data - Marine Accident Investigation Branch (MAIB) (2001-2010) and Royal National Lifeboat Institute (RNLI) (2001-2010);
- Commercial Fisheries Assessment (2011) (Annex 16A);
- Overflight fishing sightings from Marine Management Organisation (2005-09);
- Satellite monitoring data (Marine Management Organisation, 2009); and
- Admiralty Sailing Directions, North Coast of Scotland Pilot (NP 52) (2009).

18.2 **ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA**

18.2.1 **CONSULTATION**

8. As part of the NRA, consultation was carried out with marine stakeholders to ensure the impact assessment gave full account to their views. A number of joint meetings were held with both BOWL and MORL, given the proximity of the Wind Farm and the Moray Round 3 Zone development within the Moray Firth.
9. The methodology used to gain feedback from marine stakeholders was primarily through consultation meetings with key stakeholders, and through two hazard workshops with oil and gas and commercial shipping stakeholders. A consultation letter was also issued to marine stakeholders to gather further input for the assessment.
10. A detailed summary of the consultation is provided in the NRA report Annex 18A. The main points raised from the stakeholder meetings are summarised in Table 18.1.

Table 18.1 Summary of Consultation Undertaken

Consultee	Summary of Consultation Response	Project Response
<p>Maritime and Coastguard Agency (MCA) and Department for Transport (DfT)</p>	<p>Address possible cumulative issues for the two projects (the Wind Farm and the Moray Round 3 Zone), combined with the oil and gas developments in the area.</p> <p>MCA/DfT also stated their preference for phased construction safety zones and that operational safety zones are based on experience gained during the construction phase. Justification would be required for operational safety zones.</p> <p>In addition, Marine Environmental High Risk Areas (MEHRAs) should be assessed and relative proximity to the Wind Farm Site.</p>	<p>The MFOWDG was formed by BOWL and MORL in partnership with The Crown Estate to work collaboratively on potential regional cumulative impacts arising from their proposed offshore wind development.</p> <p>Phased/rolling 500 m safety zones may be applied for around each turbine or foundations whilst work is being performed, as indicated by the presence of construction vessels. The area of the site considered to be a construction zone will vary throughout the project to reflect the likely phased construction across the wind farm site prior to the wind farm becoming operational.</p> <p>BOWL intends to apply for 50 m operational safety zones during the normal operational phase, unless experience during the construction phase presents evidence that such zones may not be required.</p> <p>MEHRAs in the vicinity of the Wind Farm are identified within the NRA (Annex 18A) and baseline assessment Section 18.3.2.</p>
<p>Chamber of Shipping (CoS)</p>	<p>In terms of the Wind Farm no issues were raised.</p> <p>It was stated that the given the distance between the Wind Farm, the Moray Round 3 Zone and the coastline, the CoS would not be concerned regarding the amount of sea room available, as there is likely to be sufficient space for a vessel to pass the developments at a safe distance.</p>	<p>The potential impact of the Wind Farm on commercial shipping and navigation are assessed within the NRA (Annex 18A) and Assessment of Potential Impacts (Section 18.5.3)</p>
<p>Northern Lighthouse Board (NLB)</p>	<p>Based on surveys carried out, a stand-alone statement from the NLB was that the Wind Farm was not considered to be in area of high shipping activity.</p>	<p>Baseline shipping survey data recorded at the Wind Farm is presented in Section 18.3.3 to Section 18.3.5.</p> <p>The potential impact of the Wind Farm on shipping and navigation is assessed within the NRA (Annex</p>

Consultee	Summary of Consultation Response	Project Response
		18A) and Assessment of Potential Impacts (Section 18.5)
Royal Yacht Association (RYA) and Cruising Association (CA)	<p>RYA/CA acknowledged that the area is not particularly busy from a recreational sailing perspective with medium cruising routes through the area.</p> <p>It was noted that activity is highly weather dependent and the busiest routes are coastal along the Moray and Caithness coastlines.</p> <p>RYA/CA were concerned that different types of turbines could be used in the Wind Farm and the Moray Round 3 Zone sites and that turbines may not be aligned and in regular grid patterns. However, the consultees understood the reasons why the developers could not guarantee that this would be the case.</p>	<p>Baseline recreational shipping data recorded at the Wind Farm is presented in Section 18.3.4.</p> <p>The potential impact of the Wind Farm on recreational vessels is assessed within the NRA (Annex 18A) and Assessment of Potential Impacts (Section 18.5.4)</p> <p>Detail of the final location, turbine size and foundations to be used at both the Wind Farm and Moray Round 3 Zone sites will be defined at a later stage but will be within the Rochdale Envelope parameters.</p> <p>See Section 18.4 for development design mitigation measures, including turbine alignment and spacing.</p>

18.2.2 SCOPE OF ASSESSMENT

11. The scope of this Section is to assess all the potential shipping and navigation impacts that may result from the development of the Wind Farm and to identify associated mitigation measures and monitoring plans.
12. As part of this assessment, the hazards associated with the Wind Farm on shipping and navigation were recorded. Following the hazard log, the potential impacts on the shipping and navigation were assessed in terms of vessel routing (distance, time and fuel cost), collision risk, radar impacts and response to maritime incidents.
13. The NRA technical report and FSA is presented in Annex 18A. Figures and data from the NRA are included in the Section as required.

18.2.2.1 Geographical Scope

14. The assessment covers the Wind Farm Site (the Inner Study Area). Analysis of shipping data is provided to a 10 NM radius of the site boundary (the Outer Study Area) for comprehensive coverage of passing shipping, with other data sources presented to the extent of the data, (i.e. SAR resources and recreational sailing routes).

18.2.3 SURVEYS

15. Two vessel based surveys recorded data at the application site whilst carrying out surveys for the Wind Farm and the MORL Moray Round 3 Zone. The first survey

- took place from 1st April to 31st July 2010 on the Chartwell geophysical survey vessel.
16. The second survey was carried out on 2nd November to 13th December 2010 and 31st December 2010 to 9th January 2011 on the Gargano geotechnical survey vessel.
 17. Both Automatic Identification System (AIS) and radar track data (non-AIS) on vessel movements was gathered. The objective of the survey was to identify the vessel activity both within, and adjacent to, the Wind Farm Site.
 18. AIS is required to be fitted aboard all ships engaged on international voyages of 300 gross tonnage (GT) and upwards, cargo ships of 500 GT and upwards not engaged on international voyages and passenger ships (carrying 12 or more passengers) irrespective of size built on or after 1st July 2002. Fishing vessels over 45 m are required to carry AIS, however phased EU legislation will result in all fishing vessels of 15 m or over having AIS installed by 2014.
 19. Non-AIS vessels were recorded during the two surveys from Automatic Radar Plotting Aids (ARPAs). This radar track data was supplemented by manual observation of vessels within visual range to obtain information on type and size, where the information was not available from AIS. Non-AIS vessels tended to be smaller craft (i.e. recreation and fishing vessels [under 45m]).
 20. The data was supplemented with shore based AIS coverage to overcome any data shortfalls, i.e. periods when the vessel was outside the tracking range of the Wind Farm Site boundary, e.g. when travelling between ports.

18.2.4 IMPACT ASSESSMENT METHODOLOGY

21. The assessment methodology follows the DECC Risk Assessment Methodology (DECC 2005) and the MCAMGN 371.
22. The assessment on shipping and navigation assumes industry standard mitigation is embedded; a description of design mitigation and industry standard mitigation is presented in Section 18.4. Mitigation measures are also presented in Table 18.3 relative to the shipping and navigation receptors and potential impacts.

18.2.4.1 Worst Case

23. For the shipping collision risk assessment, worst case scenario within the Rochdale Envelope parameters is the maximum number of turbines, therefore the 3.6 MW layout (277 WTGs) and the smallest spacing is assumed (largest dimension substructure and foundation – jacket with gravity base). This leads to the worst case maximum loss in navigable sea room and largest turbine platform dimension for ship collision risk. In addition, three substations and three met masts were also modelled. For further details see Section 7: Project Description of the ES.
24. Safety zones of 500 m may be imposed around construction works, from which all vessels are excluded. The area of the site considered to be a construction zone may vary throughout the project if a phased construction approach is adopted, which is the most likely situation. However in the worst case there is the potential for an exclusion zone to be established that will exclude all traffic from the entire site

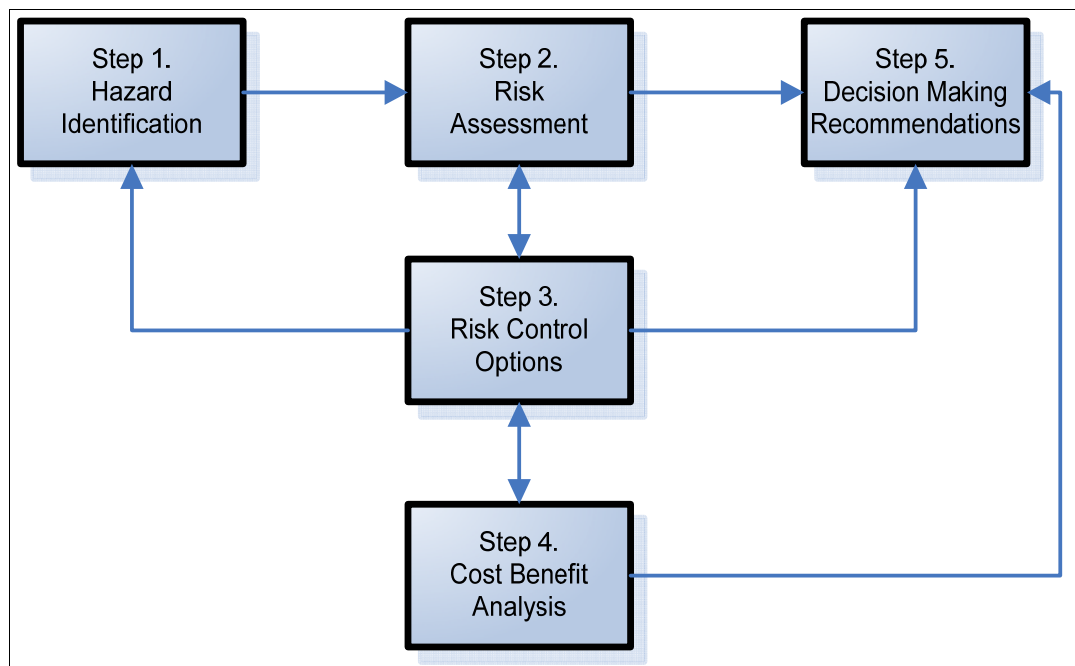
during construction. The impact on shipping and navigation in terms of vessel routeing during the construction phase assumes the worst case (entire site defined as a construction zone).

25. During the operation of the Wind Farm there are plans to apply for 50m operational safety zones during the normal operational phase, unless experience during the construction phase presents evidence that such zones may not be required.
26. In addition, large maintenance vessels could be present at the Wind Farm during the operational phase. The need for 500 m safety zones around such vessels will be assessed based on experience during construction. Safety zones will be based on the length of time and type of maintenance activities at the Wind Farm.

18.2.4.2 *Significance Criteria*

27. The impact on the main vessel types in the area (commercial shipping, fishing and recreational sailing) was firstly assessed qualitatively in the NRA (Annex 18A) based on the findings of the baseline assessment.
28. Following this, a FSA was carried out in-line with the IMO FSA process (IMO, 2002) and DECC guidance (DECC, 2005) as illustrated in Plate 18.1.

Plate 18.1 Formal Safety Assessment process



29. The detailed assessment that was carried out included:
 - Hazard Log and Risk Ranking (NRA Hazard Log, Annex 18A);
 - Quantified Navigational Risk Assessment for selected hazards;
 - Base Case and Future Case risk levels assessed for selected hazards;
 - Maritime Incident and SAR review; and
 - Assessment of risk controls and mitigation measures.
30. Consultation with marine stakeholders was carried out as part of this process to ensure the impact assessment gave full account to their views. It noted that a

number of joint meetings were held with both BOWL and MORL given the proximity of the two developments within the Moray Firth. The following stakeholders were consulted:

- MCA;
- DfT;
- CoS;
- RYA and CA;
- NLB;
- Local ports and stakeholders; and
- Oil and gas industry operators.

31. A hazard review workshop was held in Inverness on 6th July 2011 attended by local maritime stakeholders, including Inverness Harbour, Cromarty Firth Port authority, Moray Council and the NLB.
32. An offshore operator’s workshop was also carried out in Aberdeen on 7th July 2011. Full details of the hazard workshop methodology and results are provided in the NRA (Annex 18A).
33. The key maritime hazards associated with the Wind Farm were identified at the workshops and the associated scenarios prioritised by risk level. Within each scenario, vessel types were considered separately to ensure the risk levels were assessed for each and the control options were identified on a type-specific basis, e.g. risk control measures for fishing vessels differ to those for commercial ships.
34. The ranking of the risks associated with the various hazards was carried out using a risk matrix, as presented in Plate 18.2 below.

Plate 18.2 Risk Ranking Matrix

Consequence	5					
	4					
	3					
	2					
	1					
		1	2	3	4	5
		Frequency				

35. The frequency bands are ranked from low frequency (negligible [green]) to high frequency (yearly [red]). In terms of consequences, the definition is based on the impact to people, property, environment and business (negligible to major). A full description of the definitions and examples can be found in the NRA Hazard Log, Annex 18A.
36. A description of the risk matrix regions is provided in Table 18.2.

Table 18.2 Risk Matrix Description

Risk Region	Risk	Description
	Broadly Acceptable Region (Low Risk)	Generally regarded as insignificant and adequately controlled. Nonetheless marine guidance (MGN 371) and DECC methodology notes further risk reductions are required if it is reasonably practicable. However, at these levels the opportunity for further risk reduction is much more limited.
	Tolerable Region (Intermediate Risk)	Typical of the risks from activities which people are prepared to tolerate to secure benefits. There is however an expectation that such risks are properly assessed, appropriate control measures are in place, residual risks are as low as is reasonably practicable (ALARP) and that risks are periodically reviewed to see if further controls are appropriate.
	Unacceptable Region (High Risk)	Generally regarded as unacceptable whatever the level of benefit associated with the activity.

37. Other general hazards associated with the construction/installation, decommissioning, operation and maintenance phases, such as dropped object, man overboard and helicopter crash, were added following the workshops to create a preliminary Hazard Log for the project.
38. As well as ranking the hazard by expected risk, based on the estimated frequency versus most likely consequence, the worst case risk and subsequent consequence was also ranked in order to capture scenarios with a particularly high worst case risk.
39. Following the hazard workshop ranking, the impacts on the shipping and navigation receptors are assessed in the Risk Analysis Section, (Section 18.5.2).
40. As part of the NRA, the impact on vessel routeing (i.e. deviations around the Wind Farm), is compared to the current routeing through the area (pre-Wind Farm). Based on the stakeholder feedback and the number of vessels and type on a route, minor deviations from current routes are considered to be 'broadly acceptable' (not significant). The impact of large deviations on busy routes, (i.e. for regular operators/ferries), which result in increased voyage time and fuel cost, are considered to be significant.
41. The potential impacts on shipping and navigation from offshore wind farm developments are not easily categorised using the significance criteria outlined within Section 4: Environmental Impact Assessment Process and Methodology of the ES. Therefore the impact assessment methodology is based on an impact being either significant or not significant. This approach is linked to the hazard review risk matrix (Table 18.2) and definition of the impact on vessel routeing, which uses the impact assessment terminology described below:
 - **Not significant.** Impacts that are slight in terms of vessel routeing (minor deviations around the Wind Farm) and low risk in terms of vessel navigation, collision risk and response to marine incidents.

- **Significant.** Impacts that are moderate in terms of vessel routing (large deviations around the Wind Farm) and high risk in terms of vessel navigation, collision risk and response to marine incidents. Risks should be assessed, appropriate control measures are in place, residual risks are as low as is reasonably practicable (ALARP). Risks should be periodically reviewed to see if further controls are appropriate.

18.3 BASELINE CONDITIONS

18.3.1 PORTS AND NAVIGATIONAL FEATURES

42. A chart of the Wind Farm relative to nearby ports, harbours and navigational features is presented in Figure 18.1.
43. The main navigational features in the area are the Beatrice Oil and Gas Development Area and Jacky platform (Normally Unattended Installation - NUI) located approximately 1.5nm and 0.2nm south west of the Wind Farm Site, respectively.
44. The two Beatrice demonstrator turbines are located approximately 5.7 NM to the south by south west of the Wind Farm Site.
45. The harbour at Wick is located approximately 9.6 NM north west of the Wind Farm Site.
46. Military features include the RAF military Practice and Exercise Areas (PEXAs). Firing Practice Areas D809 and D807 are the closest areas (1 NM east and 2.4 NM south of Wind Farm Site) and Tain RAF Bombing Range is located approximately 18 NM south west.

18.3.2 MARINE ENVIRONMENTAL HIGH RISK AREAS

47. MEHRAs have been identified by the UK Government as areas of environmental sensitivity and at high risk of pollution from ships.
48. There are two MEHRAs located within 40 NM of the Wind Farm Site. Tor Ness in Hoy (part of the Orkney archipelago) and Kinnaird Head (between Roseheart and Fraserburgh on the Aberdeenshire coast).

18.3.3 COMMERCIAL SHIPPING

18.3.3.1 Outer Study Area Survey Analysis

49. Plots of the winter Gargano survey data (38 days) and Chartwell survey data from a summer period (30 days) are presented in Figure 18.2 and Figure 18.3.
50. The number of vessels within 10 NM of the Wind Farm Site (excluding the vessel carrying out the survey) averaged approximately 10 to 11 per day across the two surveys.
51. The majority of vessel tracks were associated with Pentland Firth route, approximately 5 NM north by north east of the Wind Farm.

52. In addition, offshore support traffic (supply and Emergency Response and Rescue Vessels (ERRVs)) were recorded to the south east of the outer study area headed to the Beatrice and Jacky fields.
53. During the two survey periods there was an average of one offshore vessel headed to and from the Beatrice and Jacky Fields every four days, with a higher number of transits recorded during the Gargano winter survey.

18.3.3.2 Inner Study Area Survey Analysis

54. A detailed analysis of the June 2010 Chartwell data combined with the Gargano winter survey data relative to the site boundary is presented in Figure 18.4.
55. A total of 39 AIS and 15 non-AIS tracks were identified to pass within the proposed turbine perimeter, corresponding to an average of just over one vessel every two days.
56. The most common type of shipping passing through the proposed Wind Farm were cargo ships, which tended to be small to medium sized coasters headed to ports within the Moray Firth (Wick, Invergordon and Buckie).
57. The main route identified from AIS as passing through the proposed Wind Farm (Inner Study Area) consisted of vessels heading to and from Wick. These tracks are shown in Figure 18.5.
58. During the combined surveys there was an average of one vessel every ten days using the route.
59. It is noted that given the type and size of vessels on this route (small commercial vessels and recreational craft), the number of vessels using this route is likely to be influenced by weather and sea conditions. Thus vessels may take more coastal/sheltered routes (south and west of the proposed Wind Farm) in strong tidal and poor weather conditions.

18.3.4 RECREATIONAL VESSEL ACTIVITY

18.3.4.1 RYA Data

60. A detailed plot of the recreational sailing activity and facilities in the area from the Coastal Atlas of Recreational Sailing (RYA, 2010) relative to the Outer Study Area and a 10 NM radius of the site boundary is presented in Figure 18.6.
61. In terms of facilities in the Moray Firth, there are a number of clubs, training centres and marinas for recreational vessels located on the coastline around Moray, Aberdeenshire, Caithness and Sutherland. There are also a range of facilities located at Inverness which is popular for vessels passing through the Caledonian Canal.
62. The nearest marina to the proposed Wind Farm is in Wick approximately 9.6 NM to the north west and the nearest clubs are located at Lossiemouth and Findochty 28 NM south.

63. There is one Medium Use route that passes through the Wind Farm from Wick to Peterhead and a Light Use route between the Northern Isles and the Moray Firth (Lossiemouth).

18.3.4.2 *Survey Data*

64. A plot of the combined recreational survey tracks recorded on both AIS and radar is presented in Figure 18.7. No recreational vessels were recorded during the winter survey.

65. From the survey data, recreational vessels were generally headed to and from Wick using coastal and cross Firth cruising routes.

66. Approximately seven sailing yachts were recorded passing through the Wind Farm Site during the combined survey periods, with two recorded on AIS, namely:

- Lord Nelson (55 m length); and
- Pauline (14 m in length).

18.3.5 FISHING VESSEL ACTIVITY

67. This section reviews the fishing vessel activity at the Wind Farm Site based on the maritime traffic survey and the Commercial Fisheries Assessment (see Section 16 of this ES).

18.3.5.1 *Survey Data*

68. The fishing vessels tracked during the combined 125 days maritime traffic survey are presented in Figure 18.8.

69. Overall, 23 fishing vessels were tracked intersecting the Wind Farm Site during the combined survey period, an average of one fishing vessel every five days.

70. It was noted that fishing vessel survey data showed good agreement with Overflight Sightings and Satellite Monitoring data (Marine Management Organisation), which can be observed in the NRA, Annex 18A.

18.3.5.2 *Commercial Fisheries Assessment*

71. A detailed study of the fishing activity in the vicinity of the Wind Farm has been performed as part of the Commercial Fisheries Assessment (see Section 16).

18.3.6 SAR RESOURCES

18.3.6.1 *SAR Helicopters*

72. A review of the assets in the area indicated that the closest SAR helicopter base is located at Lossiemouth, operated by the RAF, approximately 30 NM to the south by south west of the Wind Farm Site (presented in Figure 18.9).

73. RAF Lossiemouth has Sea King helicopters with a maximum endurance of six hours and speed of 110 mph giving a radius of action of approximately 250 NM which is well within the range of the Wind Farm Site. One helicopter is available at 15 minutes readiness between 0800 and 2200 hours, with another available at 60 minutes readiness between 0800 hours and evening civil twilight (ECT). Between 2200 and 0800 hours, one helicopter is held at 45 minutes readiness.

74. Based on the above information, the daytime response to the Wind Farm will be just over 30 minutes. At night time this will increase by 30 minutes to just over one hour due to the additional response time at the base. It is noted that these calculations are based on still air and will vary depending on the prevailing conditions.

18.3.62 *Royal National Lifeboat Institute Lifeboats*

75. The Royal National Lifeboat Institution (RNLI) maintains a fleet of over 400 lifeboats of various types at 235 stations round the coast of the UK and Ireland. The RNLI stations in the vicinity of the Wind Farm Site are presented in Figure 18.10.

76. The closest All-weather Lifeboat (ALB) is located 9.6 NM to the north west at Wick, with another located at Buckie (29 NM south of the Wind Farm Site). At each of these stations crew and lifeboats are available on a 24hour basis throughout the year. Based on the offshore position of the Wind Farm it is likely that ALBs would respond to an incident within the Wind Farm Site from Wick and this is confirmed when reviewing the historical incident data (see Section 18.3.7).

18.3.63 *Coastguard Stations*

77. HM Coastguard, a division of the MCA, is responsible for requesting and tasking SAR resources made available by other authorities, and for co-ordinating, the subsequent SAR operations (unless they fall within military jurisdiction).

78. MCA published a consultation document in December 2010, *Protecting our Seas and Shores in the 21st Century, Consultation on Proposals for Modernising the Coastguard* (MCA, 2010) in order to modernise HM Coastguard. The main part of the document proposes the reduction in the number of Maritime Rescue Co-ordination Centre (MRCC) stations around the UK coastline.

79. Revised plans were released by the MCA mid-way through 2011, *Protecting our Seas and Shores in the 21st Century, Consultation on Revised Proposals for Modernising the Coastguard* (MCA, 2011) with a second consultation period from 14th July 2011 to 6th October 2011. As part of these revised plans MRCC Stornoway and Shetland will remain open and become Maritime Rescue Sub-Centres (MRSCs) along with the Aberdeen centre.

80. The proposed Wind Farm currently lies within the Scotland and Northern Ireland region with the nearest rescue coordination centre being MRCC Aberdeen. The proposed changes would result in Aberdeen becoming a sub-centre and MRSC Aberdeen will continue to respond to any incidents within the Moray Firth including those in the vicinity of the Wind Farm Site.

18.3.64 *Salvage Tugs*

81. Two Emergency Towing Vessels (ETVs) carry out MCA duties in the north of Scotland providing emergency towing cover for the Western Isles, Northern Isles and northern Scotland. The UK Government has provided an additional three month extended contract for the tugs and during this time longer-term arrangements will be made to fund the ETVs.

82. In addition, each MRCC also holds comprehensive databases of harbour tugs available locally. Procedures are also in place with Brokers and Lloyd's Casualty Reporting Service to quickly obtain information on towing vessels that may be able to respond to an incident.
83. Emergency tug provision will generally be a contracted agreement between the vessel owners and tug operators. Coastguard Agreement on Salvage and Towage (CAST) will be invoked when owners are either unable or unwilling to engage in a commercial tow contract. MCA will pursue costs through arbitrators on a cost recovery basis.
84. JP Knight (Caledonian) operates four tugs that work out of Cromarty Firth (approximately 46 NM south west of the applications site boundary), along with offshore support vessels which may have with towing capabilities that pass or work in the area (i.e. Beatrice Oil Field).

18.3.7 MARITIME INCIDENTS

18.3.7.1 Marine Accident Investigation Branch Incidents

85. The locations of accidents, injuries and hazardous incidents reported to the MAIB within the Outer Study Area, (10 NM of the Wind Farm Site) between January 2001 and December 2010 are presented in Figure 18.11, colour-coded by type.
86. A total of 21 incidents were reported within the Outer Study Area, corresponding to an average of two per year. The majority of the incidents occurred in and around Wick Bay. The most common incident type recorded within 10 NM of the Wind Farm was a machinery failure, representing 57% of all incidents over the ten year period (approximately half of these were fishing vessels).
87. There were no incidents reported within the Inner Study Area. The closest incident to the Wind Farm was a Hazardous Incident approximately 0.5 NM from the eastern boundary on 24th May 2005. The incident involved a 21 m fishing vessel which was involved in a near miss with another unidentified vessel.
88. The second closest incident involved an Accident to Person on board a 15 m scallop dredger which was emptying clam dredges, when a crew member slipped on the deck and received a blow to the head. The skipper radioed to the coastguard and when the vessel arrived in port the crewman was taken to hospital by a waiting ambulance.

18.3.7.2 RNLI Incidents

89. Data on RNLI lifeboat responses within the Outer Study Area in the ten-year period between 2001 and 2010 have been analysed. A total of 67 launches were recorded by the RNLI (excluding hoaxes and false alarms). Figure 18.12 presents the RNLI incidents by casualty type.
90. Fishing and Accidents to Person were the most common casualty type involved, accounting for 40% and 34% of RNLI launches, respectively. It is noted that just over 50% of the fishing vessel casualties involved small fishing boats operating within 2 NM off the coastline and Wick Bay.

91. Unspecified/Other accounted for 12% (vehicle in the sea (4), aircraft (2) and animals (1)). Yachts accounted for 6% of casualties with various other vessel types making up the remainder of incidents.
92. One incident was recorded within the Wind Farm Site over the 10 year period analysed. This incident involved a leak/swamping on-board a sailing yacht in Wind Force 6 in September 2010. RAF and Wick ALB SAR units were involved assisting the vessel to safety.

18.3.8 ASSESSMENT LIMITATIONS

93. One limitation associated with NRA work is the quality of the underlying shipping data. To minimise this, shipping surveys were carried out during summer and winter periods to record fluctuations in shipping and vessel activity over seasonal and tidal variations. A range of vessels were recorded on AIS, radar track data (non-AIS) and visual observations to ensure commercial ships, fishing vessels and recreational craft were recorded in the Outer Study Area.
94. The baseline shipping survey data validated the Ship Routes database used to model the collision risk frequency (ship-to-ship and ship-to-structure) before and after development of the Wind Farm to ensure any risk modelling was based on reliable information.
95. A further potential limitation often rests in the collision risk models. The COLLRISK model was used within this study and is the only model calibrated for UK waters using the Ship Routes database.
96. The review of potential impacts was carried out by experienced personnel including local mariners through the use of hazard workshops and consultation process. This gives further confidence in the findings of the work.
97. As a result of the approach adopted, the limitations associated with this study are not considered to be significant.

18.4 DEVELOPMENT DESIGN MITIGATION

98. The impact of the Wind Farm has been partly mitigated by location, as the site is in an area away from the busy commercial shipping route to/from Pentland Firth (6 NM north east) and platform supply routes to Beatrice Oil Field (5-6 NM south).
99. The wind farm layout will mitigate the potential impacts on vessel navigation and visual obstruction by aligning the wind turbines in straight lines to ensure navigable channels where possible. It is noted there could be slight alterations to wind turbine alignment and spacing due to micro-siting.

18.4.1 INDUSTRY STANDARD MITIGATION

100. The following section describes the embedded industry standard mitigation measures for the Wind Farm.
101. Safety zones of 500 m may be imposed around construction activities and major maintenance works at the Wind Farm. During the operation of the Wind Farm there are plans to apply for 50 m operational safety zones during the normal

- operational phase. Safety Zones will be applied for in line with DECC guidance (DECC, 2007).
102. Marine navigational marking, including lights and marks on significant and intermediate peripheral structures will be provided in accordance with NLB requirements, which will comply with IALA Recommendation 0-139 (the Marking of Offshore Wind Farms) and the requirements of MCA MGN 371.
103. Inter-array cables will be buried or protected where feasible, however due to the uncertainty regarding seabed and underlying geological conditions there may be areas where it is necessary to surface lay inter-array cables. Positions of the inter-array cable routes notified to Kingfisher Information Services-Cable Awareness (KIS-CA) for inclusion in cable awareness charts and plotters for the fishing industry.
104. Appropriate liaison to ensure information on the Wind Farm and special activities is circulated in Notices to Mariners, Navigation Information Broadcasts and other appropriate media.
105. The Wind Farm and associated submarine inter-array cables will be charted by the UK Hydrographic Office in Admiralty Charts.
106. As per MCA recommendations on sailing vessel mast and wind turbine rotor blade interaction, the lowest point of rotor sweep should be at least 22 m above MHWS.
107. An Emergency Response Co-operation Plan (ERCoP) for the Wind Farm (as per the MCA template), will be in place pre-construction, and a number of design features to be incorporated are as follows:
- All wind turbines and other Wind Farm 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;
 - 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 will be such that, under normal conditions of visibility and all known tidal conditions, they are clearly readable by an observer, stationed three metres above sea levels, and at a distance of at least 150 m from the turbine; and
 - The Wind Farm should be designed and constructed in order to allow emergency rotor shut-down in the event of a search and rescue, counter pollution or salvage operation in or around the Wind Farm.

18.5 ASSESSMENT OF POTENTIAL IMPACTS

18.5.1 HAZARD REVIEW WORKSHOPS

108. The hazard review workshop reviewed shipping and navigation hazards identified by stakeholder feedback and experience at other offshore developments (generic industry hazards). Anatec's Hazard Log software was used to recorded hazards identified by stakeholders. The hazards are listed below:

- Commercial ship (powered) collision;
 - Drifting ship collision;
 - Recreational vessel collision;
 - Fishing vessel collision;
 - Fishing gear interaction with inter-field cabling;
 - Fishing gear interaction with export cable;
 - Fishing gear interaction with substructures;
 - Vessel anchoring on or dragging anchor over subsea equipment; and
 - Vessel-to-vessel collision due to avoidance of site or work vessels in area.
109. The following generic industry hazards were also identified for the site but not discussed in detail:
- Attendant vessel collision with structure;
 - Man overboard during work activities at site;
 - Dropped object during work activities at site; and
 - Deliberate unauthorised boarding or mooring to structure.
110. In addition, during the offshore operators' workshop in Aberdeen the impact on tug and supply vessel access to offshore platforms in the area was discussed. Offshore support vessels use a route 5-6 NM south of the proposed Wind Farm, approaching the Beatrice and Jacky platforms from Aberdeen and Peterhead. Therefore little concern was expressed by the offshore operator's as no change in vessel routeing is expected as a result of the Wind Farm.
111. Overall, feedback from the stakeholders at the hazard review workshop concluded that no risks were unacceptable. A total of two risks were ranked within the tolerable, ALARP region based on the probable outcome whilst three were ranked as tolerable based on the worst case outcome.
112. The hazards ranked as tolerable based on probable outcome were:
- Man overboard during transfer to/from turbine or working alongside turbine; and
 - Attendant Wind Farm vessel collision with Wind Farm structure.
113. These incidents involve wind farm related vessels and persons working at the site as opposed to third parties.
114. The three additional hazards ranked as tolerable based on worst case outcome were:
- Fishing vessel collision with structure;
 - Dropped object during construction, decommissioning or major maintenance; and
 - Vessel-to-vessel collision due to avoidance of site.
115. Two of the worst case outcomes involve third party vessels and were therefore selected for further risk analysis.

116. Further details on all hazards identified (including area, phase of operation, causes, risk ranking, risk control and mitigation measures) are recorded in the NRA Hazard Log (see Annex 18A).

18.5.2 RISK ANALYSIS

117. Following identification of the higher risk navigation scenarios during the hazard review workshop, risk analyses were carried out to investigate selected hazards in more detail. It is noted that the impact of the Wind Farm on MEHRA sand ports and harbours (e.g. displacement of traffic nearer to these features) was screened out from the detailed assessment due to the distance to the nearest MEHRA (approximately 40 NM) and the negligible impact considered on ports/harbour approach channels and traffic.

118. More attention was focused upon the high risk areas to identify and evaluate the factors which influence the level of risk with a view to their effective management. Four risk assessments were carried out and these were:

- Base Case without Wind Farm level of risk;
- Base Case with Wind Farm level of risk;
- Future Case without Wind Farm level of risk; and
- Future Case with Wind Farm level of risk.

119. The following scenarios were investigated in detail:

- Vessel-to-vessel collisions;
- Vessel-to-Wind Farm structure collisions (powered and drifting); and
- Inter-array cable interaction

120. The results of the risk modelling are presented in detail within the NRA Annex 18A.

121. Assessment has also been carried out of:

- Impact on commercial ships;
 - Routeing (additional distance, time and fuel cost)
 - Impact on collision risk
- Impact on recreational vessels;
 - Routeing (additional distance, time and fuel cost)
 - Impact on collision risk
- Impact on fishing vessels;
 - Routeing (additional distance, time and fuel cost)
 - Impact on collision risk
- Impact on marine radar, ship based communication and VHF systems; and
- Impact on SAR operations including transit distance and time.

122. The NRA assessment was primarily focused on the operational phase of the project. It is identified that during the construction/decommissioning phase there will be an increased level of vessel activity within the Wind Farm which may pose additional navigational risk. These would be managed in line with similar offshore construction projects to ensure the safety of navigational stakeholders in the area.

A detailed review will be undertaken as part of the construction/decommissioning planning.

123. It is expected that this will involve the use of 500 m safety zones (see Section 18.2.4.118.2.4.1 on the worst case) which will provide a means of regulating the rights of navigation so as to preserve the safety of those working in the Wind Farm and those on-board other vessels that may be navigating in this area.
124. These would be applied for in accordance with Section 95 and Schedule 16 of the Energy Act 2004, the Electricity (Offshore Generating Stations) (Safety Zones) (Applications Procedures and Control & Access) Regulations 2007 and DECC guidance (DECC, 2007).

18.5.3 IMPACT ON COMMERCIAL SHIPPING

125. In terms of nearby traffic, the majority of vessels pass clear of the site (shipping using the coastal route 3-5 NM to the west). The only route that will be partly affected in terms of increased collision risk is the north west/south east shipping route to and from Wick. Approximately one vessel every ten days uses this route (on average), the majority of which are coastal tankers and/or small to medium sized cargo vessels. Given the low number of vessels on this route the collision risk is considered to be low. However, vessels on this route could be impacted in terms of routeing distance, time and fuel cost, as they will deviate from their current route to avoid the Wind Farm and construction/operational safety zones. The assessment carried out concluded that these impacts were not significant. The current position of this shipping route and tracks is presented in Figure 18.13.
126. In addition, a small number of vessels currently pass close (less than 200 m) from the eastern boundary of the proposed Wind Farm when travelling between the Moray Firth and Northern Norway/Russia. Given the current passing distance there is an increased risk of ship-to-structure collision, however the overall impact on risk was calculated to be low. The small number of tankers and cargo vessels using this route will increase passing distance from the Wind Farm Site to a safe distance (i.e. when there is a strong easterly or south easterly gale and/or tidal flow). Again the impact in terms of routeing distance, time and fuel cost was assessed to be not significant.
127. The two main shipping routes passing in close proximity to the Wind Farm Site are presented in Figure 18.14.

18.5.4 IMPACT ON RECREATIONAL VESSELS

128. The air clearance between turbine rotors and sea level conditions at MHWS will not be less than 22 m, as recommended by the MCA. This minimises the risk of interaction between rotor blades and yacht masts.
129. In terms of vessel routeing (distance, time and fuel cost), recreational vessels should be able to pass between turbines in suitable conditions (i.e. during good visibility and calm sea conditions), as well as being able to pass inshore and offshore of the Wind Farm. Vessels are likely to route outside the Wind Farm during the

construction phase and may incur a minor deviation, increasing voyage time. Overall, the impact on vessel routeing will not be significant.

130. It was noted during consultation with the CA and RYA, that the area is not busy from a recreational sailing perspective. A small number of vessels intersected the Wind Farm Site, however dependant on sea and weather conditions, it is not expected to be a frequent event and the increase in collision risk will be minor. A small number of vessels may incur a small deviation around the Wind Farm during the construction phase, increasing voyage time, however the overall impact assuming industry standard mitigation (see Table 18.3) is not considered to be significant.

18.5.5 IMPACT ON FISHING VESSELS

131. A detailed study of the impacts on fishing activity in the vicinity of the Wind Farm has been performed as part of the Commercial Fisheries Assessment (see Section 16).
132. In terms of fishing vessel transit distance, time and fuel cost, the impacts on vessels steaming by the site to fishing grounds can be considered similar to other passing vessels in the area. However, it is noted that due to the smaller sizes of these vessels and the spacing between turbines, there is good prospect for fishing vessels to navigate within the Wind Farm itself. Transiting vessels are likely to pass inshore and offshore of the Wind Farm during the construction phase and may incur a minor deviation, increasing voyage time. Based on the small deviation required the impact on vessel routeing is not expected to be significant.
133. There will be an increase in collision risk for vessels passing through the operational Wind Farm; however, the decision to do this will lie with the master who will be responsible for assessing the risks associated with navigating in proximity to and through an offshore wind farm. This decision is likely to be based on the type and size of fishing vessel and sea, weather and visibility conditions at the time.
134. The NRA concluded, through qualitative and quantitative assessment, that the overall impact of the Wind Farm on fishing vessel routeing and collision risk, assuming industry standard mitigation (see Table 18.3), is not considered to be significant.

18.5.6 IMPACT ON MARINE RADAR SYSTEMS

135. A navigational impact was identified based on potential radar interference and decreased detection of small vessels (mainly recreational craft and small fishing boats) emerging from the Wind Farm.
136. Trials on the impact of offshore wind farms on marine radar systems have been carried out at North Hoyle (MCA and QinetiQ, 2004), Kentish Flats (BWEA, 2007) and Beatrice demonstration turbines (QinetiQ, 2006). The results of the North Hoyle and Kentish Flats trails indicate that the onset range from the wind turbine structures of false returns is about 1.5 NM, with a progressive increase in the impact of the effects on radar to about 500 m.

137. A number of vessels bound for Wick pass inside the 1.5 NM range of proposed turbines at which radar interference could be experienced. It is noted that upon development of the Wind Farm vessels heading to/from Wick are likely to pass at approximately 1-1.5 NM north of the Wind Farm Site, thereby subject to a low level of radar interference.
138. In addition, radar interference could be experienced by offshore vessels supporting the Jacky platform as the 500 m turbine buffer intersects part of the Jacky Platform 500 m Safety Exclusion Zone. Consultation with the Oil and Gas operators indicated that Wind Cat service vessels approach the Jacky platform from Buckie, therefore access and navigation from the south will not be impacted to any significant degree and turbines within the Wind Farm could be used to aid navigation.
139. Overall it was concluded that the impact of interference on marine radar systems on vessels passing through the area will not be significant.

18.5.7 IMPACT ON SAR

140. The Wind Farm Site lies within the Scotland and Northern Ireland region with the nearest rescue coordination centre being MRCC Aberdeen, (it is noted that under the revised MCA SAR restructure this centre will become a MRSC), see (Section 18.3.6.3). MRSC Aberdeen will respond to any incidents within the Moray Firth including those in the vicinity of the Wind Farm Site and the impact of the Wind Farm is not significant.
141. In the event of an emergency arising, within or adjacent to the Wind Farm, the main types of SAR would be carried out by RNLI ALB and/or SAR helicopter. A review of the assets in the area of the Wind Farm Site indicated that the closest ALB is 9.6nm away at Wick, with another located at Buckie (29nm south), whilst there is a SAR helicopter base located at Lossiemouth, approximately 30nm from the Wind Farm. This RAF base has Sea King helicopters with a maximum endurance of six hours giving a radius of action of approximately 250nm which is well within the range of the Wind Farm.
142. A review of historical incidents indicated that the incident levels in the vicinity of the site have tended to be low (Figure 18.11 and Figure 18.12). The risk assessment also indicated that there will not be a significant increase in the frequency of maritime incidents due to the Wind Farm.
143. Giving account to the design features associated with the Wind Farm, and commitments by the developer to meet the MCA MGN 371 guidance and industry best-practice, including the development of an Emergency Response Co-operation Plan (ERCoP) pre-construction and in collaboration with the nearby offshore operators, it is considered that SAR issues can be well managed.
144. It is considered that SAR operations will not be significantly impacted by the Wind Farm in terms of transit time, as an ALB or ILB will be able to navigate through a wind farm and associated safety zones (dependant on sea state and weather

conditions). In addition, a lifeboat and SAR helicopter will be launched to respond to an incident (based on incident severity).

145. Overall it was concluded that the impact of the Wind Farm, assuming industry standard mitigation (see Table 18.3), will not be significant.

18.6 MITIGATION MEASURES AND RESIDUAL IMPACTS

146. BOWL has mitigated the impact of the Wind Farm as risk control measures will be put in place during the development and operation of the Wind Farm.
147. A number of mitigation measures are presented which are required by industry to ensure the project conforms to regular requirements and good practice.
148. A summary of the embedded industry standard and best practice mitigation measures identified throughout the NRA relative to the potential impact and residual impact significance is provided in Table 18.3.

Table 18.3 Potential Impacts and Mitigation Measures

Receptor	Potential Impact	Mitigation/Type	Description	Residual Impact
Commercial, recreational and fishing vessels	Vessel routeing (distance, time, fuel cost and collision risk)	Industry Standard - Marked on Admiralty Charts	Wind Farm and inter-array cables will be charted by the UK Hydrographic Office using the magenta turbine tower chart symbol found in publication 'NP 5011 - Symbols and Abbreviations used in Admiralty Charts'. Submarine inter-array cables associated with Wind Farm will also be charted on the appropriate scale charts.	Not significant
		Industry Standard - Marking and lighting	Structures to be marked and lit in-line with NLB and IALA guidance.	
		Industry Standard - Information circulation	Appropriate liaison to ensure information on the Wind Farm and special activities is circulated in Notices to Mariners, Navigation Information Broadcasts and other appropriate media.	
		Best Practice - Control Centre	A Control Centre will monitor AIS and non-AIS vessels by CCTV and record the movements of ships around the Wind Farm as well as company vessels working at the site. Vessels identified in construction areas or safety zones will be identified and contacted.	

Receptor	Potential Impact	Mitigation/Type	Description	Residual Impact
Recreational vessels	Recreational vessel blade/mast interaction	Industry Standard - Turbine air draught	Lowest point of rotor sweep at least 22 m above Mean High Water Springs as per MCA recommendations.	Not significant
SAR operations	SAR operations, including SAR resources transit distance and time	Industry Standard - Compliance with MCA's Marine Guidance Notice (MGN) 371 including Annex 5 Industry Standard - Formulation of an Emergency Response Cooperation Plan (ERCoP) as per MCA template	Annex 5 specifies '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.' BOWL will use the draft template created by the MCA to formulate an emergency response plan and site Safety Management Systems, in consultation with the MCA.	Not significant

18.7 SUMMARY OF IMPACTS

150. A summary of the potential impacts on shipping and navigation is presented in Table 18.4 below.

Table 18.4 Summary of Impacts on Shipping and navigation

Residual Impacts	Magnitude of Impact	Nature	Significance of Impact
Commercial Shipping Routeing (distance, time, fuel cost and collision risk)	Small	Negative	Not significant
Recreational Vessel Routeing (distance, time, fuel cost and collision risk) and blade/mast interaction	Small	Negative	Not significant
Fishing Vessel Routeing (distance, time, fuel cost and collision risk)	Small	Negative	Not significant
Radar Interference on shipborne instruments (radar and VHF)	Small	Negative	Not significant
SAR operations including SAR resources transit distance and time	Small	Negative	Not significant

18.8 MONITORING AND ENHANCEMENTS

18.8.1 SAFETY MANAGEMENT SYSTEMS

151. From a navigation risk perspective, monitoring will take place through the project's Safety Management System (SMS). The SMS will include an incident/accident reporting system which will ensure that incidents and near misses are recorded and reviewed to monitor the effectiveness of the risk control measures in place at the site. In addition, any information gained from near misses/accidents at other offshore wind farm sites is likely to be considered with respect to the control measures applied at the Wind Farm.

152. The following sub-sections list the typical monitoring methods and systems which will be put in place at the Wind Farm.

18.8.1.1 CCTV

153. CCTV may be installed to enable coverage of the whole Wind Farm from key locations either on the wind turbine structures or the substations. CCTV technology can be adjustable for day/night conditions, which will allow operators in a Control Centre to identify vessel names from a distance to facilitate radio communications.

18.8.1.2 *Control Centre*

154. Whilst no radar monitoring of vessel movements has been proposed for the site (it was noted during consultation that Beatrice Alpha has radar fitted), a Control Centre monitoring AIS will be used to monitor and record the movements of vessels around the Wind Farm (work boats and passing vessels).

18.8.1.3 *Subsea Cables and Met Masts*

155. The subsea inter-array cable routes will be subject to periodic inspection.

156. Met masts and met ocean buoys will be deployed prior to the construction phase; however, these devices will also be used to support operations throughout the life of the project.

18.9 **ASSESSMENT OF CUMULATIVE IMPACTS**

18.9.1 **INTRODUCTION**

157. Given below is the assessment of cumulative impacts upon shipping and navigation arising from the Wind Farm in conjunction with other existing or foreseeable planned project/development activities.

158. A CIADD (MFOWDG, 2011) was produced which set out the developments to be considered and the assessment method for each technical assessment and is the basis of this assessment. The CIADD is presented in Annex 5B.

18.9.2 **SCOPE OF ASSESSMENT**

159. The scope and method of this assessment was previously described in the CIADD (MFOWDG, 2011). This remains unchanged from the method presented in the CIADD (Annex 5B).

160. Cumulative and in-combination impacts with maritime activities (shipping, fishing, recreation and associated facilities) are assessed in the NRA (Annex 18A). The following section presents details on possible cumulative impacts with other developments including those at the Moray Firth Round 3 Zone. The assessment of cumulative impacts has been made against the existing baseline conditions as presented in Section 18.3 for the Wind Farm. The impacts upon shipping and navigation have been assessed using the same criteria as presented in Section 18.2.4. The impact has been predicted as either significant or not significant.

18.9.3 **CONSULTATION**

161. The CIADD (MFOWDG, 2011) was presented to MS for review in April 2011 for comment.

162. Following these initial comments on the CIADD, scoping opinions were received from MS in regard to the Wind Farm (MS, 2011) and for the OfTW (MS, 2011). A revised methodology was then developed. Subsequent telephone discussions and written responses confirmed that the proposed methodology was considered appropriate and fit for purpose.

163. As part of the NRA, BOWL and MORL undertook joint consultation to recorded feedback on a cumulative level. Details are provided within the NRA Annex 18A.

18.9.3.1 *Geographical Scope*

164. As presented in the CIADD the geographical extent of the study area for the cumulative assessment includes offshore developments in a national (UK level) and a regional context (Moray Firth).

18.9.3.2 *Developments Considered in Assessment*

165. Section 4.10.7 of the CIADD (MFOWDG, 2011) (Annex 5B) presented the developments for which it was considered an assessment of cumulative impacts with the BOWL project should be undertaken for shipping and navigation. These were:

- Moray Firth Round 3 Zone (western and eastern development areas);
- Other Offshore Wind Farms and Infrastructure:
 - Aberdeen European Offshore Wind Deployment Centre (EOWDC);
 - Neart na Gaoithe;
 - Inch Cape;
 - Firth of Forth Round 3 sites;
 - Methil Offshore Windfarm; and
- Subsea Cables:
 - MORL Offshore Export Cable;
 - BOWL Offshore Export Cable;
 - Proposed Viking SHETL cable; and
- Proposed SHETL hub;
- Pentland Firth and Orkney Marine Energy developments;
- Shipping and Navigation;
- Military and Aviation activities;
- Dredging and sea disposal in the Moray Firth;
- Oil and Gas Developments:
 - Beatrice and Jacky platforms and associated infrastructure; and
 - The proposed Polly Well.

166. A high level review of the offshore developments was undertaken to screen out those that would not result in a cumulative impact. Details of the developments that were screened out are provided below:

- The offshore wind farms in the outer and Firth of Forth and Tay (Neart na Gaoithe, Inch Cape, Firth of Forth Round 3 sites and Methil) and the turbines planned at the Aberdeen EOWDC are of a scale and at a sufficient distance that there will not be a cumulative impact on shipping and navigation;
- The Pentland Firth and Orkney Marine Energy developments have been screened out, given that the majority of construction and operation/maintenance vessels will be routing from local support bases (e.g. Scrabster, Stromness, Kirkwall and Lybster) and as a result vessels will not navigate in the vicinity of the Wind Farm;
- A small number of military vessel tracks were recorded during the maritime surveys within 10 NM of the Wind Farm. The large majority of vessels were

- recorded on the Pentland Firth route, therefore the cumulative impacts on marine based military activities are not considered to be significant; and
- Currently there are no licensed aggregate dredging areas in the Moray Firth. However, there are a small number of charted dredge sea disposal (spoil grounds) located within close proximity to the Caithness coast (approximately 4 NM). There is available sea room in the Moray Firth for transiting dredge and/or sea disposal vessels. In addition, given the size of ships working from local ports and small harbours, vessels are likely to use more sheltered coastal routes. Therefore the cumulative impact will not be significant.
167. The potential shipping and navigation impacts for the remainder of offshore developments were considered further giving account to:
- Changes to commercial, fishing and recreational vessel routeing; and
 - Increase in collision risk (vessel-to-structure or vessel-to-vessel).
168. The cumulative impact on shipping and navigation, from simultaneous construction and cable laying works at the Wind Farm and OfTW, are not considered to have a significant impact (these are assessed for the individual phases of the project). The cable corridor runs well clear of busy shipping lanes in the vicinity of the Wind Farm (i.e. the Pentland Firth route) and cable laying works are considered to be temporary in nature.
169. The OnTW will not have any effects on Shipping and Navigation and hence have not been considered in this cumulative assessment.

18.9.4 PREDICTED IMPACTS

18.9.4.1 Regional Wind Farm Development

170. In a regional context, the nearest potential wind farm development area is located in the Moray Firth Round 3 Zone (western and eastern development areas).
171. In terms of the Wind Farm, cumulatively there will be an increased impact on shipping and navigation routeing, given vessels will deviate around the developments. In addition, there will be a potential increase in the collision risk, where vessels deviate around the wind farm sites into busier shipping channels, (i.e. the Pentland Firth route). This could also occur during the construction phase based on safety zones which could cover all major construction works across the Wind Farm. In addition, there is likely to be overlapping construction windows at the Wind Farm and Eastern Development Area in the Moray Firth Round 3 Zone.
172. However, given the low density of shipping passing through the area and the available sea room out-with major shipping routes (i.e. Pentland Firth route); the cumulative impact is considered to be not significant.
173. There could be a cumulative impact on offshore vessel routeing (deviations and collision risk) through the western development area, as vessels approach the Beatrice and Jacky Fields from the east. On-going consultation will take place with offshore operators to assess any potential impact on offshore vessels and rig access. Given the uncertainty over development of the area, and the availability of sea room to the south of the zone, the cumulative impact is not likely to be significant.

174. In terms of the export cable works from the Moray Firth Round 3 Zone wind farms it is considered that there will not be a significant cumulative impact on shipping and navigation due to the separation distance between the expected cable corridors and the Wind Farm and its associated export cables.

18.9.4.2 Oil and Gas Developments

175. A possible in-combination impact will be on access to the platforms in the Jacky and Beatrice Fields and the proposed Polly Well (i.e. future drilling and decommissioning of installations).

176. The Polly Well is anticipated to be tied into the Beatrice Bravo platform and as the vessels and rigs tend to route to these locations from the south and east, they are well clear of the Wind Farm. Therefore the cumulative impact on vessel routeing and rig access is not considered to be significant.

18.9.4.3 Other Developments

177. SHETL has made proposals for an offshore HVDC cable and hub, which is planned to be located approximately 4.5 NM to the east of the Wind Farm.

178. As commercial shipping density is relatively low within the Wind Farm area it is considered that any cumulative impact of the SHETL cable and hub will not be significant.

18.9.5 MITIGATION MEASURES

179. Assuming industry standard mitigation measures are put in place at the Wind Farm and the Moray Firth Round 3 wind farm sites no further requirement for additional mitigation is anticipated beyond mitigation measures presented in Table 18.3.

18.9.6 RESIDUAL CUMULATIVE IMPACTS

180. Table 18.5 presents a summary of the shipping and navigation residual cumulative impacts.

Table 18.5 Summary of Residual Cumulative Impacts

Residual Impacts	Magnitude of Impact	Nature	Significance of Residual Impact
Commercial Shipping Routeing and Collision Risk	Small	Negative	Not significant
Recreational Vessel Routeing and Collision Risk	Small	Negative	Not significant
Fishing Vessel Routeing and Collision Risk	Small	Negative	Not significant

18.10 STATEMENT OF SIGNIFICANCE

181. The Wind Farm and Outer Study Area is located in an area of low commercial ship density with the main ship route passing 5 NM north by north east of the Wind Farm Site on the Pentland Firth route.

182. Consultation with navigational stakeholders was positive with no objections to the Wind Farm Site; however, close coordination is needed between BOWL and the nearby Oil and Gas operators. Consultation is on-going to ensure navigation and non-navigational issues are addressed at relevant stages of the Wind Farm development.
183. There is limited fishing and recreational vessel activity within the Wind Farm Site. Recreational routeing is influenced by weather and sea conditions with a small number of RYA/CA cruising routes in the area. Fishing activity was recorded mostly to the south and east of the Wind Farm Site, with vessels also recorded on passage, using the Pentland Firth route.
184. In the hazard review workshop involving local navigational stakeholders, pre-mitigation, all hazards were identified to be low assuming industry standard mitigation measures (see Table 18.3).
185. Following identification of the key navigational hazards, risk analyses were carried out to investigate selected hazards in more detail. The overall level of risk post development including industry standard mitigation measures was found to be low.
186. Overall, a quantitative assessment estimated that, compared to the background marine accident risk levels in the UK, the increase in risk to both people and the environment caused by the Wind Farm assuming industry standard mitigation is low.
187. Overall, it is predicted that with embedded industry standard mitigation measures put in place for the proposed Wind Farm, the development will have a minor negative residual impact on shipping and navigation. No effects on shipping and navigation from the Wind Farm are considered to be significant both for the Wind Farm in isolation, and cumulatively with other existing, proposed and future developments.

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