

28 OFFSHORE TRANSMISSION WORKS SHIPPING AND NAVIGATION

28.1 INTRODUCTION

1. This Section of the ES evaluates the likely significant effects of the (OfTW on shipping and navigation. 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 28A: Navigation Risk Assessment (NRA). Figures and data from the NRA are included in this Section as required.
3. This Section includes the following elements:
 - Assessment Methodology and Significance Criteria;
 - Baseline Description;
 - 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.

28.1.1 GUIDANCE DOCUMENTS

28.1.1.1 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 developments in the following annexes of the MCA document Considerations on Site Position, Structures and Safety Zones (Annex 1), Navigation, Collision Avoidance and Communications (Annex 2) and Safety and Mitigation Measures (Annex 4).

28.1.1.2 Other Guidance

6. Other forms of guidance used in this assessment are as follows:
 - 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).

28.1.1.3 Other Key Reference Materials and Data

7. Other key reference materials and data used in this assessment are as follows:
 - North Hoyle Trials (MCA, 2005) and (QinetiQ and MCA, 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);
- Navigation Risk Assessment (2011) (Annex 28A);
- 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).

28.2 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

28.2.1 CONSULTATION

8. As part of the NRA for the Wind Farm and OfTW, consultation was carried out with marine stakeholders to ensure the impact assessment gave account to their views. A number of joint meetings were held with both BOWL and Moray Offshore Renewables Ltd (MORL), given the proximity of the Wind Farm Site 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 individual hazard review workshops with oil and gas and commercial shipping stakeholders. A detailed summary of the consultation is provided in Section 18: Wind Farm Shipping and Navigation (see Section 18.2.1). Consultation and scoping responses for the OfTW are presented in the main NRA report Annex 28A and in Table 28.1.
10. Scoping responses on the OfTW, relevant to shipping and navigation were received from the following organisations:
 - Marine Scotland (MS);
 - Marine Coastguard Agency (MCA);
 - Northern Lighthouse Board (NLB);
 - Royal Yacht Association (RYA); and
 - Defence Infrastructure Organisation.
11. The main points raised from the scoping comments are summarised in Table 28.1 below.

Table 28.1 Summary of Scoping Responses

Consultee	Summary of Consultation Response	Project Response
Marine Scotland (MS)	MS stated the report should address possible issues concerning collision risk, navigational safety, effect on small craft navigational and communication equipment.	The potential impact of the OfTW on shipping and navigation, including small craft and navigational equipment are assessed within the NRA (Annex 28A) and Assessment of Potential Impacts (Section 28.5)
Marine Coastguard Agency (MCA)	<p>MCA stated that shipping activity appears relatively low. However, they noted that there are distinct areas where shipping routes intersect the OfTW cable corridor, particularly east to west, where tracks pass along the southern coastal areas of the Moray Firth. The traffic study and associated NRA should focus on these areas.</p> <p>The NRA should reference any electromagnetic effects on ships compasses and navigation.</p> <p>Particular attention should be paid to cabling routes and burial depth for which a Burial Protection Index (BPI) study should be completed and, subject to the traffic volumes, an anchor penetration study may be necessary.</p>	<p>Baseline shipping survey data recorded in the OfTW cable corridor is presented in Section 28.3.3 to Section 28.3.5.</p> <p>The potential impact of the OfTW on shipping and navigation, including small craft and navigational equipment/electromagnetic effects are assessed within the NRA (Annex 28A) and Assessment of Potential Impacts (Section 28.5)</p>
Northern Lighthouse Board (NLB)	<p>NLB noted there would be a requirement for Notice(s) to Mariners, Radio Navigation Warning and publication in appropriate bulletins, stating the nature and timescale of any works carried out in the marine environment relating to this project.</p> <p>It may be necessary to mark the landfall site of the export cable depending on the location chosen after the OfTW process has been completed. All navigational marking and lighting of the site or its associated marine infrastructure will require the Statutory Sanction of the Northern Lighthouse Board prior to deployment.</p> <p>NLB would also welcome and encourage engagement with any</p>	<p>Notice(s) to Mariners, Radio Navigation Warning and publication in appropriate bulletins, stating the nature and timescale of any works carried out in the marine environment relating to this project will be promulgated prior to any works in the cable corridor.</p> <p>Mitigation measures are presented in Section 28.6</p>

Consultee	Summary of Consultation Response	Project Response
	other Offshore Renewable Energy Developers in order to work together to minimise the cumulative impact of site development in the vicinity.	
Royal Yacht Association (RYA)	<p>RYA indicated that it seems unlikely that there would be any significant impact of the OfTW on recreational sailing either in the installation or operational phases.</p> <p>Most recreational vessels will pass along the coast and although the small harbours are used by recreational craft, the landfall will presumably not be located at one of them.</p> <p>RYA highlighted a possible opportunity for improving local harbour infrastructure during the construction phase of the OfTW to the benefit of all harbour users.</p>	<p>Baseline recreational shipping survey data recorded in the OfTW cable corridor is presented in 28.3.3 to Section 28.3.5.</p> <p>The potential impact of the OfTW on shipping and navigation, including small craft and navigational equipment/electromagnetic effects are assessed within the NRA (Annex 28A) and Assessment of Potential Impacts (Section 28.5)</p>
Defence Infrastructure Organisation	<p>The Defence Infrastructure Organisation confirmed that they had no objections to the OfTW.</p> <p>However, the Defence Infrastructure Organisation noted that the cable route runs through an area which is used by the Navy for Joint Warrior Exercises. Therefore, they would be grateful if information could be provided on the dates planned for laying the cables, when available.</p>	<p>Baseline navigational features, including military practice areas are presented in Section 28.3.1.</p>

28.2.2 SCOPE OF ASSESSMENT

12. The scope of this Section is to assess all the potential shipping and navigation impacts that may result from the OfTW and to identify associated mitigation measures and monitoring plans.
 13. As part of this assessment, the hazards associated with the OfTW on shipping and navigation were recorded. Following the hazard review workshop (for both Wind Farm and OfTW), the potential impacts on shipping and navigation were assessed in terms of vessel routing (distance, time, fuel and grounding risk) and anchoring, collision risk, electromagnetic impacts and response to maritime incidents.
- 28221 The OfTW NRA technical report and Formal Safety Assessment (FSA) is presented in Annex 28A. Figures and data from the NRA are included in the Section as required.

28.2.2.2 Geographical Scope

14. The assessment covers the OfTW corridor boundary (the Inner Study Area). Analysis of shipping data is provided to a 10 NM radius of the OfTW corridor boundary (the Outer Study Area) for comprehensive coverage of passing shipping, with other data sources presented to the extent of the data, (i.e. fishing vessel sightings and anchorage areas).

28.2.3 SURVEYS

15. Two vessel based surveys recorded data in the OfTW Corridor whilst carrying out surveys for the Wind Farm and the Moray Firth 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. For the OfTW cable route to shore the primary source of shipping data was from Automatic Identification System (AIS) data on vessel movements. The objective of the survey was to identify the vessel activity both within, and adjacent to, the OfTW.
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. 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 OfTW, e.g. when travelling between ports.)

28.2.4 IMPACT ASSESSMENT METHODOLOGY

20. The assessment methodology principally follows the DECC Risk Assessment Methodology (DECC, 2005) and the MCA MGN 371.
21. 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 28.4. The embedded and best practice mitigation measures are also presented in Table 28.3 relative to the shipping and navigation receptors and potential impacts.

28.2.4.1 Worst Case

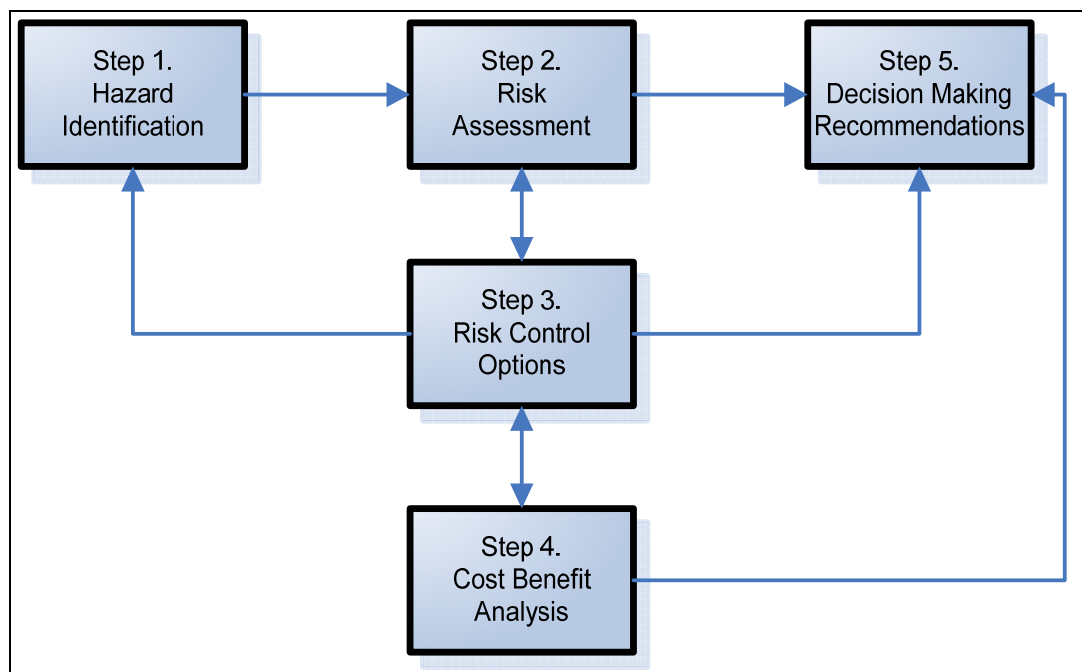
22. For the OfTW cable corridor navigation risk assessment and Rochdale Envelope (worst case assessment), a worst case scenario for the impacts of the OfTW upon shipping and navigation has been identified from Section 7: Project Description of the ES. The following parameters represent the realistic worst case for the OfTW:

- The maximum number of cables and largest length of unburied cable(s); whereby 45% of the cable will be protected by either rock placement or concrete mattresses, representing the greatest potential anchor interaction risk; and
- The maximum duration of the OfTW installation (cable laying and burial/protection activities) constituting the greatest loss of navigable sea room.

28.24.2 *Significance Criteria*

23. The impact on the main vessel types in the area (commercial shipping, fishing and recreational sailing) was firstly assessed qualitatively in the NRA (Annex 28A) based on the findings of the baseline assessment.
24. 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 28.1.

Plate 28.1 Formal Safety Assessment process



25. The detailed assessment that was carried out included:
- Hazard Log and Risk Ranking (NRA, Annex 18A);
 - Navigational Risk Assessment for selected hazards;
 - Maritime Incident and Search and Rescue review; and
 - Assessment of risk controls and mitigation measures.
26. 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.
27. 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. An offshore operator’s workshop was also carried out in Aberdeen on 7th July 2011.
28. The key maritime hazards associated with the Wind Farm and OfTW were identified at the hazard review workshops. Full details of the Hazard workshop methodology and results are provided in the Wind Farm NRA Hazard Log (Annex 18A).
29. The ranking of the risks associated with the various hazards was carried out using a risk matrix, as presented in Plate 28.2 below.

Plate 28.2 Risk Ranking Matrix

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

30. 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.
31. A description of the risk matrix regions is provided in Table 28.2.

Table 28.2 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.

32. Other general hazards associated with the construction/installation, decommissioning and 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.
33. 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.
34. Following the hazard workshop ranking, the impacts on the shipping and navigation receptors are assessed in the Risk Analysis section, (Section 28.5.2).
35. As part of the NRA, the impact on vessel routeing (i.e. deviations around cable laying vessels), is compared to the current vessel routeing. Based on the stakeholder feedback and the number of vessels and type on a route, minor/temporary deviations are considered to be 'broadly acceptable' (not significant). The impact of large deviations on busy routes, (i.e. for regular operators/ferries), which could result in increased voyage time and fuel cost, are considered to be significant.
36. The potential impacts on shipping and navigation from offshore wind farm developments are not easily categorised using the significance criteria outlined within Section 4. 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 28.2) 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 or temporary deviations around OfTW activities) and low risk in terms of vessel navigation, collision risk and response to marine incidents; and
 - **Significant.** Impacts that are moderate in terms of vessel routeing (large deviations around OfTW activities) 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.

28.3 *BASELINE CONDITIONS*

28.3.1 **PORTS AND NAVIGATIONAL FEATURES**

37. A chart of nearby navigational features ports, harbours and anchorage areas relative to the OfTW is presented in Figure 28.1.
38. The OfTW cable route corridor passes 6.3 NM west of Radar Target Buoy Number 3 and through the western edge of the Firing Practice Area D807 (used by RAF weapons targeting and training purposes.) The OfTW cable route corridor is approximately 3 NM east of Binn Hill rifle range Practice and Exercise Area (PEXA X5702).
39. From east to west the following anchorage areas have been identified from charts and the pilot book (Admiralty Sailing Directions, 2009) for the area:
- Banff Bay (16.5 NM east of the OfTW) – anchorage in depths of 12 m. Smaller vessels can anchor further inshore (dependant on draught), where the ground swell which persists in the outer approaches to the bay is less.
 - Whitehills (14 NM east of the OfTW) – vessels waiting on tide for entering the harbour can anchor in a water depth of approximately 12 m.
 - Cullen Bay (6 NM east of the OfTW) – anchorage can be found in the outer part of the bay, in depths of 9 to 11 m. In addition, Port Long approximately 0.8 NM east by south east is a rocky cove with sandy bottom and is used as a temporary refuge by local craft which are unable to make Cullen Harbour during strong winds from the north.
 - Spey Bay (the OfTW corridor intersects Spey Bay) – anchorage is available anywhere west of the meridian 3 degrees west, but mariners are advised to remain in depths of not less than 10 m. In the event of strong north easterly winds, the anchorage should be vacated at once as in these conditions the sea quickly starts to break at a considerable distance offshore.
 - Lossiemouth (7.7 NM west of the OfTW) – an outer anchorage can be used when waiting on suitable tides to enter, however mariners are advised to keep Covesea Skerries Light open north of Stotfield Head and to remain in depths not less than 10 m. The best berth for larger vessels is in a depth of about 13 m, 242 degrees from the harbour entrance and with Halliman Skerries Beacon 2 NM west to north west, here the holding is good, but further east the sea bed is rocky and holding is poor. It is noted that vessels anchoring off Lossiemouth should take care to avoid submarine cable outfall, the extremity of which is marked by a special buoy 930 m north east of the harbour entrance.
 - Burghead Bay (18 NM west of the OfTW) – an outer anchorage is recommended approximately 1 NM west of the harbour entrance in a depth of 11 m (sand). Disused cables in this vicinity are no longer considered a hazard but a submarine outfall pipe, over which depths maybe about 2.5 m less than charted

on account of rock protection, extends 1022 m north west from the extremity of Burghead.

28.3.2 MARINE ENVIRONMENTAL HIGH RISK AREAS

40. Marine Environmental High Risk Areas (MEHRAs) have been identified by the UK Government as an area of environmental sensitivity and at high risk of pollution from ships.
41. There is one MEHRA located within 30 NM of the OfTW, located at Kinnaird Head (between Rosehearty and Fraserburgh on the Aberdeenshire coast).

28.3.3 COMMERCIAL SHIPPING

28.3.3.1 Outer Study Area Survey Analysis

42. Charts of representative 28 day survey periods of winter (November 2010 to January 2011) Gargano data and Chartwell summer data (July 2010) are presented in Figure 28.2 and Figure 28.3.
43. The number of vessels within 10 NM of the OfTW (excluding the vessel carrying out the survey) averaged approximately nine vessels per day during the two surveys.
44. The majority of vessel tracks were associated with vessels heading east/west into Inverness and Cromarty Firth.

28.3.3.2 Inner Study Area Survey Analysis

45. The main east/west route intersects the OfTW cable corridor for approximately 3-4 NM. In general, merchant shipping on this route keeps at least 1.3-2.5 NM north of the Moray and Aberdeenshire coastlines, mainly due to sea depth restrictions.
46. In addition, offshore support traffic was recorded intersecting the OfTW cable corridor on a narrow route (approximately 4 NM south east of the Wind Farm Site) headed to the Beatrice and Jacky Oil Fields from Aberdeen and Peterhead. Wind Cat crew transfer vessels were also recorded intersecting the cable routes when travelling between Buckie and the Beatrice/Jacky platforms.

28.3.3.3 Outer Study Area Anchoring Review

47. A detailed analysis of a combined dataset of Chartwell and Gargano survey data (56 days) relative to the Outer Study Area is presented in Figure 28.4.
48. It can be observed that a number of vessels were recorded during the surveys at anchor within 3 NM of the OfTW cable corridor, notably in Spey Bay.
49. It is also noted that offshore drilling rigs can moor in the Outer Study Area whilst 'waiting for orders' and/or prior to being moored in the Cromarty Firth for maintenance.
50. Additional AIS data recorded from Chartwell (April and May 2010) was analysed and three semi-submersible drilling rigs were recorded moored within the Outer Study Area as described below:

- John Shaw was recorded 6.3 NM west of the OfTW cable corridor (5.5 NM north of Lossiemouth);
- Ocean Nomad was recorded 6.8 NM west of the OfTW cable corridor ; and
- Borgsten Dolphin was recorded approximately 10 NM west of the OfTW cable corridor (7.6 NM north by north west of Lossiemouth).

28.3.3.4 Inner Study Area Anchoring Review

51. A detailed chart of Spey Bay and the Inner Study Area, including anchored vessels recording during the combined survey period is presented in Figure 28.5.
52. Within approximately 6 NM of the Inner Study Area, in Spey Bay, there were 14 vessels recorded at anchor (the majority were small to medium sized cargo vessels (55%)).
53. An average of one vessel every two days was recorded anchoring in the area, with approximately equal numbers of vessels recorded during the summer and winter surveys.
54. A summary of the three closest anchored vessels recorded during the two surveys is provided below:
 - The crude oil tanker Penlop (255 m in length, broadcasting a draught of 8.6 m) was recorded anchored for a period of five days during November 2010 on the western edge of the Inner Study Area.
 - The second closest vessel anchoring was the tug Kintore (29 m in length, broadcasting a draught of 3.5 m) recorded for four days during July 2010, approximately 130 m west of the Inner Study Area and 1.3 NM from the coast.
 - The third closest anchored vessel was the general cargo vessel Sea Ruby (78 m in length, broadcasting a draught of 4 m) 470 m east of the Inner Study Area (1.7 NM north of Portgordon).

28.3.4 RECREATIONAL VESSEL ACTIVITY

28.3.4.1 RYA Data

55. 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 OfTW cable corridor is presented in Figure 28.6.
56. The nearest marina to the OfTW is located at Portgordon approximately 0.54 NM (1 km) east, and the nearest clubs are located at Lossiemouth and Findochty.
57. There are three Medium Use routes that pass over the OfTW cable corridor, from Wick to Peterhead, Buckie, and Lossiemouth. A Light Use route between the Northern Isle and Moray Firth (Lossiemouth) also intersects the OfTW cable corridor.
58. It is also noted that Spey Bay is a General Sailing Area and extends 3.7 NM from the OfTW land fall options.
59. RYA define a General Sailing Area as an area in extensive use for general day sailing by all types of recreational craft but particularly smaller craft such as small

cruisers, day boats, dinghies, sailboards and personal watercraft. Such craft will not normally be undertaking point-to-point passages but will be on out and return activities and may appear to be sailing in random directions as they take advantage of wind and tide to make progress.

28.3.5 FISHING VESSEL ACTIVITY

60. This Section reviews the fishing vessel activity along the OfTW cable corridor based on the maritime traffic surveys and the Commercial Fisheries Assessment (see Section 27 of this ES).

28.3.5.1 Survey Data

61. The fishing vessels tracked during the combined 56 days maritime traffic survey are presented in Figure 28.7.

62. The majority of fishing tracks were recorded headed in and out of the fishing port of Buckie and with fishing vessels intersecting the OfTW cable corridor approximately 10 NM north of the OfTW landfall.

63. Overall, 48 fishing vessels were tracked intersecting the OfTW cable corridor during the combined survey period, an average of approximately one fishing vessel per day.

64. It was noted that survey and Marine Management Organisation satellite monitoring and sightings data showed good agreement with the survey data.

28.3.5.2 Commercial Fisheries Assessment

65. A detailed assessment of the fishing activity in the vicinity of the OfTW has been performed as part of the Commercial Fisheries Assessment (see Section 27).

28.3.6 SEARCH AND RESCUE RESOURCES

66. A comprehensive review of the SAR resources in the region, relative to the Wind Farm Site and OfTW cable corridor is presented in Section 18: Wind Farm Shipping and Navigation of this ES.

28.3.7 MARITIME INCIDENTS

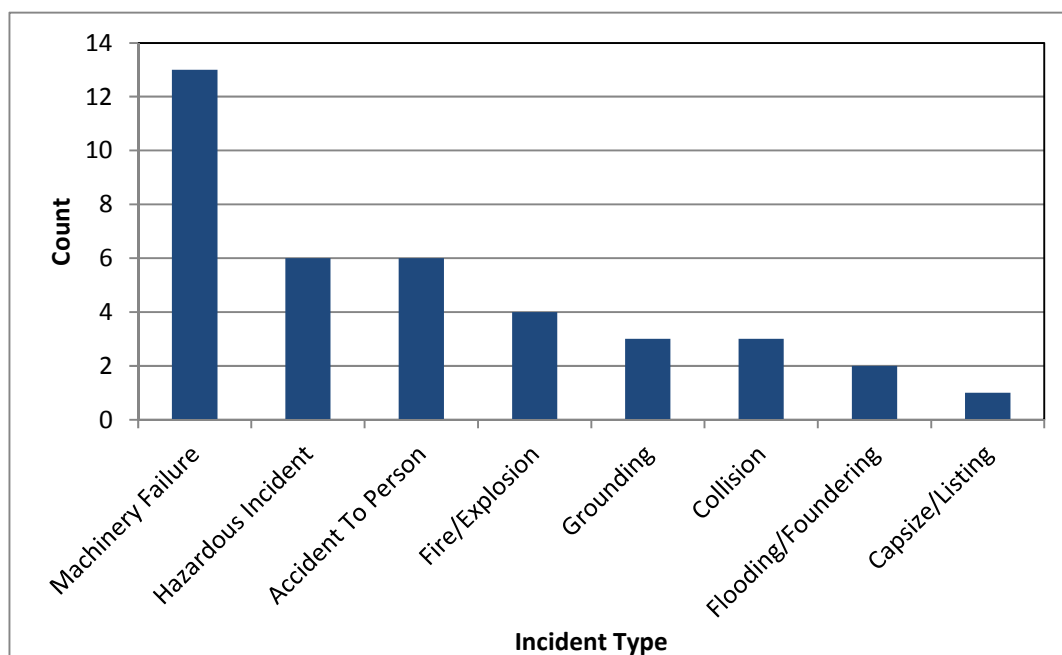
28.3.7.1 Marine Accident Investigation Branch Incidents

67. The locations of accidents, injuries and hazardous incidents reported to the Marine Accident Investigation Branch (MAIB) within the Outer Study Area, (10 NM of the OfTW) between January 2001 and December 2010 are presented in Figure 28.8, colour-coded by type.

68. A total of 38 incidents were reported within the Outer Study Area, corresponding to an average of four incidents per year. The majority of the incidents occurred in the coastal area between Lossiemouth and Portsoy.

69. The most common incident type recorded within the Outer Study Area (10 NM) was a machinery failure representing 34% of all incidents over the ten year period (approximately a quarter of these were fishing vessels). The distribution by incident type is presented in Plate 28.3.

Plate 28.3 MAIB Incidents within the Outer Study Area (2001-2010)

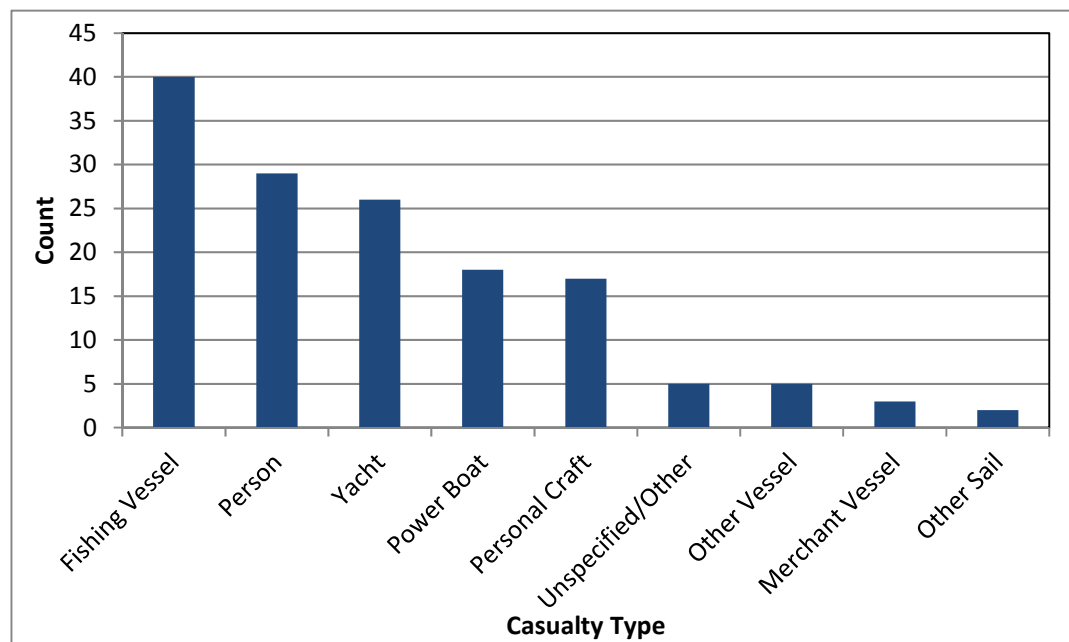


70. There were no incidents reported within the Inner Study Area, the closest incident was a machinery failure recorded approximately 0.4 NM from the OfTW in September 2005. The incident involved a 5 m fibre glass fishing vessel which got a submerged rope caught around propeller. An emergency call was made by member of public and the vessel was towed into port by the Buckie All Weather Lifeboat (ALB).
71. The second closest incident involved a collision between a general cargo ship (90 m) and a fishing beam trawler (12 m) in September 2008 in clear visibility and daylight conditions approximately 0.6 NM west of the Inner Study Area. The fishing vessel had gear deployed at the time and the cargo ship was on passage at full speed. The merchant vessel attempted evasive manoeuvres to avoid the fishing trawler when it was sighted, however both vessels collided sustaining minor damage.

28.3.72 *RNLI Incidents*

72. 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 145 launches were recorded by the RNLI (excluding hoaxes and false alarms). Figure 28.9 presents the RNLI incidents by casualty type.
73. Fishing (28%), person (20%) and yacht (18%) were the most common casualty types involved in the RNLI accident data. The remainder of casualties were mainly made up of inshore vessels, i.e. power boats (12%) and personal craft/canoes (12%). The overall distribution by casualty type is summarised in Plate 28.4.

Plate 28.4 RNLi Casualty Types within 10 NM of OfTW (2001-2010)



74. No incidents were recorded within the Inner Study Area over the 10 year period analysed. The three closest incidents are summarised below:

- A machinery failure occurred on a yacht on 24th June 2007; Buckie ALB gave assistance approximately 0.1 NM west of Inner Study Area (0.8 NM north of the coast).
- A failed search for missing person (presumed drowned) on 25th October 2004 by Buckie All-weather Lifeboat (ALB) approximately 0.16 NM east of the Inner Study Area (11.5 NM north by north west of Buckie).
- Buckie ALB gave assistance in a search for an abandoned canoe 25th March 2007, observed 0.2 NM east of the Inner Study Area.

28.3.8 ASSESSMENT LIMITATIONS

75. 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 to ensure commercial ships, fishing vessels and recreational craft were recorded in the Outer Study Area of the OfTW.

76. The review of potential impacts was carried out by experienced personnel including local mariners through the use of hazard review workshops and the consultation process. This gives further confidence in the findings of the work.

77. As a result of the approach adopted, the limitations associated with this study are not considered to be significant.

28.4 DEVELOPMENT DESIGN MITIGATION

78. The impact of the OfTW has been partly mitigated by location, as the OfTW is in an area away from the busy commercial shipping route to/from Pentland Firth.

79. BOWL is committed to ensuring that the post installation status of the OfTW shipping activities to be safely resumed. Embedded design mitigation to facilitate this includes:

- Cable burial where feasible (minimum 55%);
- Protection of cable where burial is not feasible (up to 45%);
- Use of rock dumping to cover cables or to limit the height of free spans;
- Use of concrete mattresses to cover cables; and
- Post installation, trenching and protection surveys.

28.4.1 INDUSTRY STANDARD MITIGATION

80. The following Section describes the embedded industry standard mitigation measures for the OfTW.

81. Export cables will be buried or protected where feasible, taking into account fishing and anchoring practices (see Section 7.12.5: OfTW Cable Protection Measures of the ES).

82. Positions of export cable routes notified to Kingfisher Information Services-Cable Awareness (KIS-CA) for inclusion in cable awareness charts and plotters for the fishing industry. Potential for admiralty charts to note no anchoring over charted cable(s).

83. Appropriate liaison to ensure information on the OfTW and special activities is circulated in Notices to Mariners (NtMs), Navigation Information Broadcasts and other appropriate media.

28.5 ASSESSMENT OF POTENTIAL IMPACTS

28.5.1 HAZARD REVIEW WORKSHOPS

84. The hazard review workshop reviewed shipping and navigation hazards identified by stakeholder feedback and experience at other offshore developments (generic industry hazards). A number of hazards relating to the Wind Farm and OfTW were reviewed, with the information recorded using Anatec's Hazard Log software, see Section 18.5.1 and the NRA Hazard Log (Annex 18A) for more information. The following list of hazards apply to the OfTW:

- Fishing gear interaction with export cable; and
- Vessel anchoring on or dragging anchor over subsea equipment.

85. The following generic industry hazard was also identified for the Wind Farm and OfTW but not discussed in detail:

- Dropped object during work activities.

86. Overall, feedback from the stakeholders at the hazard review workshop concluded that no risks were unacceptable in terms of the OfTW.

87. One hazard was ranked as tolerable based on worst case outcome:

- Dropped object during construction, decommissioning or major maintenance.

88. A dropped object incident generally involves Wind Farm/OfTW related vessels and persons working at the site as opposed to passing third party vessels.
89. Further details on all hazards identified (including area, phase of operation, causes, risk ranking, risk control and mitigation measures) are recorded in the main NRA Hazard Log (see Annex 18A).

28.5.2 RISK ANALYSIS

90. 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 OfTW on MEHRAs and 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 30 NM) and the negligible impact considered on ports/harbour approach channels and traffic.
91. More attention was focused upon the high risk areas to identify and evaluate the factors which influence the level of risk. The impact on shipping and navigation is assessed during installation/decommissioning and operational phases of the OfTW.
92. Assessment has also been carried out of:
- Impact on commercial ships;
 - Routeing (additional distance, time and fuel cost)
 - Impact on collision and grounding risk
 - Anchoring
 - 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 small vessel anchoring;
 - Impact on shipbourne navigation equipment; and
 - Impact on SAR operations, including transit distance and time.

28.5.3 IMPACT ON COMMERCIAL SHIPPING

93. Impacts on commercial shipping from the OfTW are assessed in the following subsections.

2853.1 Ship Routeing

94. The main shipping lane intersecting the OfTW cable corridor is the coastal route used by vessels headed east/west to Inverness and Cromarty Firth. Due to the draughts of these ships and water depth, vessels tend to keep at least 1.3 to 2.5 NM north of the Moray and Aberdeenshire coast. Shipping is likely to avoid shallow, coastal areas, where there may be the possibility of a grounding impact; therefore the risk is not significant.

95. Offshore supply vessels also intersect the OfTW, east of Beatrice Oil Field, when travelling between the Beatrice Oil Field and offshore supply bases (Peterhead and Aberdeen). In addition, Wind Cat crew transfer vessels were also recorded intersecting the cable routes when travelling between Buckie and the Beatrice/Jacky platforms. No impact on vessel routing or grounding risk is predicted for vessels on these offshore routes.
96. Given the available sea room in the Moray Firth, east and west of the OfTW cable route corridor and the low levels of inshore commercial vessels in close proximity to the OfTW Inner Study Area, there will not be a significant impact on commercial ship routing. The main impacts will be of a temporary nature during the cable laying/installation process and this is assessed in Section 28.5.3.3.

28.5.3.2 *Anchoring*

97. The hazard review workshop highlighted that the Moray Firth provides vessels with sheltered anchorages, inshore of adverse sea and weather conditions that can be experienced in the North Sea. Vessels including, shuttle tankers, offshore supply ships, military vessels, survey and cable laying vessels anchor off the Moray Firth coastline during severe weather.
98. Larger commercial vessels mainly anchor further from shore and during the survey a crude oil tanker was recorded approximately 8 NM from the OfTW landfall location, in good holding ground (sand and muddy sand).
99. Small to medium sized cargo ships and other commercial vessels (e.g. tugs, offshore vessels and mobile drilling rigs) were recorded using inshore anchorages in Spey Bay or Cullen Bay, in closer proximity (under 10 NM) to the OfTW cable corridor. The sea bed type in Spey Bay is less mobile, and is mainly coarse sediment and gravels.
100. In terms of the impact to vessel anchoring displacement from these areas, it is expected that following installation of the cable and marking on admiralty charts, anchoring activity is likely to migrate east (towards Lossiemouth) and/or west (off Buckie) of the cable. It is noted that there are a number of alternative anchorages described in the pilot book for the area and marked on admiralty charts (Burghead Bay, Cullen Bay and Whitehills); therefore the impact on vessel anchoring is considered not to be significant.
101. The risk of anchor interaction for the OfTW cable corridor is considered to be higher in the Spey Bay area, therefore, to minimise the impact on current anchoring practices, cable protection and burial should be used to decrease the likelihood of anchor dragging or snagging cables. Overall the impact on vessel anchoring and risk of dragging anchor onto the operational cable is considered not to be significant, on the basis that risks still exist, although low.

28.5.3.3 *Increased Traffic*

102. The presence of cable laying vessels within the OfTW cable corridor during the installation phase can pose additional risk to navigation. This is mainly due to

increased vessel activity and the fact that cable laying vessels are restricted in manoeuvrability, leading to an increase in collision risk.

103. Vessels on the coastal route (headed east/west to Inverness and Cromarty Firth) could be impacted in terms of routeing distance, time and fuel cost, as they will deviate from their current route to avoid cable laying works. The assessment carried out identified that these impacts were not significant; given the temporary nature of the works and that only minor deviations would be required.
104. It is considered that there is available sea room in the area for passing commercial vessels to route around additional marine operations traffic and cable laying vessels. Assuming industry standard safety management systems and mitigation, it is expected that cable laying, maintenance and decommissioning works can be carried out safely, and the impact on commercial shipping will not be significant.

28.5.4 IMPACT ON RECREATIONAL VESSELS

105. The OfTW cable corridor is intersected by a number of RYA recreation cruising routes, and a general sailing area is located within Spey Bay. Scoping comments from RYA indicated that it is unlikely that there would be any significant impact of the OfTW on recreational sailing either in the installation or operational phases.
106. During the shipping survey a small number of recreational vessels were recorded sailing off the Moray coastline to Lossiemouth. Vessels on this route could be temporarily impacted during cable laying works in terms of routeing (distance, time and fuel cost) and risk of collision.
107. In a similar manner to those discussed for commercial vessels, the overall impact on recreational routeing and collision risk is considered to be not significant, given the available sea room within Spey Bay (outwith main shipping routes), the temporary nature of works and comments received from the RYA.

28.5.5 IMPACT ON FISHING VESSELS

108. Impacts on fishing vessels from the OfTW are assessed in the following subsections.

2855.1 Fishing Vessel Routeing

109. The surveys recorded fishing tracks approximately 10 NM north of the OfTW cable land fall options. Vessels were also recorded transiting to the nearby fishing ports of Portgordon, Buckie, Banff and Macduff. Fishing vessels on these routes could be impacted in terms of routeing distance and time; however there is available sea room in the area for vessels to pass at safe distance from activities within the OfTW. Overall, the impact on fishing vessel routeing will not significant.
110. In addition, local fishing vessels will be aware of cable laying vessels within the OfTW corridor during the installation phase through NtMs and fisheries liaison. Non-local fishing vessels will become aware of the cable laying activities as they arrive at fishing grounds through day marks and lights used by the cable laying vessels to warn passing vessels of restrictions in manoeuvrability.

28552 *Fishing Gear Interaction*

111. The impact of the OfTW on fishing grounds and potential gear interaction with the cable is covered within the Commercial Fisheries Assessment; see Section 27 of this ES.

28553 *Increased Traffic*

112. The presence of cable laying vessels within the OfTW cable corridor can pose additional risk to navigation of fishing vessels. This is mainly due to increased vessel activity and the fact that cable laying vessels are restricted in manoeuvrability, resulting in an increased risk of collision.
113. There is available sea room in the area for fishing vessels to safely pass around additional marine operations traffic, including cable laying or decommissioning vessels. In addition, local fishing vessels will be aware of vessels within the OfTW cable corridor through NtMs and fisheries liaison.
114. Assuming industry standard safety management systems and mitigation, it is expected that cable laying, maintenance and decommissioning works can be carried out safely. Overall, no significant impact is predicted on fishing vessels, in terms of collision risk when transiting through the area.

28.5.6 IMPACT ON SMALL VESSEL ANCHORING

115. The impact on smaller vessel (non-commercial) anchoring and risk of dragging anchor over the OfTW, (including recreational vessels) is expected to be similar in nature and extent to those discussed for larger commercial ships.
116. However, small vessels are likely to seek more sheltered/inshore anchorages, which are not limited by sea depth and anchor chain length. As identified for commercial shipping, alternative anchorages are described in the pilot book for the area and marked on admiralty charts (Burghead Bay, Cullen Bay and Whitehills). Therefore, assuming industry standard mitigation/cable burial and protection, including surveys to monitor export cables, the impact on small vessel anchoring displacement and dragged anchor risk will not be significant.
117. Consultation carried out with RYA and CA during the NRA (for Wind Farm and OfTW) stated that consultees would like the export cables buried or protected, particularly near port approaches. However, RYA/CA noted this is not considered an issue where sea depth is less than 10 m (approximately 0.62 NM north of the OfTW cable landfall location).

28.5.7 IMPACT ON SHIPBOURNE NAVIGATIONAL EQUIPMENT

118. A navigational impact was identified based on electromagnetic interference on small vessels (mainly recreational craft and small fishing boats) navigation equipment including compasses and communication equipment.
119. Based on the findings of the trials at the North Hoyle Offshore Wind Farm (MCA, 2005) and (QinetiQ, 2004), the wind farm generators and their cabling, inter-turbine and onshore, did not cause any compass deviation during the trials.

120. In addition studies have found that the greater distance the compass is from the cause of interference the less impact will be experienced.
121. It is assumed that all equipment and export cables from the Project will be rated and in compliance with design codes. 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. Overall, 55% of cable will be buried, with the remaining cable protected. As per ES Section 7: Project Description, typical cable protection solutions include covering the cable with:
- Concrete mattresses;
 - Rock armour;
 - Rock nets; or
 - Rock placement.
122. Therefore, it is considered that any electromagnetic fields will be very weak and will not have a significant impact on small vessels navigation or electronic equipment.

28.5.8 IMPACT ON SEARCH AND RESCUE

123. A review of historical incidents indicated that the incident levels in the vicinity of the OfTW cable corridor have tended to be low, see Section 28.3.7.
124. In the event of an emergency arising, within or adjacent to the OfTW, 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 OfTW Corridor indicated that the closest ALB is at Buckie (2.5 NM east), whilst there is a SAR helicopter base located at Lossiemouth, approximately 11 NM west of the OfTW cable corridor. This RAF base has Sea King helicopters with a maximum endurance of six hours giving a radius of action of approximately 250 NM which is well within the range of the OfTW.
125. It is considered that SAR operations will not be significantly impacted by the OfTW in terms of transit time, given the temporary nature of cable laying works, the proximity to SAR resources (Lossiemouth and Buckie) and the available sea room in the area for lifeboats to deviate around works.
126. Giving account to the design features associated with the Wind Farm and OfTW, 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-Wind Farm construction and in collaboration with the nearby offshore operators, it is considered that SAR issues can be well managed.
127. Overall it was concluded that the impact of the installation, operation and decommissioning phases of the OfTW on SAR will not be significant.

28.6 MITIGATION MEASURES AND RESIDUAL IMPACT

128. BOWL has mitigated the impact of the OfTW as industry standard risk control measures will be embedded during the installation and operation of the OfTW.

129. A number of mitigation measures are presented which are required by industry to ensure the project conforms to regular requirements and industry good practice.
130. 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 28.3 below.

Table 28.3 Potential Impacts and Mitigation Measures

Receptor	Potential Impact	Mitigation/ Type	Description	Residual Impact
Commercial, recreational and fishing vessels	Vessel routing (distance, time, fuel cost and collision/grounding risk)	Industry Standard - Information circulation Best Practice - Marine Control Centre	Appropriate liaison to ensure information on the OfTW and special activities is circulated in Notices to Mariners, Navigation Information Broadcasts and other appropriate media A Marine Control Centre will monitor AIS and record the movements of ships around the export cable(s) as well as company vessels working at the cable route	Not significant
Commercial and small vessels (recreation and fishing)	Vessel anchoring displacement and dragged anchor	Industry Standard - Marked on Admiralty Charts Industry Standard - Cable protection Industry Standard - Fisheries liaison Best Practice - Surveys of cable routes and burial depths Best Practice - Marine Control Centre	Export cable(s) will be charted by the UK Hydrographic Office on the appropriate scale charts. Potential to note no anchorage over charted cable(s). Export cable(s) will be buried or protected, where feasible taking into account fishing and anchoring practices, e.g. rock dumping, concrete mattresses and trenching (where possible) to a suitable depth. Positions of the export cable routes notified to FISHSafe via Kingfisher Information Services-Cable Awareness (KIS-CA) for inclusion in cable awareness charts and plotters for the fishing industry. Periodic and planned surveys of cable routes to monitor burial depths and sea bed mobility. A Marine Control Centre will monitor AIS and record the movements of ships around the export cable(s) as well as company vessels working at the	Not significant

Receptor	Potential Impact	Mitigation/ Type	Description	Residual Impact
		Best Practice - Vessels anchoring in the area set up alarm zones	cable route. Vessels anchoring in the area can set up alarm zones to warn if an anchor has moved (dragged).	
Vessels shipbourne equipment	Electromagnetic interference on shipbourne equipment	Industry Standard - Cable protection Best Practice - Surveys of cable routes and burial depths	Export cable(s) will be buried or protected, where feasible taking into account fishing and anchoring practices, e.g. rock dumping, concrete mattresses and trenching (where possible) to a suitable depth. Periodic and planned surveys of cable routes to monitor burial depths and sea bed mobility.	Not significant
Search and Rescue operations	Search and Rescue 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.' 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

28.7 SUMMARY OF IMPACTS

131. A summary of the potential impacts on shipping and navigation is presented in Table 28.4 below.

Table 28.4 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/grounding risk)	Small	Negative	Not Significant
Commercial, fishing or small vessel anchoring displacement and dragged anchor	Small	Negative	Not Significant
Electromagnetic interference on shipborne equipment	Small	Negative	Not Significant
Radar Interference on shipborne instruments (radar and VHF)	Small	Negative	Not Significant
Search and Rescue operations including SAR resources transit distance and time	Small	Negative	Not Significant

28.8 MONITORING AND ENHANCEMENTS

28.8.1 SAFETY MANAGEMENT SYSTEMS

132. 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 to be 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 and OfTW are likely to be considered with respect to the control measures applied at the OfTW.

133. The following subsections list the typical monitoring methods and systems which will be put in place at the Wind Farm Site and OfTW.

28.8.1.1 Marine Control Centre

134. Whilst no radar monitoring of vessel movements has been proposed for the OfTW Corridor, a Marine Control Centre monitoring AIS will be used to monitor and record the movements of vessels around the export cables (work boats and passing vessels).

28.8.1.2 Subsea Cables and Met Masts

135. The subsea cable routes will be subject to periodic inspection to ensure they remain buried. Any future maintenance works on the cable route should be carried out following issuing NtMs broadcasts on VHF.

28.9 ASSESSMENT OF CUMULATIVE IMPACTS

28.9.1 INTRODUCTION

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

137. A Cumulative Impacts Assessment Discussion Document (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.

28.9.2 SCOPE OF ASSESSMENT

138. 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).

139. Cumulative and in-combination impacts with maritime activities (shipping, fishing, recreation and associated facilities) are assessed in the NRA (Annex 28A). 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 28.3 for the OfTW. The impacts upon shipping and navigation have been assessed using the same criteria as presented in Section 28.2.4. The impact has been predicted as either significant or not significant.

28.9.3 CONSULTATION

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

141. 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.

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

28.9.3.1 Geographical Scope

143. 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).

28.9.3.2 Developments Considered in Assessment

144. 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 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:
 - Moray Firth Round 3 Zone OFTO;
 - Beatrice Offshore Transmission Works (OfTW);
 - 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.

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

- The offshore wind farms in the Outer and Firth of Forth (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 OfTW;
- A small number of military vessel tracks were recorded during the maritime surveys within 10 NM of the OfTW. Given the low level of activity and positive scoping comments received from the Defence Infrastructure Organisation on the OfTW, 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. There are a small number of chartered dredge sea disposal (spoil grounds) located within close proximity to the 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 of the OfTW is not significant.

146. 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 routing; and
 - Increase in collision risk (vessel-to-structure or vessel-to-vessel).
147. The cumulative impact on shipping and navigation, from simultaneous construction and cable laying works at the Wind Farm Site 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 Site (i.e. the Pentland Firth route) and cable laying works are considered to be temporary in nature.
148. The OnTW will not have any effects on Shipping and Navigation and hence have not been considered in this cumulative assessment.

28.9.4 PREDICTED IMPACTS

28.9.4.1 Regional Wind Farm Development

149. The nearest potential wind farm development area is located in the Moray Firth Round 3 Zone. The proposed cable corridor passes through the centre of the Western Development Area of the Moray Firth Round 3 Zone for approximately 6.2 NM.
150. In terms of the OfTW, cumulatively there will be an impact if the cable installation and construction phases of wind farm developments in the Western Development Area overlap. There could be reduced sea room across the Western Development Area due to the presence of wind farm construction and cable laying ships, and vessels of this type will be restricted in manoeuvrability.
151. The first export from the Wind Farm is expected to be in the second quarter of 2016 and any construction works within the Western Development Area are likely to occur in the second quarter of 2019, therefore the cumulative impact is not considered to be significant.
152. 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 OfTW.

28.9.4.2 Oil and Gas Developments

153. A possible in-combination impact will be on access to the platforms in the Jacky and Beatrice Fields and the proposed Polly development (i.e. future drilling and decommissioning of installations).
154. There could be an in-combination impact during installation of the export cable, as cable laying vessels tend to be restricted in manoeuvrability and there may be reduced sea room in the cable corridor (east of the Beatrice Field).

155. Vessels and rigs tend to route to Beatrice and Jacky Oil Fields from the south and east, and there will be available sea room to deviate around cable laying vessels. Overall, the cumulative impact is considered not to be significant.

28.9.4.3 Other Developments

156. SHETL has made proposals for an offshore High Voltage Direct Current (HVDC) cable and hub, which is planned to be located approximately 4.5 NM to the east of the Wind Farm.

157. As commercial shipping density is relatively low within the Wind Farm Site and export cable corridor, it is considered that any cumulative impact that could occur during overlapping installation phases of the SHETL cable/hub and the OfTW will not be significant.

28.9.5 MITIGATION MEASURES

158. Assuming industry standard mitigation measures are put in place at the OfTW and the Moray Firth Round 3 wind farm sites/export cable works no further requirements for additional mitigation are anticipated beyond mitigation measures presented in Table 28.3, Section 28.6.

28.9.6 RESIDUAL CUMULATIVE IMPACTS

159. Table 28.5 presents a summary of the shipping and navigation residual cumulative impacts.

Table 28.5 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

28.10 STATEMENT OF SIGNIFICANCE

161. The impact on shipping and navigation from the OfTW in terms of routeing distance/time, collision and grounding risk is considered to be not significant. Given the low level of shipping activity along the majority of the cable route, the available sea room and temporary nature of cable laying works, vessels should be able to increase passing distance from marine operations and associated works.
162. The Moray Firth provides vessels with anchorages that are sheltered from adverse sea/weather conditions. The displacement of anchoring vessels and risk of anchor interaction for the OfTW is considered to be higher in Spey Bay, therefore, to minimise the impact on current anchoring practices, cables will be buried or protected where feasible, to decrease the likelihood of anchor dragging or snagging cables.
163. There are alternative anchorages available in the area, and assuming industry standard mitigation/cable burial and surveys to monitor export cables, the impact on vessel anchoring will not be significant.
164. Scoping comments from RYA indicated that it is unlikely that there would be any significant impact of the OfTW on recreational sailing either in the construction or operational phases. Given the available sea room within Spey Bay for vessels to safely pass cable works (outwith shipping routes), the impact on recreation vessels will not be significant.
165. The impact of the OfTW on fishing grounds and potential gear interaction is covered within the Commercial Fisheries Assessment; see Section 27 of this ES.
166. Any electromagnetic fields generated by the export cable(s) will be very weak and the impact on navigation or electronic equipment will not be significant.
167. It was concluded that the impact of the OfTW on SAR operations and transit times will not be significant.
168. Overall, it is predicted that with embedded industry standard mitigation measures put in place for the proposed OfTW, the works will have no significant effects on shipping and navigation.

28.11 REFERENCES

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