



Rampion Offshore Wind Farm



ES Section 14 – Shipping & Navigation

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14 SHIPPING AND NAVIGATION

14.1 Introduction

- 14.1.1 This chapter summarises the work undertaken as part of the Navigational Risk Assessment (Appendix 14.1 – hereafter referred to as the NRA) used to identify and assess the existing vessel activity and navigational features in the vicinity of the proposed Rampion Offshore Wind Farm (the Project). The NRA covers the impacts of the proposed Offshore Project development on shipping and navigation in relation to commercial, recreational and fishing vessels.

14.2 Legislation and Policy Context

National Policy Statements (NPS)

- 14.2.1 NPS provide the primary basis on which the Secretary of State is required to make its decision.
- 14.2.2 The National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) dated July 2011 makes reference to the potential impact of offshore wind developments on Navigation and shipping. Relevant sections from EN-3 relating to the systems assessed within this chapter are given below.
- 14.2.3 Paragraph 2.6.153 states that: *“Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist.”*
- 14.2.4 Paragraph 2.6.154 states that: *“Assessment should be underpinned by consultation with the Marine Management Organisation (MMO), Maritime and Coastguard Agency (MCA), the relevant General Lighthouse Authority, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected.”*
- 14.2.5 Paragraph 2.6.156 states that: *“Applicants should undertake a Navigational Risk Assessment (NRA) in accordance with relevant Government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above.”*
- 14.2.6 Paragraph 2.6.157 states that: *“The navigation risk assessment will for example necessitate:*
- *A survey of vessels in the vicinity of the proposed wind farm;*

- *A full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant marine guidance; and*
- *Cumulative and in-combination risks associated with the development and other developments (including other wind farms) in the same area of sea."*

14.2.7 Paragraph 2.6.158 states that: *"Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on navigation and shipping."*

14.2.8 Paragraph 2.6.159 states that: *"Where the precise extents of potential safety zones are unknown, a realistic worst case scenario should be assessed. Applicants should consult the MCA and refer to the Government guidance on safety zones."*

14.2.9 Paragraph 2.6.160 states that: *"The potential effect on recreational craft, such as yachts, should be considered in any assessment."*

14.3 Guidance documents

14.3.1 The primary guidance documents used in this report are as follows:

- 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 (2008); and
- Department for Environment and Climate Change (DECC) in Association with MCA Guidance on the Assessment of Offshore Wind Farms - Methodology for Assessing Marine Navigational Safety Risks of Offshore Wind Farms (2005).

14.3.2 MGN 371 highlights issues that shall be taken into consideration when assessing the impact on navigational safety from offshore renewable energy developments, proposed within United Kingdom internal waters, territorial sea or Renewable Energy Zones (REZ).

14.3.3 The MCA require that the Methodology is used as a template for preparing navigation risk assessments. It is centered on risk management and requires a submission that shows that sufficient controls are, or will be, in place for the assessed risk (base case and future case) to be judged as broadly acceptable or tolerable.

14.3.4 Other guidance documents used during the assessment are listed below:

- MCA Marine Guidance Notice 372 (MGN 372 M+F) Offshore Renewable Energy Installations (OREIs) Guidance to Mariners Operating in the Vicinity of UK OREIs (2008);

- International Association of Marine Aids to Navigation and Lighthouse Authorities' (IALA) – 0-139 the Marking of Man-Made Offshore Structures, Edition 1 (2008);
- International Maritime Organisation (IMO) – Guidelines for Formal Safety Assessment (FSA) For Use in the IMO Rule-Making Process MSC/Circ. 1023 and MEPC/Circ. 395 (2002); and
- Royal Yachting Association (RYA) – The RYAs Position on Offshore Energy Developments (2012).

14.4 Scoping

- 14.4.1 Initial consultation on the project was carried out via the Offshore Project Offshore wind farm Scoping Document (E.ON/RSK, 2010), as well as further stakeholder engagement in 2011. Responses received are presented in the Infrastructure Planning Commission (IPC) Scoping Opinion report (IPC, 2010).
- 14.4.2 The information, advice and comments received during the scoping process with regard to shipping and navigation issues are summarised in Table 14.1 together with a list of the locations in the ES where the comments are addressed.

Table 14.1: Scoping and consultation responses

Date	Consultee	Summary of Issues	Sections where addressed
8/11/10	Maritime and Coastguard Agency	Possible impacts associated with collision risk.	Collision risk is assessed within section 14.0 of the NRA and includes assessment of baseline and future case risk.
		Possible impacts associated with navigation safety.	Issues identified within MGN 371 and the Methodology for Assessing Marine Navigational Risk have been addressed within the NRA.
		Possible impacts associated with intrusion and noise.	Acoustic noise masking sound signals and impacts on Sonar have been considered within section 20.9 of the NRA.
		Possible impacts associated with Emergency Response.	Impacts on the demand and provision of Emergency Response are addressed in section 19.0 of the NRA.

Date	Consultee	Summary of Issues	Sections where addressed
		Possible impacts associated with Marking and Lighting.	Marine navigational markings as required by THLS and IALA guidance O-139 are addressed in section 4.0 of the NRA.
		Possible impacts associated with effect on small craft navigation and communication.	Impacts on recreational craft are addressed in section 11.0 of the NRA.
		Risk to Drifting Recreational Craft in Adverse Weather	Recreational craft collision has been addressed in section 14.3.4
		The likely squeeze of small craft in to routes of larger commercial vessels	Impacts on recreational craft are covered in section 11.0 of the NRA.
		Requested that reference should be made to: • MGN 371 (and MGN 372); • The DECC/DfT methodology for assessing wind farms; • Marine Environmental High Risk Areas (MEHRA); • Order 1a (found in the IHO s44 standard (edition 5). (not IHO order 1) • Casualty info from MAIB and RNLI (to establish the risk profile of the area); • The “Rochdale Envelope” (given that the turbine foundations and capacity is undecided yet);	Guidance as indicated has been used to assess navigation and shipping within the NRA for the Rampion site. The NRA was undertaken using the principles of Rochdale. A full summary of guidance can be found in section 2.0 of the NRA. MEHRAS have been assessed in section 6.6.
		Cable routes and burial depth should be assessed subject to traffic volumes and an anchor penetration study may be required;	Impacts associated within the export cable have been assessed within the NRA. Further assessment work will be undertaken as required.
		The MCA shipping Route template does not recommend the development of wind farms within a distance of 5 nautical miles from the entry/exit of a Traffic Separation Scheme (TSS) and recommends a minimum separation of 3.5 nautical miles between turbines on opposite sides of a route.	Interaction with the Entry/Exit of the TSS has been assessed within the NRA. No channels and therefore opposing sides of turbines are planned.

Date	Consultee	Summary of Issues	Sections where addressed
		Study should include radar and manual observations in addition to AIS data to include vessels less than 300gt;	4 weeks of Radar surveys were under taken in January 2011 and July 2011 to capture vessels under 300gt
		Ensure full consideration of the implications to all identified marine users particularly those in the Inshore Traffic Zone (ITZ);	Impacts on routes entering, exiting or interacting with ITZ have been considered in section 9.0 of the NRA.
		Developers need to be aware that the radar effects of OWF on ship's radars are an important issue and will be subject to further discussion within the radar sub group of NOREL	Impacts on Radar have been considered within section 16 of the NRA.
n/a	RYA	RYA presented Offshore Project with 'RYA (December 2009) The RYA's Position on Offshore Energy Developments' for consideration in the NRA.	This document (and subsequent revisions) was used within the NRA, as detailed in section 2.0.
12/10/10	THLS	Need for navigational study including MGN 371 and survey over a 4 week period.	4 weeks of seasonal traffic data has been analysed in section 8.0 of the NRA.
		Further consultation required to confirm marine navigational marking requirements as per IALA recommendation O-139.	Marine navigational markings as required by THLS and IALA guidance O-139 are addressed in section 4.0 of the NRA.
		Decommissioning, removal and residual impacts after this should be considered	Construction and decommissioning impacts have been considered in section 15.0

14.4.3 It was noted the following stakeholders had no comment on the Scoping Report:

- Shoreham Port Authority; and
- Newhaven Port Authority.

Formal Pre-application Consultation

14.4.4 As detailed in Section 5 – EIA Methodology, an extensive programme of engagement has been undertaken with regard to the Project, details of which are provided in the Consultation Report for the Project (Document 5.1). This included publication of the Draft ES as part of the Section 42 and Section 48 consultation in June 2012.

14.4.5 Key consultees (including MCA and Shoreham Port) provided responses to the draft ES regarding shipping and Navigation. Modifications subsequently made to the final ES in respect of the responses received are as follows:

- 14.4.6 Survey methodology has been clarified in Sections 14.4.9 to 14.4.16;
- 14.4.7 Additional information regarding the collision risks due to the introduction of construction vessels in the area has been included in the NRA;
- 14.4.8 Information on the commercial impacts of potential re-routes as a result of the Wind farm are discussed in Section 14.6.41; and
- 14.4.9 Further regard has been made to the anchoring activity off Shoreham Harbour and an anchoring analysis has been carried out.

14.5 Assessment Methodology

Establishment of Baseline Environment

- 14.5.1 Data from the following sources were used to establish and analyse the baseline environment:
- Automatic Identification System (AIS) and Radar survey data recorded from Shoreham (14 days from January 2011 and 14 days from July 2011);
 - Long term AIS data recorded from Shoreham (January 2011 onwards);
 - Vessel observation survey from survey vessel *Freja* (June to August 2010);
 - Fishing Surveillance (Satellite 2009 and Over flights 2005-09);
 - UK Coastal Atlas of Recreational Boating, 2009 and 2010 GIS Shape Files.
 - Maritime Incident Data (Maritime Accident Investigation Branch (MAIB) 2001-2010 and Royal National Lifeboat Institute (RNLI) 2001-2010);
 - Search and Rescue (SAR) areas (as per MCA Definitions);
 - MoD PEXA areas;
 - Marine aggregates dredging data (licence areas and active areas) from The Crown Estate and British Marine Aggregates and Producers Association (BMAPA);
 - Admiralty Sailing Direction – Dover Strait Pilot, NP 28, 7th Edition, 2005 ; and
 - UK Admiralty Charts.

AIS and Radar Data Collection

- 14.5.2 A shipping traffic survey of the Offshore Project site was carried out using AIS and radar to collect track data on vessel movements. This 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. The objective of the survey was to identify the vessel activity both within and adjacent to the Offshore Project site.
- 14.5.3 Data were recorded from the National Coastwatch Institution (NCI) Shoreham Station, approximately 7.3nm to the north of the Offshore wind farm site.
- 14.5.4 The survey location relative to the Offshore wind farm site is presented in Figure 14.1. The 20nm buffer provides an indication of meaningful data coverage relative to the Offshore wind farm site. The 20nm buffer is measured from the survey location site indicated within Figure 14.1.
- 14.5.5 The traffic survey was undertaken within the requirements of MGN 371. The survey was carried out over two 14 day survey periods, in order to collect data on vessel movements in the area during the winter and summer, as well as to cover tidal variations. AIS and radar data were recorded from Shoreham during the following survey periods:
- 17th to 31st January 2011; and
 - 16th to 30th July 2011.

(Note: the first and last day of both survey periods were partial days due to survey equipment set-up and removal, so both surveys were comprehensive over a 14 day period.)

- 14.5.6 In addition, the 28 days of survey data has been supplemented with longer term AIS data collection from Shoreham, in order to validate vessel routeing and for the identification of regular traffic.
- 14.5.7 More details of AIS requirements and the radar data collection methodology are presented below.

AIS

- 14.5.8 Regulation 19 of Safety of Life at Sea (SOLAS) Chapter V - Carriage requirements for ship-borne navigational systems and equipment - sets out navigational equipment to be carried on board ships according to ship type. In 2000, IMO adopted a new requirement (as part of a revised new chapter V) for ships to carry AIS. AIS is a system by which ships automatically send data concerning their position, Maritime Mobile Service Identity (MMSI), etc., on two individual Very High Frequency (VHF) channels to the shore and other vessels at very frequent intervals.

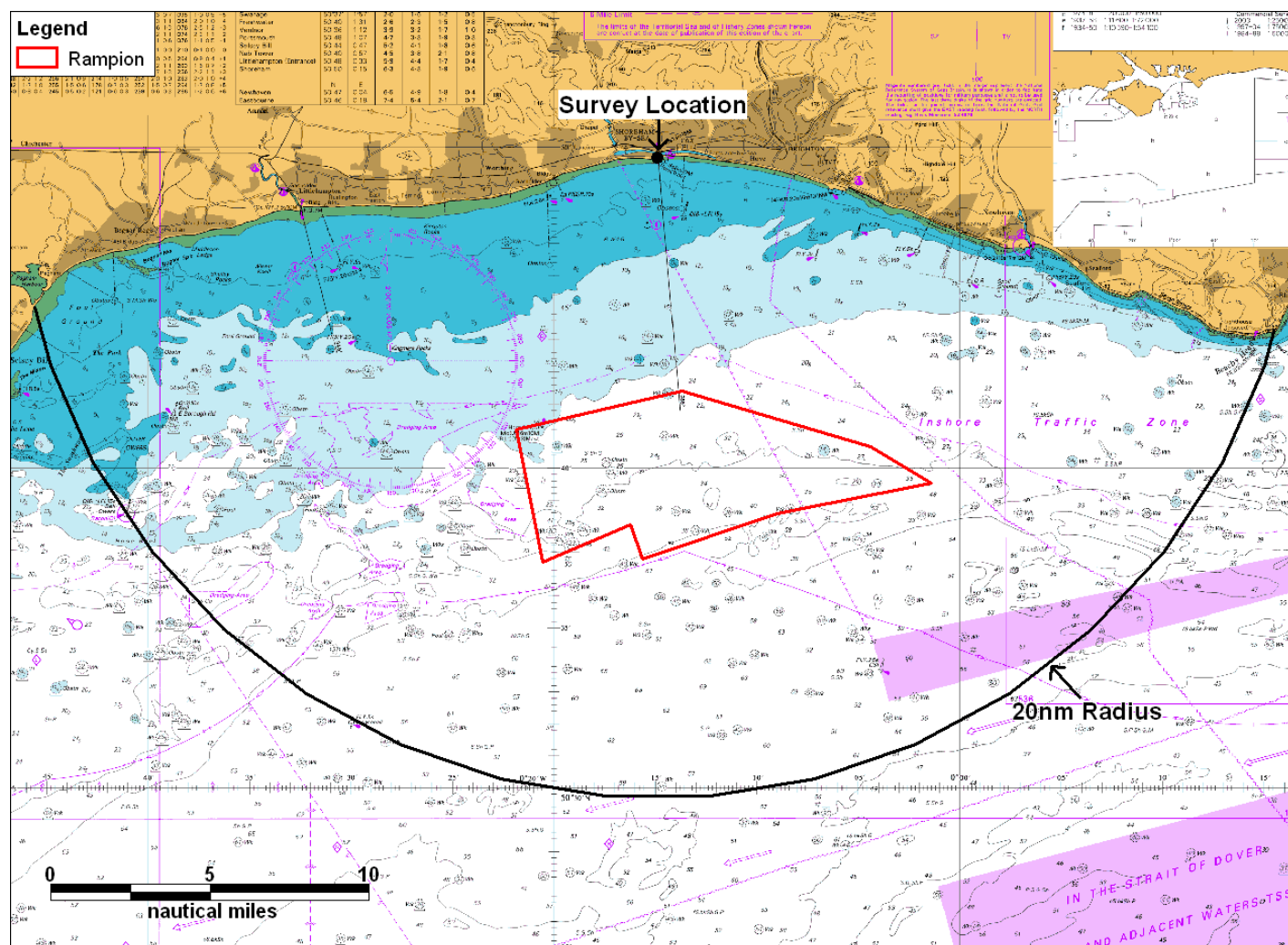


Figure 14.1: Chart Overview of Survey Location

14.5.9 The regulation requires AIS to be fitted aboard all ships engaged on international voyages of 300 gross tonnage and upwards, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships irrespective of size built on or after 1st July 2002. It also applies to ships engaged on international voyages constructed before 1st July 2002, according to the following timetable:

- all passenger ships, not later than 1st July 2003;
- tankers, not later than the first survey for safety equipment on or after 1st July 2003; and
- ships, other than passenger ships and tankers, of 50,000 gross tonnage and upwards, not later than 1st July 2004.

14.5.10 At the time of surveying, AIS was required on board fishing vessels over 45m in length. Therefore, larger vessels were recorded on AIS, while smaller vessels without AIS installed (i.e., fishing vessels under 45m and recreational craft) were recorded, where possible, on Radar. (It is noted that a proportion of smaller vessels also carry AIS voluntarily).

Radar

14.5.11 The following section describes the methodology and equipment used to collect the non-AIS, radar ship track data from Shoreham.

14.5.12 The radar data logging equipment was set up to record each target acquired on the Automatic Radar Plotting Aid (ARPA) set up next to the National Coastwatch Institution (NCI) Shoreham Station. The target positional data was recorded from a feed from the radar to the serial port of a survey laptop.

14.5.13 The radar was manned between approximately 0600hrs and 2200hrs during surveying, with targets not on AIS acquired manually. Between 2200hrs and 0600hrs (with the station unmanned) radar targets were acquired automatically by the radar, over an area defined by the watch-keepers, which covered the offshore area of interest.

14.5.14 The radar range varied based on conditions and target details, but vessels were typically tracked up to 12nm from the survey location and some targets beyond 20nm.

14.5.15 If a vessel was tracked on both AIS and radar, radar targets were filtered out to avoid duplicate tracks using information recorded in the survey log form. AIS tends to track vessels over longer range and provides a more precise position.

Fishing Sightings and Satellite Data

- 14.5.16 Fisheries statistics in the UK are reported by ICES statistical Rectangles and Subsquares. The Offshore Project site is located within ICES Rectangle Subsquare 30E9/4, with the export cable corridor located within Subsquares 30E9/4 and 30E9/2, as shown in Figure 14.2.
- 14.5.17 The Subsquare encompassing the Offshore wind farm site has an area of approximately 286nm² (981km²).
- 14.5.18 Data on fishing vessel sightings were obtained from Marine Management Organisation (MMO) for the five-year period 2005-2009. The MMO monitor the fishing industry's compliance with UK, EU and international fisheries laws through the deployment of patrol vessels, surveillance aircraft and the sea fisheries inspectorate. Each patrol logs the positions and details of all fishing vessels (UK and non-UK) within the Rectangle being patrolled. All vessels are logged, irrespective of size, provided they can be identified by their Port Letter Number (PLN).
- 14.5.19 The MMO also operates a satellite vessel monitoring system from its Fisheries Monitoring Centre in London. The vessel monitoring system is used, as part of the sea fisheries enforcement programme, to track the positions of fishing vessels in UK waters. It is also used to track all UK registered fishing vessels globally. Vessel position reports are received approximately every 2 hours unless a vessel has a terminal on board which cannot be polled and then it must report once per hour. The data cover all EC countries within British Fisheries Limits and certain Third Countries, e.g., Norway and Faeroes. Vessels used exclusively for aquaculture and operating exclusively within baselines are exempt. Satellite data which have been analysed in this report are from 2009 and includes UK and non-UK fishing vessels.

Recreational Data

- 14.5.20 The Royal Yacht Association (RYA), supported by the Cruising Association, who represent the interests of cruising sailors and motor-boaters worldwide, have identified recreational cruising routes, general sailing and racing areas for UK waters. This work was based on extensive consultation and qualitative data collection from RYA and Cruising Association members, through the organisations' specialist and regional committees and through the RYA affiliated clubs. The consultation was also sent to berth holder associations and marinas. The results of this work were published in *Sharing The Wind* (RYA, 2004) and updated GIS layers published in the *Coastal Atlas* (RYA, 2008). Data from 2010 has been used for this study.

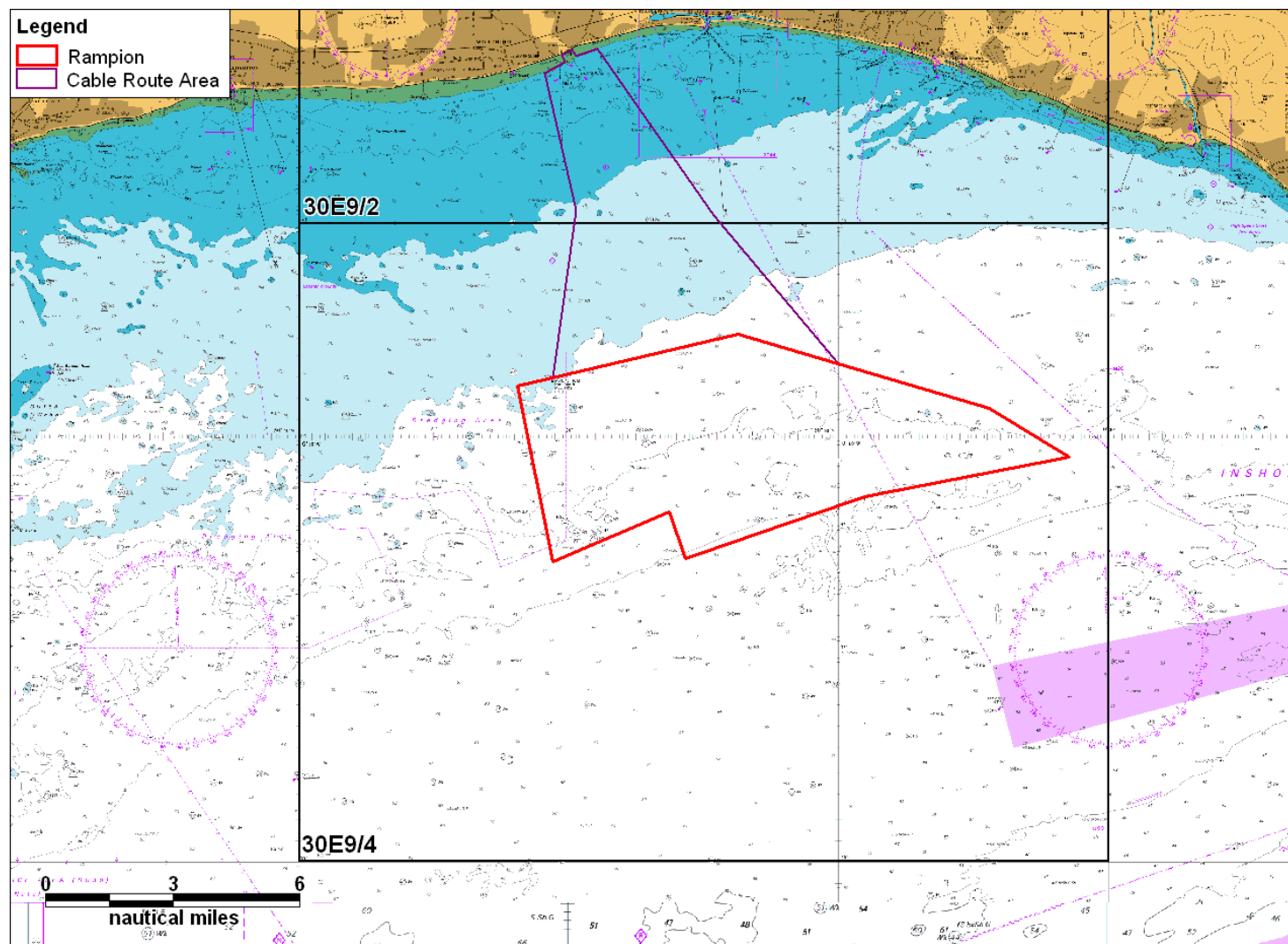


Figure 14.2: ICES Subsquares Encompassing the Offshore Project wind farm site and the Export Cable Corridor

- 14.5.21 In addition, recreational craft data has been extracted from the AIS and radar survey tracks recorded during the shipping surveys (January and July 2011). The different recreational activities taking place in the vicinity of the Offshore Project site (such as recreational diving and recreational fishing) have been identified through visual lookout maintained during the AIS and radar surveys, the observation survey from the vessel *Freja* (June to August 2010), as well as through consultation with local stakeholders. The tracks of vessels known to be engaged in a particular recreational activity, for example dive charter boats, have also been identified from the AIS surveys.

Maritime Incident Data

- 14.5.22 All UK commercial vessels are required to report accidents to MAIB. Non-UK vessels do not have to report unless they are in a UK port or are in 12 mile territorial waters and carrying passengers to a UK port. There are no requirements for non-commercial recreational craft to report accidents to MAIB. The locations accidents, injuries and hazardous incidents reported to MAIB within 10nm of the wind farm boundary for the last ten years between January 2001 and December 2010 have been analysed in this report.
- 14.5.23 Data on RNLI lifeboat responses within 10nm of the Offshore Project site during the ten-year period between 2001 and 2010 have been analysed in this report.

Marine Aggregates Area

- 14.5.24 Dredging activity was recorded on AIS during both of the shipping surveys carried out from Shoreham. In addition, marine aggregates dredging data (licenced areas and active areas) were also supplied by The Crown Estate. A desk based study was carried out using this information to identify commercial aggregates dredging activity in the area. Consultation has also been undertaken with dredging operators.

Navigational Features

- 14.5.25 Other navigational features such as IMO Routeing Measures and Ministry of Defence (MOD) Practice and Exercise Areas (PEXAs) have also been considered.

UK Admiralty Charts

- 14.5.26 Admiralty charts are nautical charts issued by the United Kingdom Hydrographic Office (UKHO) and are subject to Crown Copyright. The charts have been used to consider approaches and entrances to port and harbours in the area. The charts also include data on depths (chart datum), coastline, Aids to Navigation, land and underwater contour lines, seabed composition (for anchoring), hazards, tidal information ("tidal diamonds"), IMO Routeing Measures, and in short, anything which could assist navigation in this area to ensure it is fully considered within this work. The following are the main charts used in this study:

- 1652 – Selsey Bill to Beachy Head;
- 2450 – Anvil Point to Beachy Head;
- 2656 – English Channel Central Part; and
- 2675 – English Channel.

Identification and Assessment of Impacts and Mitigation Measures

14.5.27 The baseline assessment allowed higher risk areas to be identified through the maritime traffic survey, desk-based research, hazard workshop and consultation (the boundary provided for consultation was broader than that currently proposed). Following this a Formal Safety Assessment (FSA) was carried out in-line with the IMO FSA process and DECC guidance.

14.5.28 The risk assessment within the impacts section includes the following:

- hazard log and risk ranking;
- quantified navigational risk assessment for selected hazards;
- base case and future case risk levels assessed for selected hazards;
- SAR review; and
- assessment of mitigation measures.

14.5.29 Consultation with marine stakeholders was carried out as part of this process to ensure the impact assessment gave full account to their views. The following stakeholders were consulted:

- Maritime and Coastguard Agency (MCA);
- Department for Transport (DfT);
- Trinity House;
- Chamber of Shipping (CoS);
- Royal Yachting Association (RYA) / Cruising Association;
- Local ports; and
- Dredging operators / shipping operators.

14.5.30 In addition, a Hazard Review Workshop was held in Brighton attended by local navigational stakeholders, including recreational sea users, RNLI, coastguard and harbour masters.

14.5.31 Following identification of the higher risk navigation scenarios, risk analyses were carried out to investigate selected hazards in more detail. This allowed more attention to be 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.

14.5.32 An overview of the general methodology applied in the assessment is presented in Figure 14.3.

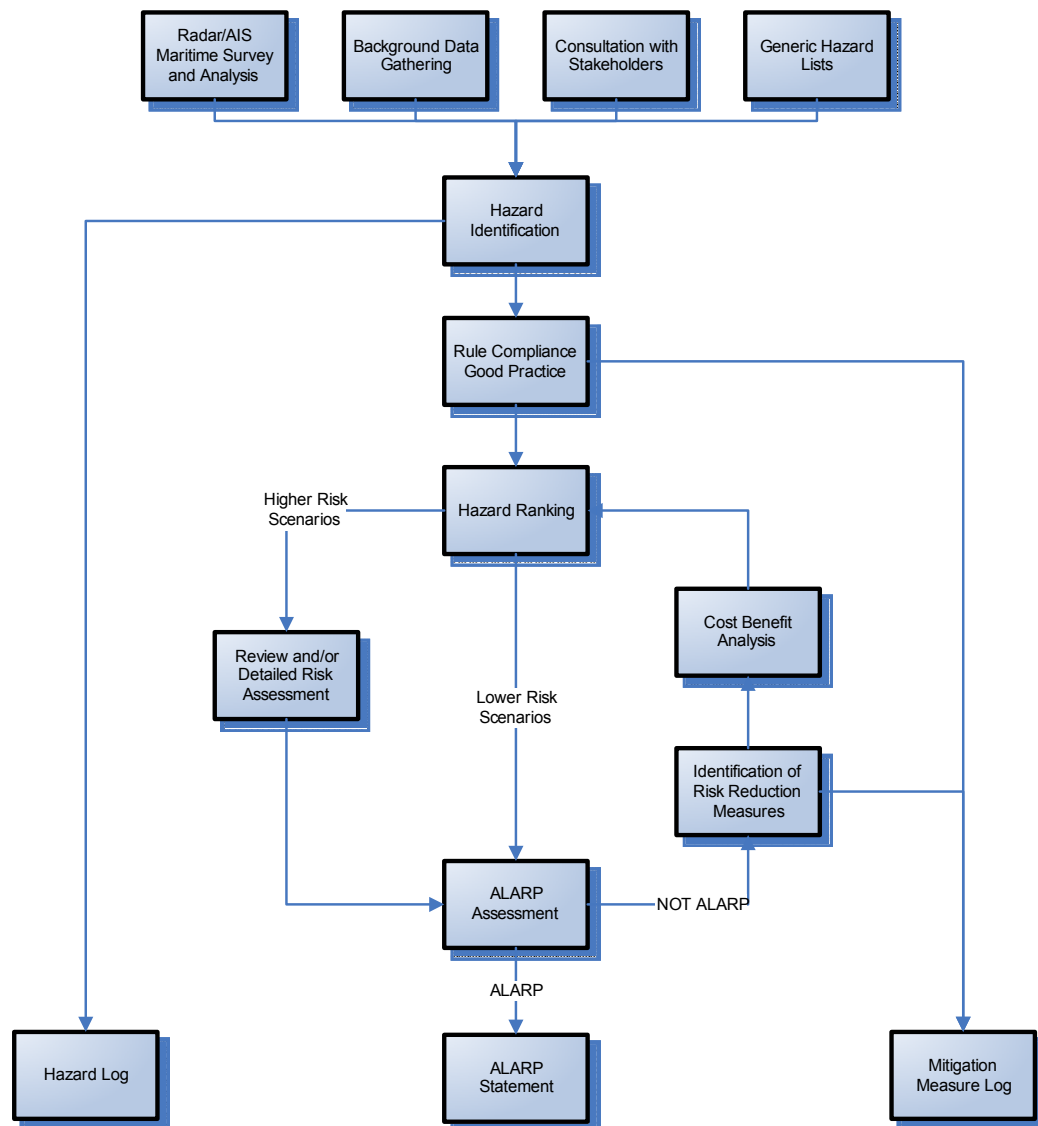


Figure 14.3: Overview of Methodology for the Risk Assessment

Sensitivity / Importance

- 14.5.33 The impact assessment defines the sensitivity of the navigational receptors from high to low. Table 14.2 provides the sample definitions relating to the sensitivity of Shipping and Navigation relative to the proposed Offshore Project Offshore Wind Farm.

Table 14.2: Sensitivity/Importance

Receptor Importance/Sensitivity	Examples
High	International Routeing Measures which are adopted by the International Maritime Organisation (e.g., Traffic Separation Schemes (TSS), deep water routes); Recognised commercial shipping lanes essential for international navigation; Approaches to major ports; and Designated large ship anchorages.
Medium	National and regional commercial shipping lanes; Approaches to minor ports; Designated small ship anchorages and historically preferred anchorages; and Recreational routes.
Low	Local commercial shipping lanes; Small harbours or jetties; and Slipways.

Magnitude of Impact

- 14.5.34 Table 14.3 presents potential magnitudes of impact for shipping and navigation receptors based on the physical change in the environmental baseline conditions as a result of the wind farm development.

Table 14.3: Magnitude of Impact

Magnitude	Examples
Large	Permanent large change required to commercial shipping route; Permanent change of anchorage area; and Permanent large increase in collision risk.
Medium	Temporary large change or permanent moderate change required to commercial shipping route; Temporary avoidance of anchorage area required; and Temporary large or permanent moderate increase in collision risk.
Small	Temporary moderate/minor change or permanent minor change to commercial shipping route; and

Magnitude	Examples
	Temporary moderate/minor or permanent minor increase in collision risk.
Negligible	Changes in commercial shipping navigation that are unlikely to be noticeable; and No increase in collision risk.

Significance of Residual Effects

14.5.35 Following the determination of the sensitivity of the shipping and navigation receptors and the magnitude of the impact, the significance of that impact was then determined using the matrix shown in Table 14.4.

Table 14.4: Significance of Effect

	Sensitivity/Importance		
Magnitude	High	Medium	Low
Large	Major	Major/Moderate	Moderate
Medium	Major/Moderate	Moderate	Minor
Small	Moderate	Minor	Not Significant
Negligible	Minor	Not Significant	Not Significant

14.5.36 An assessment has been made of the significance of residual effects, i.e. those remaining after mitigation.

Uncertainty and Technical Difficulties Encountered

14.5.37 The majority of data sets used within the shipping and navigation assessment have a low level of uncertainty and therefore there is confidence in the data used. The exception to this was both recreational craft and commercial fishing vessels (under 45m) which had a medium level of uncertainty due to lack of AIS data carriage requirements on these vessels and therefore coverage of these vessels.

14.5.38 It is noted that the level of vessel activity in the area will fluctuate based on the weather conditions. This particularly applies to recreational craft activity. The weather during the summer survey was mixed and hence there was considerable variation in the recorded level of recreational craft activity, with very limited activity during periods of poor weather. This leads to uncertainty in the baseline level of activity. It is also noted that attendees at the Hazard Review Workshop held for the project considered that the summer survey in July 2011 was not carried out at the busiest times for recreational craft in the area (May and August).

- 14.5.39 The difficulty in obtaining representative data on fishing vessel activity was noted at the Hazard Review Workshop. The level of fishing activity is variable and can change due to issues such as changes in quotas. Furthermore, the vessel type information available from satellite data could be misleading, as vessels may not be engaged in their primary fishing method.
- 14.5.40 There is a low level of uncertainty in the quality of the data for commercial vessels, due to AIS data carriage requirements. In consultation meetings it was stated that the number of vessels visiting Shoreham increased significantly after the first survey in January 2011, and Newhaven was closed for dredging operations during the two survey periods. Whilst these limitations apply to the periods of simultaneous AIS and radar data collection, the long term AIS data collection from Shoreham provides additional data and hence confidence in the commercial vessel dataset.
- 14.5.41 In terms of technical difficulties in the gathering of the survey data, both the AIS and radar systems were operational throughout the duration of both the January and July survey periods. However, the range of both systems varies depending on a number of factors, including the weather. For the majority of the time, the radar tracked targets up to 12nm from the survey location and some targets beyond 20nm. The radar range during the survey period may have resulted in under representation in non-AIS vessel activity towards the limits of the survey data presented. The AIS range was typically at least 20nm during the survey periods.

14.6 Environmental Baseline

Introduction

- 14.6.1 Maritime traffic surveys, including Radar and AIS data sets, were collected in January and July 2011. Fishing vessel sightings and surveillance data, recreational sailing data and details of historical maritime issues have all been analysed and are presented in this section to give a summary of the baseline environment for the Offshore Project site.

Navigational Features

- 14.6.2 This section presents an overview of the baseline navigational features relative to the site (Figure 14.4).
- 14.6.3 The main navigational features in the vicinity of the Offshore Project site are IMO routeing measures. The termination point of the Dover Strait Traffic Separation Scheme (TSS) lies to the south of the Offshore Project site, with the eastern part of the site within the adjacent Inshore Traffic Zone (ITZ). At its closest point there is approximately 4.4nm between the site's southern boundary and the traffic separation zone.

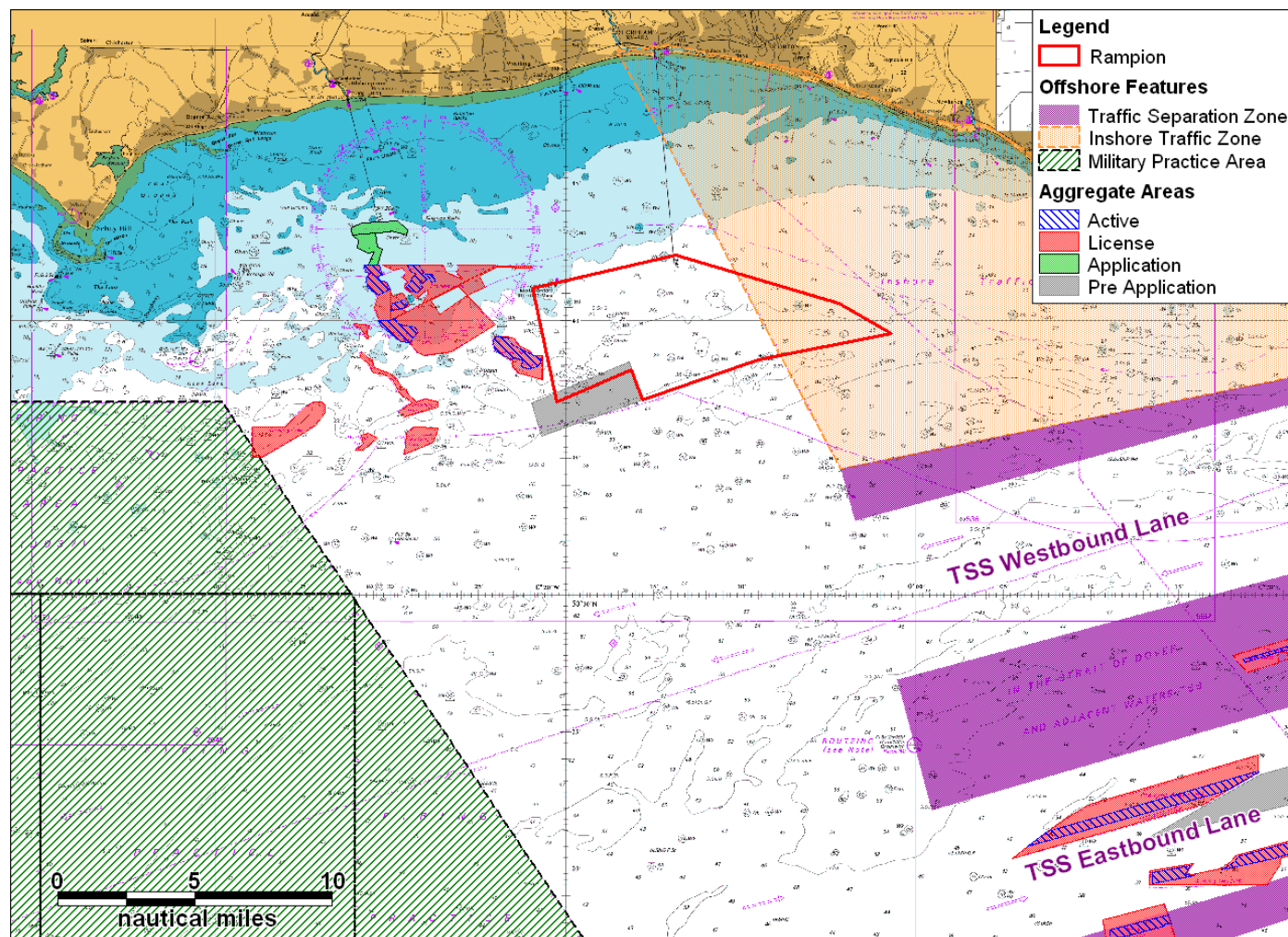


Figure 14.4: Overview of Navigational Features in proximity to the Offshore Project Site

- 14.6.4 There are a number of licensed marine aggregate dredging areas to the west of the Offshore Project site, in the Owers Bank dredge region. There is also a pre-application area (Area 499), which lies partly within the southwest part of the site.

Shipping Analysis

- 14.6.5 This section presents AIS and radar shipping data for the Offshore Project site recorded during January 2011 and July 2011 from the NCI Shoreham Station. A combined AIS and radar dataset was created including 28 days of both AIS and Radar data. Any duplicate tracks (i.e. recorded on AIS and radar) were filtered from the final survey data. Ship tracks within 20nm of the survey location are presented in the following section.

Overview of Shipping Levels and Types

- 14.6.6 Plots of the tracks recorded during the winter and summer survey periods, colour-coded by vessel type, are presented in Figure 14.5 and Figure 14.6 respectively.
- 14.6.7 In total there was an average of 85 vessels per day passing within 20nm of the survey location (based on the effective survey duration of 28 days of AIS and radar tracks.)
- 14.6.8 Figure 14.7 presents the tracks intersecting the Offshore Project site during the combined 28 day survey period.
- 14.6.9 Figure 14.8 presents the daily number of vessels passing through the Offshore Project site during the two survey periods.
- 14.6.10 It can be seen that the level of activity within the Offshore Project site was higher during the survey in July 2011 compared with the survey in January 2011. There was an average of 7 to 8 vessels per day passing through the Offshore Project site during the winter survey in comparison with an average of 16 to 17 vessels per day during the July survey. It is noted that the majority of these tracks were non-AIS radar tracks (61%) as opposed to AIS tracks (39%). Figure 14.9 presents the type distribution for vessels passing through the Offshore Project site (excluding unspecified).
- 14.6.11 Unspecified ships accounted for 47% of all vessels recorded within the Offshore Project site during the survey periods. These were generally radar targets with no visual identification. It is noted that these targets are likely to be fishing vessels and recreational craft.

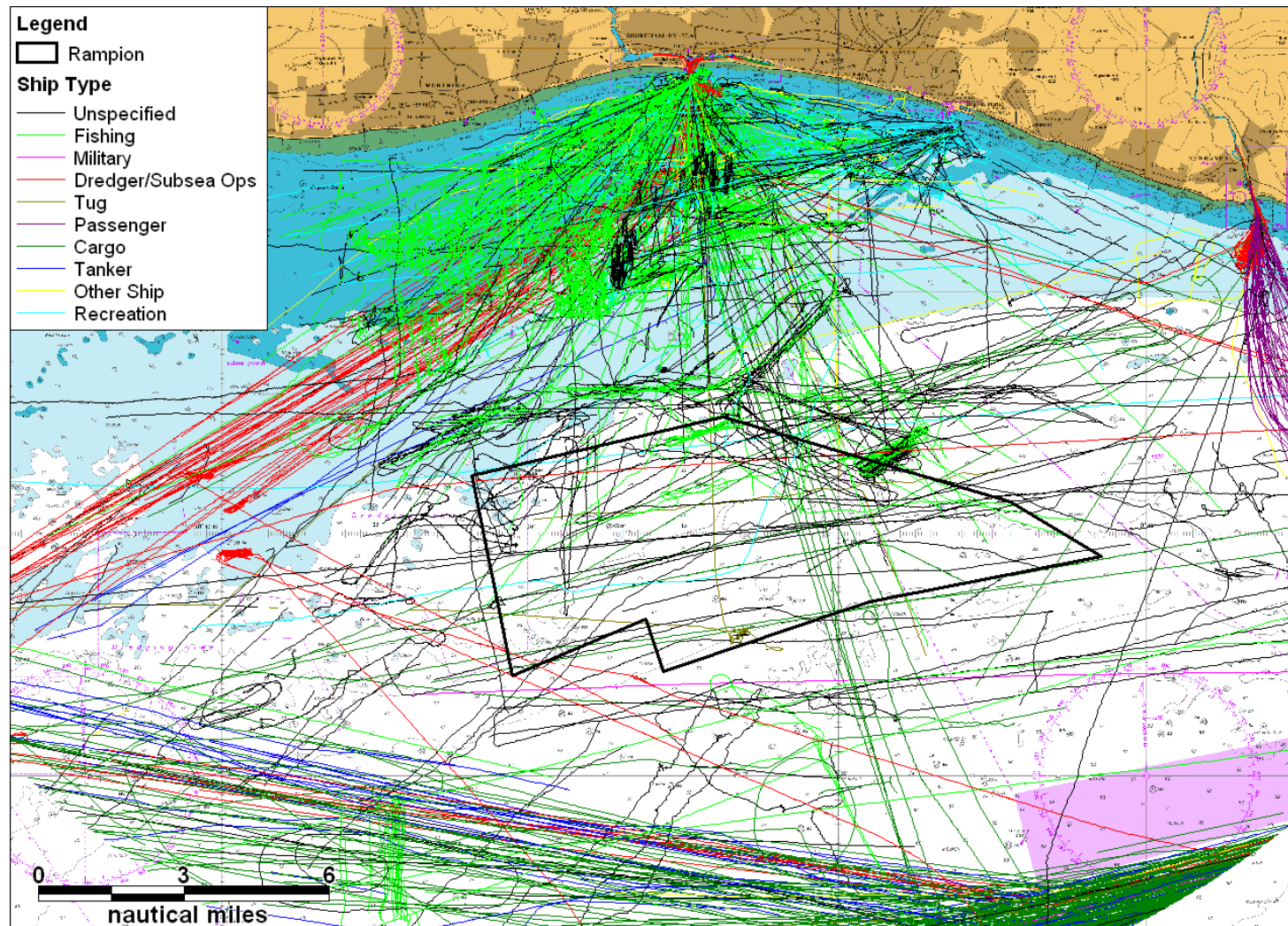


Figure 14.5: Combined AIS and Radar Tracks by Type (14 days, January 2011)

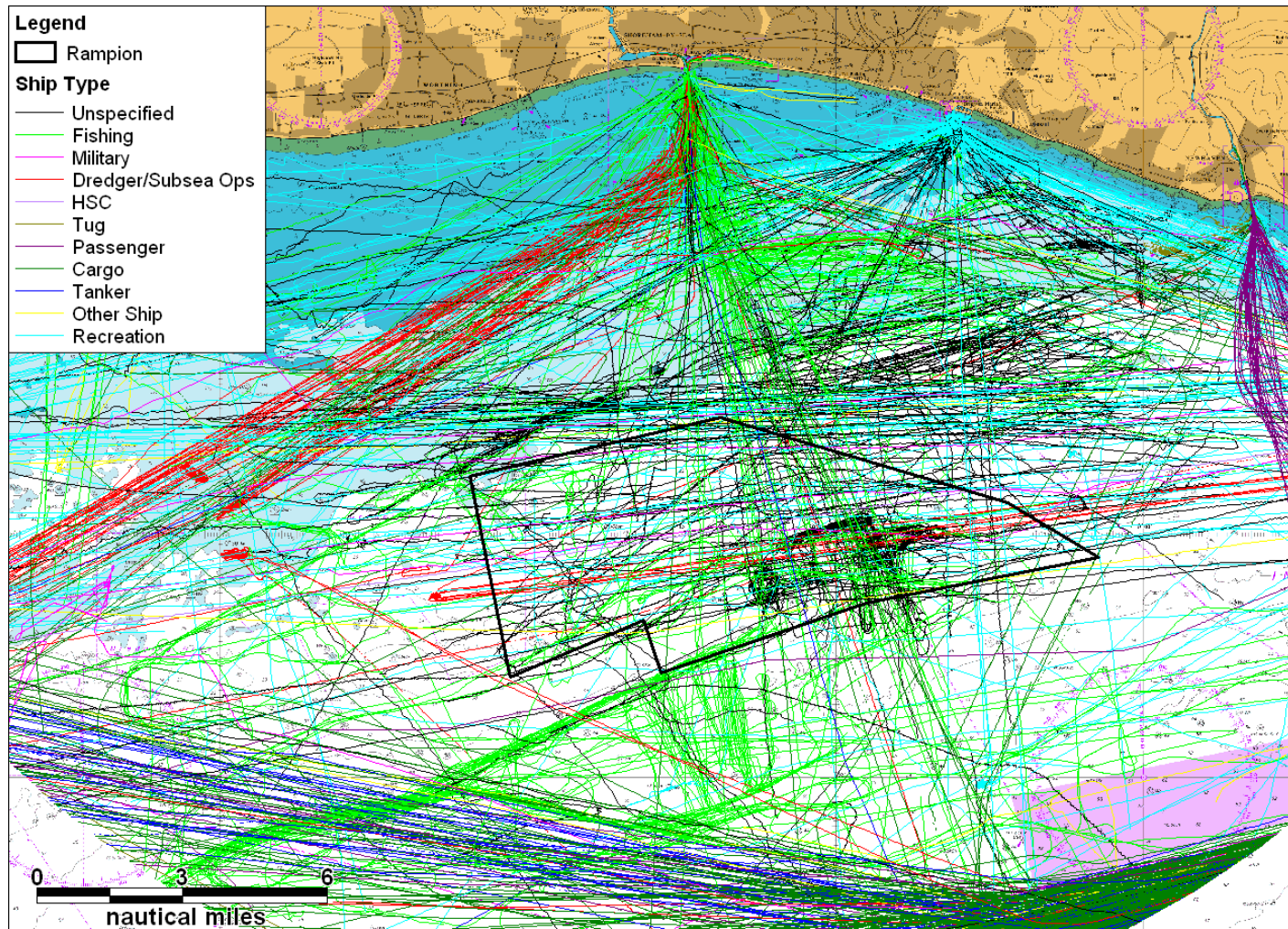


Figure 14.6: Combined AIS and Radar Tracks by Type (14 days, July 2011)

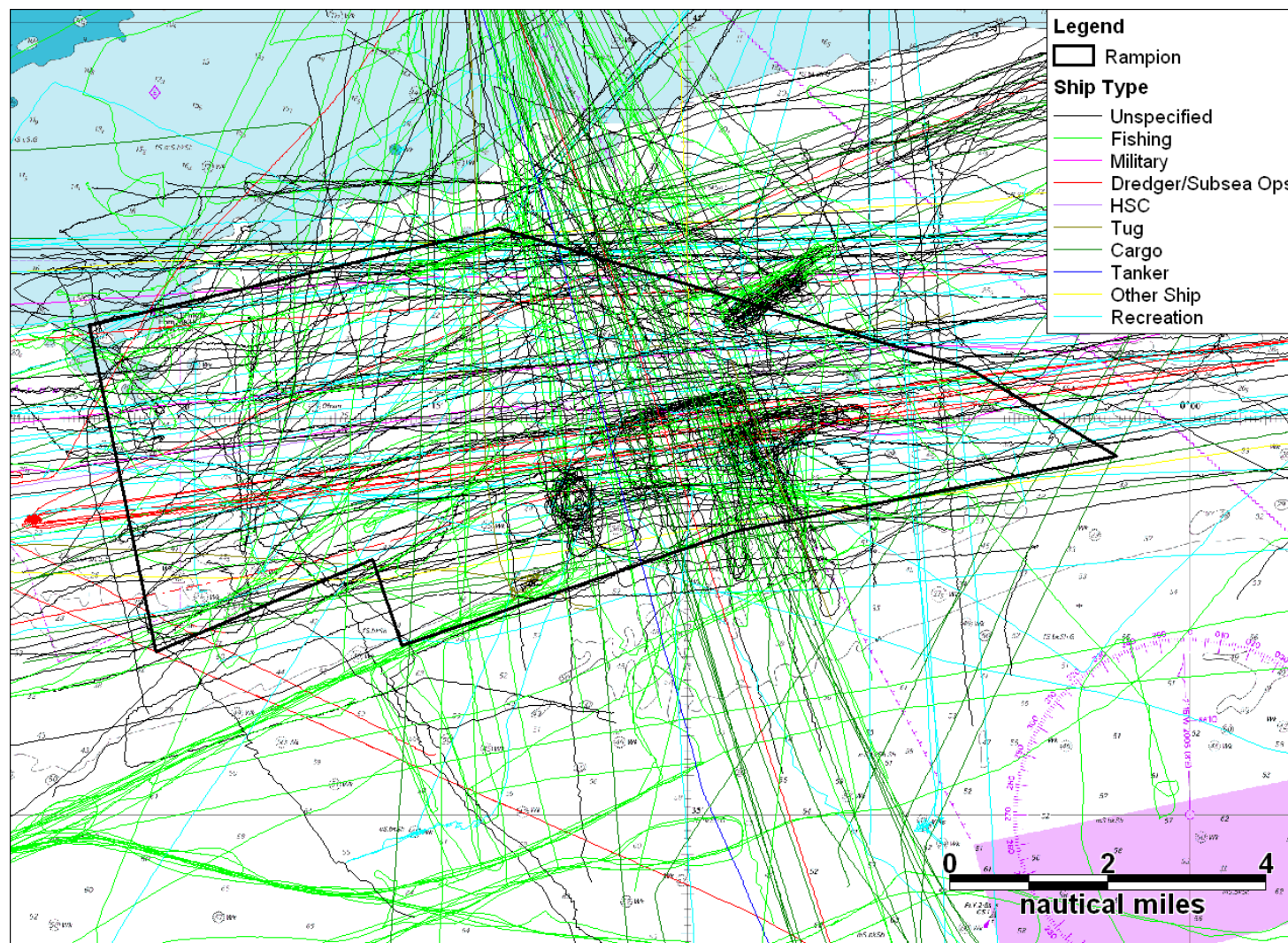


Figure 14.7: Combined AIS and Radar Tracks by Type – Intersecting the Offshore Project Site

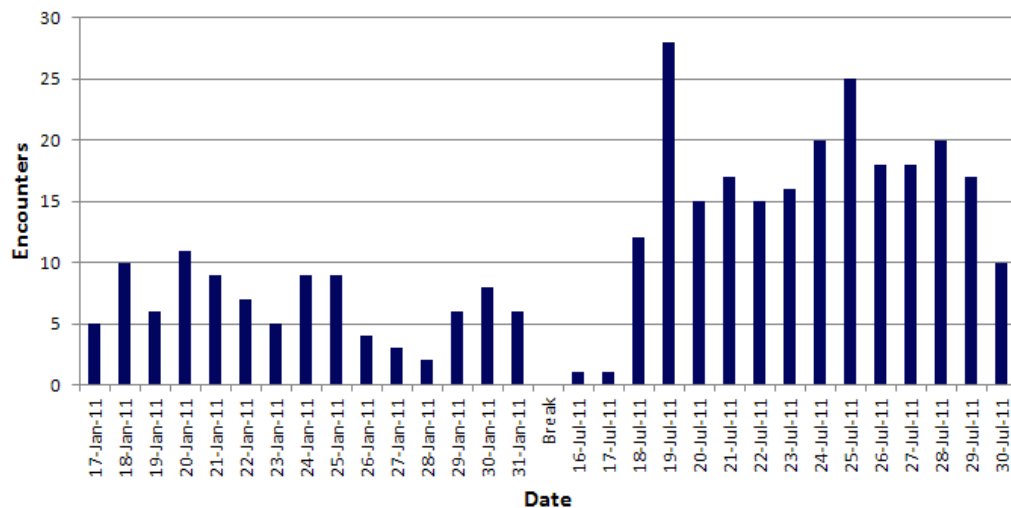


Figure 14.8: Vessels per day intersecting the Offshore Project Site

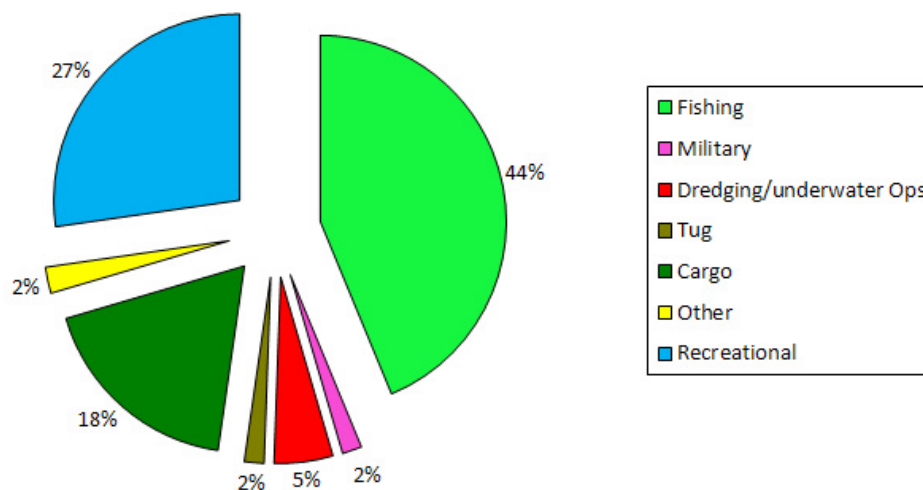


Figure 14.9: Vessel Type Distribution Passing through the Offshore Project Site (excluding unspecified)

14.6.12 Excluding unspecified ships, fishing vessels were the most common type recorded within the site comprising 44% of traffic. Recreational craft made up 27% of traffic; followed by cargo vessels contributing 18%, and dredgers and underwater operations vessels (5%).

14.6.13 Analysis of the main vessel types recorded within the Offshore Project site (cargo, fishing, recreational and dredgers/underwater operations vessels) is presented in sections 14.5.14 - 14.5.43.

Cargo Vessels

14.6.14 A chart of cargo vessel tracks within 20nm of the survey location is presented in Figure 14.10.

14.6.15 Cargo ships were the most common type within 20nm of the survey location, accounting for 32% of all vessels recorded during the survey period. The vast

majority of cargo vessels tracked during the survey were exiting the westbound lane of the Dover Strait TSS, and passed to the south of the Offshore Project site.

- 14.6.16 Of the vessels passing through the Offshore Project site during the survey there was an average of just over 1 cargo vessel per day. Of these approximately 47% passed north/south through the site headed to/from Shoreham, and 34% were associated with Newhaven.

Fishing Vessels

- 14.6.17 Fishing vessel activity was recorded on AIS (27%) and radar (73%), with vessels tracked steaming through the area as well as engaged in fishing.
- 14.6.18 A plot of fishing vessel tracks recorded during the survey in January 2011 is presented in Figure 14.11.
- 14.6.19 The majority of fishing vessels tracked were working out of Shoreham, with most of the smaller boats leaving Shoreham heading east or west. However, a number of beam trawlers operating out of Shoreham did head south and were observed operating within and in close proximity to the site.
- 14.6.20 In total, 1 to 2 fishing vessels were recorded per day within the Offshore Project site, this included both vessels on passage and those that are assumed to have been engaged in fishing.
- 14.6.21 A plot of the fishing vessel tracks recorded during the second survey, in July 2011, is presented in Figure 14.12.
- 14.6.22 The level of fishing activity recorded within the Offshore Project site was greater during the July survey period, with a number of vessels transiting the site and an increase in vessels engaged in fishing within the site. As was the case in the first survey, the majority of the smaller fishing boats operating out of Shoreham went to the east or west.
- 14.6.23 In addition to the AIS and Radar data for fishing vessel tracks, sightings and satellite data for the area has also been used to analyse fishing activity within the site.
- 14.6.24 The numbers of fishing vessel sightings, surveillance patrols and hence average sightings per patrol within each ICES Subsquare encompassing the Offshore Project site and export cable corridor in the five-year period 2005-09 are presented in Table 14.5.

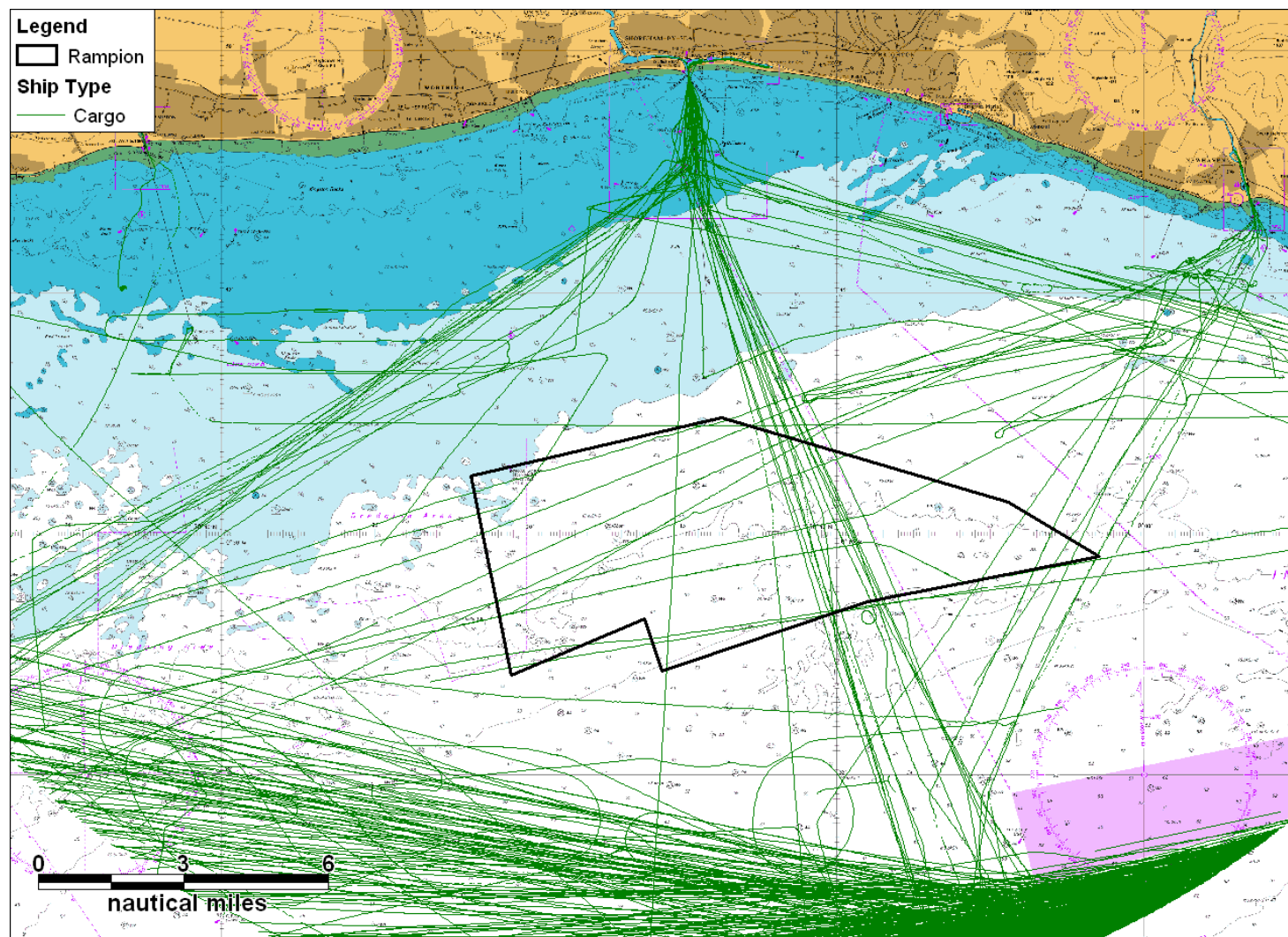


Figure 14.10: Cargo Vessel Tracks (28 days)

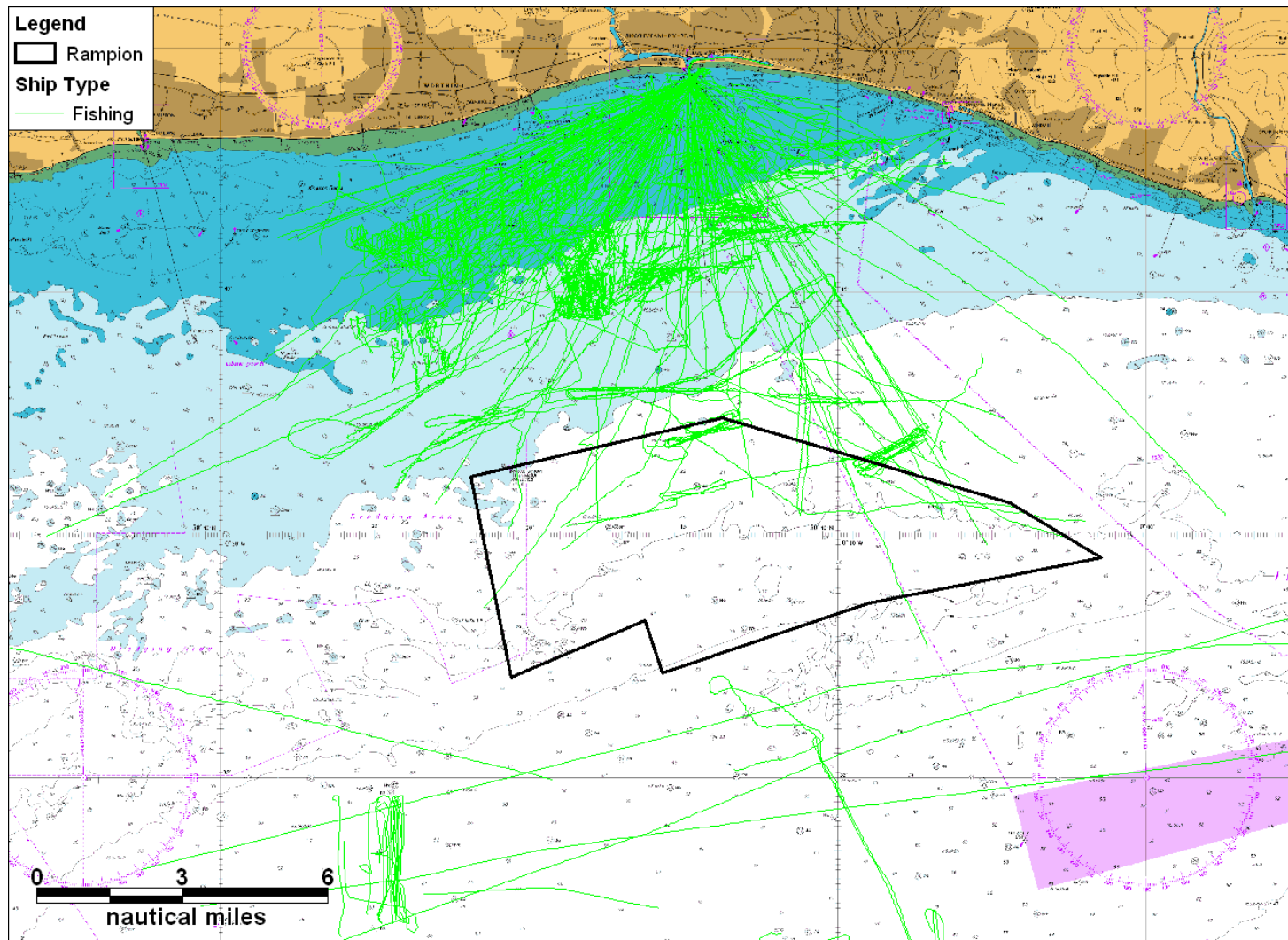


Figure 14.11: Fishing Vessel Tracks (14 days, January 2011)

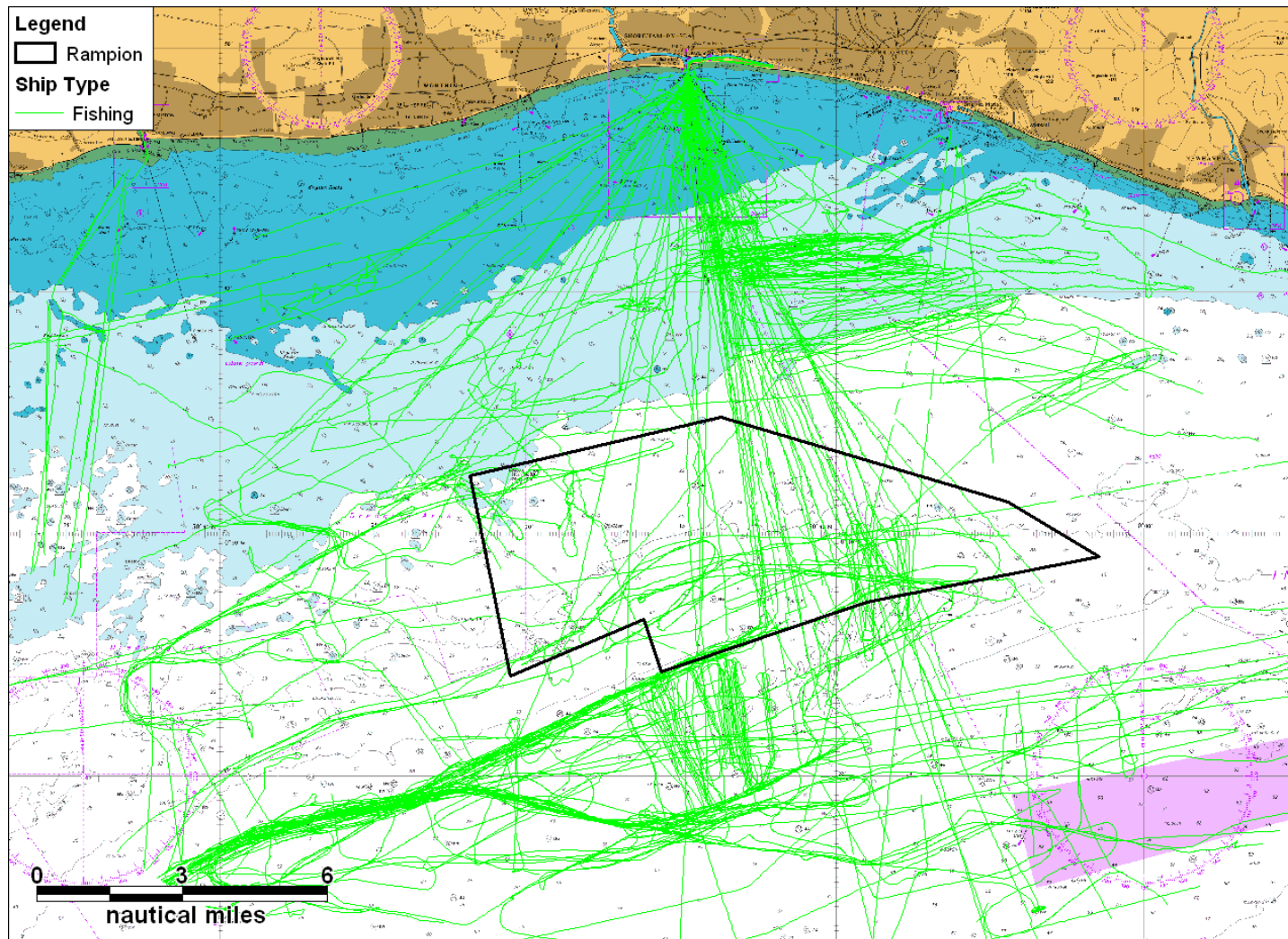


Figure 14.12: Fishing Vessel Tracks (14 days, July 2011)

Table 14.5: Average sightings per patrol (2005-09)

ICES Subsquare	Sightings	Patrols	Sightings per Patrol
30E9/2	2,008	566	3.5
30E9/4	1,412	655	2.2

- 14.6.25 Therefore, the Subsquare 30E9/4 had an average of just over 2 fishing vessel sightings per patrol. Subsquare 30E9/2, which intersects the proposed export cable corridor, has a higher number of sightings per patrol, however, it is noted that this includes vessels within port.
- 14.6.26 The sightings data were imported into GIS for mapping and analysis. The fishing vessel sightings colour-coded by gear type are presented in Figure 14.13.
- 14.6.27 In terms of the Offshore Project site there were 209 sightings with the most common types recorded being beam trawlers (62%), scallop dredgers (18%), and unspecified trawlers (8%). In proximity to the coast, within the export cable corridor, the most common fishing vessel types recorded were gill netters and potters/whelkers.
- 14.6.28 The latest satellite data set analysed is from 2009 and the data include both UK and foreign vessels of 15m length and over, with positions received at a minimum of every two hours. The satellite positions have been converted to a density grid and this is presented in Figure 14.14.
- 14.6.29 It should be noted that the grid in the figure above is shaded according to relative density within the area of the grid.
- 14.6.30 A detailed study of the fishing activity in the vicinity of the wind farm has been performed as part of the Commercial Fisheries Assessment (Section 18). This study identified the general region in which the Offshore Project site is located to be an area of moderate to high levels of activity by UK fishing vessels of 15m length and over, in a national context.

Recreational Craft Activity

- 14.6.31 This section reviews recreational craft activity at the Offshore Project site based on the two maritime traffic surveys (January and July 2011) and information published by the Royal Yachting Association (RYA).
- 14.6.32 The level of recreational activity recorded during the survey in January 2011 was relatively low, with an average of 3 to 4 vessels recorded per day. The recreational craft tracks recorded during the 14 day survey period are presented in Figure 14.15.

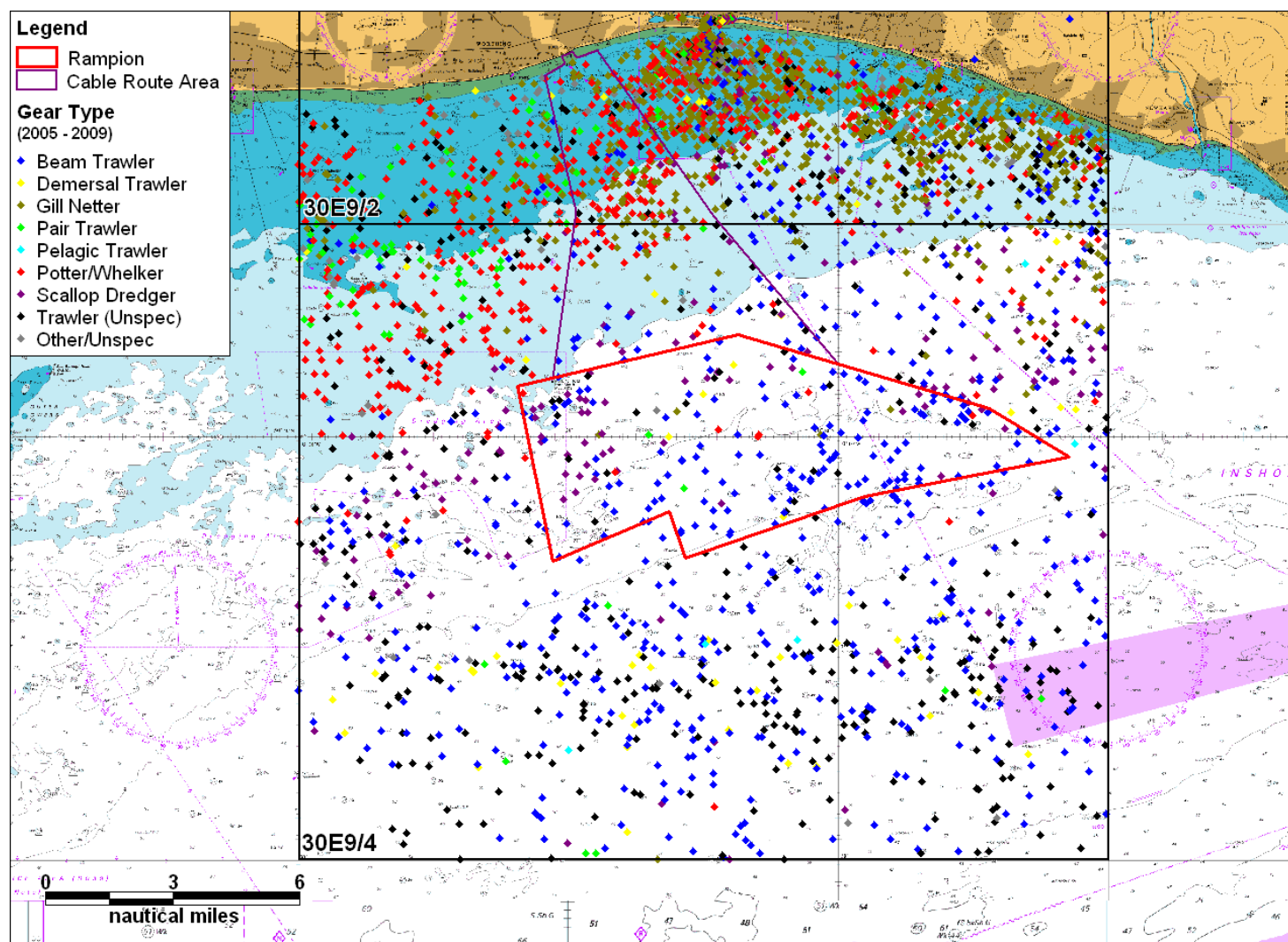


Figure 14.13: Fishing vessels Gear Type

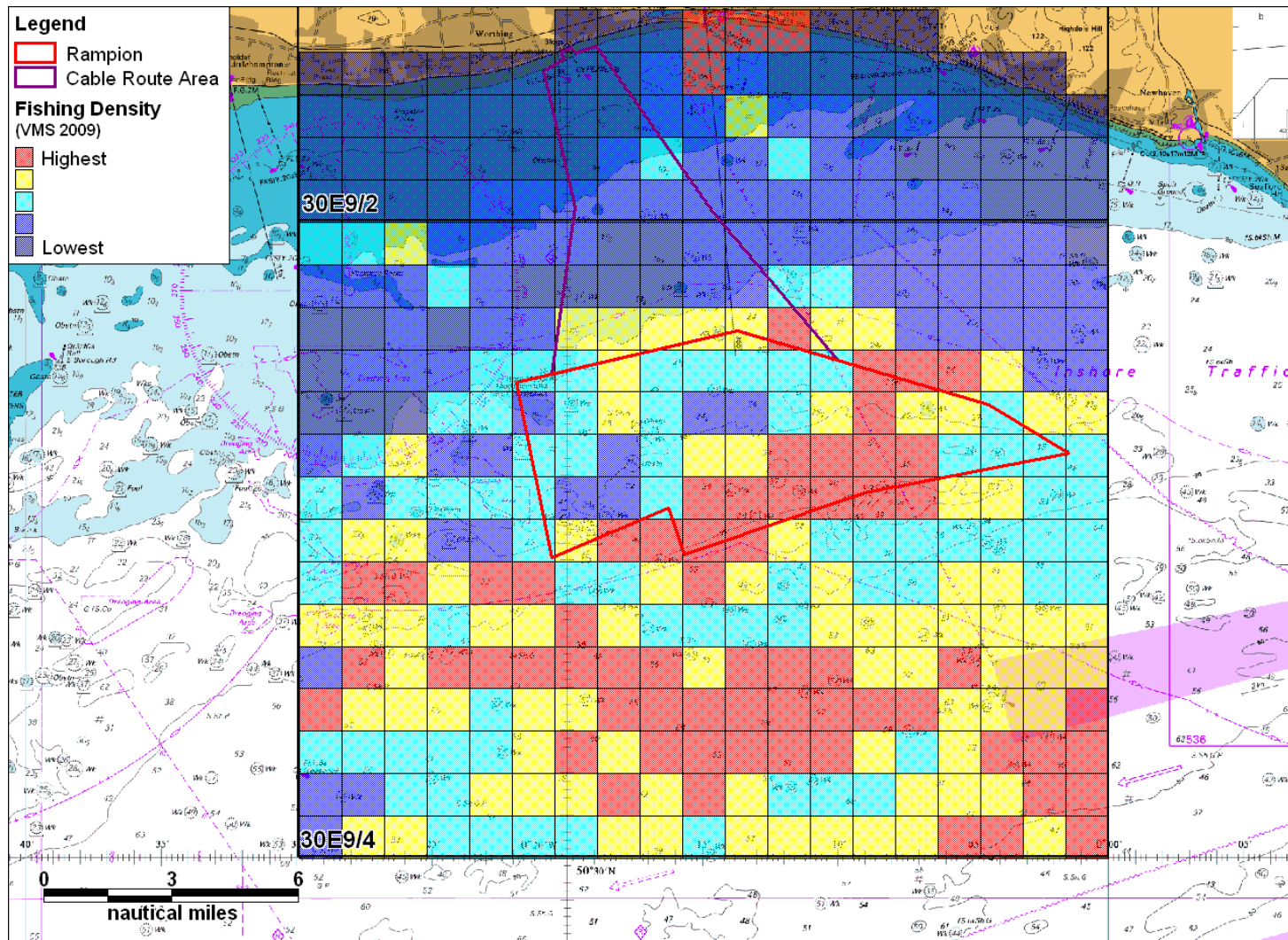


Figure 14.14: Fishing Vessel Density (2009)

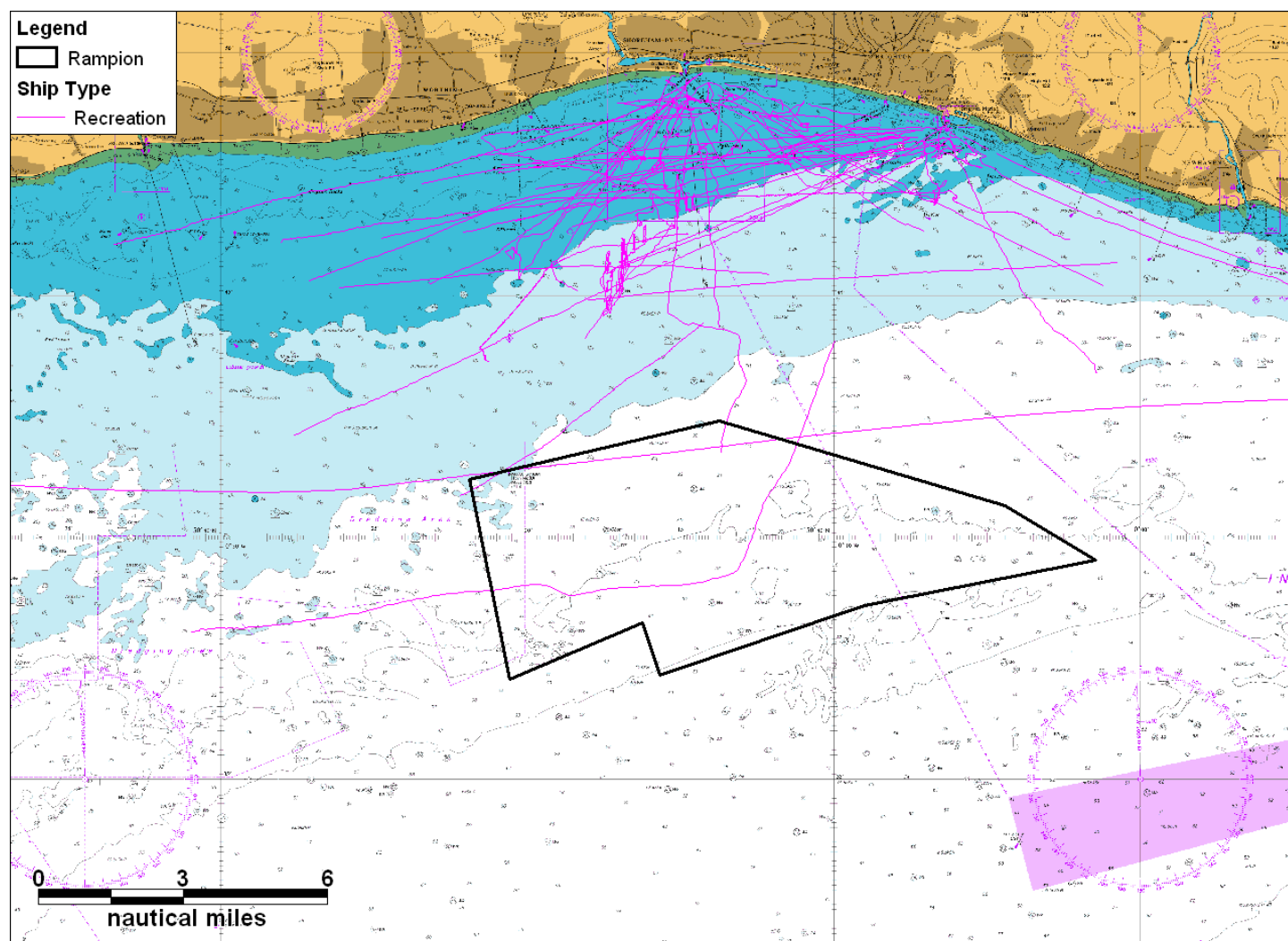


Figure 14.15: All Recreation Vessel Tracks 17th – 31st January 2011 (14 days)

- 14.6.33 As expected the level of recreational activity was greater during the survey in July 2011, with an average of 16 to 17 vessels recorded per day. The level of recreational activity fluctuated during the 14 day survey period, with a peak in recreational activity recorded on Saturday 23rd July when 25 recreational craft were recorded. The recreational tracks recorded during the 14 day summer survey are presented in Figure 14.16.
- 14.6.34 An average of just over three craft per day were recorded passing through the Offshore Project site during the summer survey period. The majority of the craft recorded passing through the site were headed east/west with a large proportion of these craft associated with ports in the Solent. Based on the recreational craft recorded on AIS using this route, the majority of these craft were sailing vessels, typically 10-24m in length. However, power boats were also recorded in the area during the summer survey period, including a number intersecting the Offshore Project site.
- 14.6.35 Recreational craft were also tracked passing north/south through the Offshore Project site, with the majority of these craft associated with Brighton. These included recreational diving boats, generally travelling between Brighton and wrecks to the south of the Offshore Project site.
- 14.6.36 A review of 'Sharing The Wind' published by the RYA (Ref. i) and updated GIS layers published in the Coastal Atlas (Ref. ii) was carried out for the Offshore Project sea area.
- 14.6.37 The division of recreational craft routes use (Heavy, Medium and Light Use) is based on the following classification:
- Heavy cruising routes: - Very popular routes on which a minimum of six or more recreational craft will probably be seen at all times during summer daylight hours. These also include the entrances to harbours, anchorages and places of refuge;
 - Medium cruising routes: - Popular routes on which some recreational craft will be seen at most times during summer daylight hours; and
 - Light cruising routes: - Routes known to be in common use but which do not qualify for medium or heavy classification.
- 14.6.38 A summary plot of the recreational sailing activity and facilities in the wider area is presented in Figure 14.17. This is based on the latest RYA data (2010).
- 14.6.39 In terms of facilities, the nearest to the proposed Offshore Project development are the numerous marinas and clubs along the Sussex coast, 7-8nm from the northern boundary of the site.

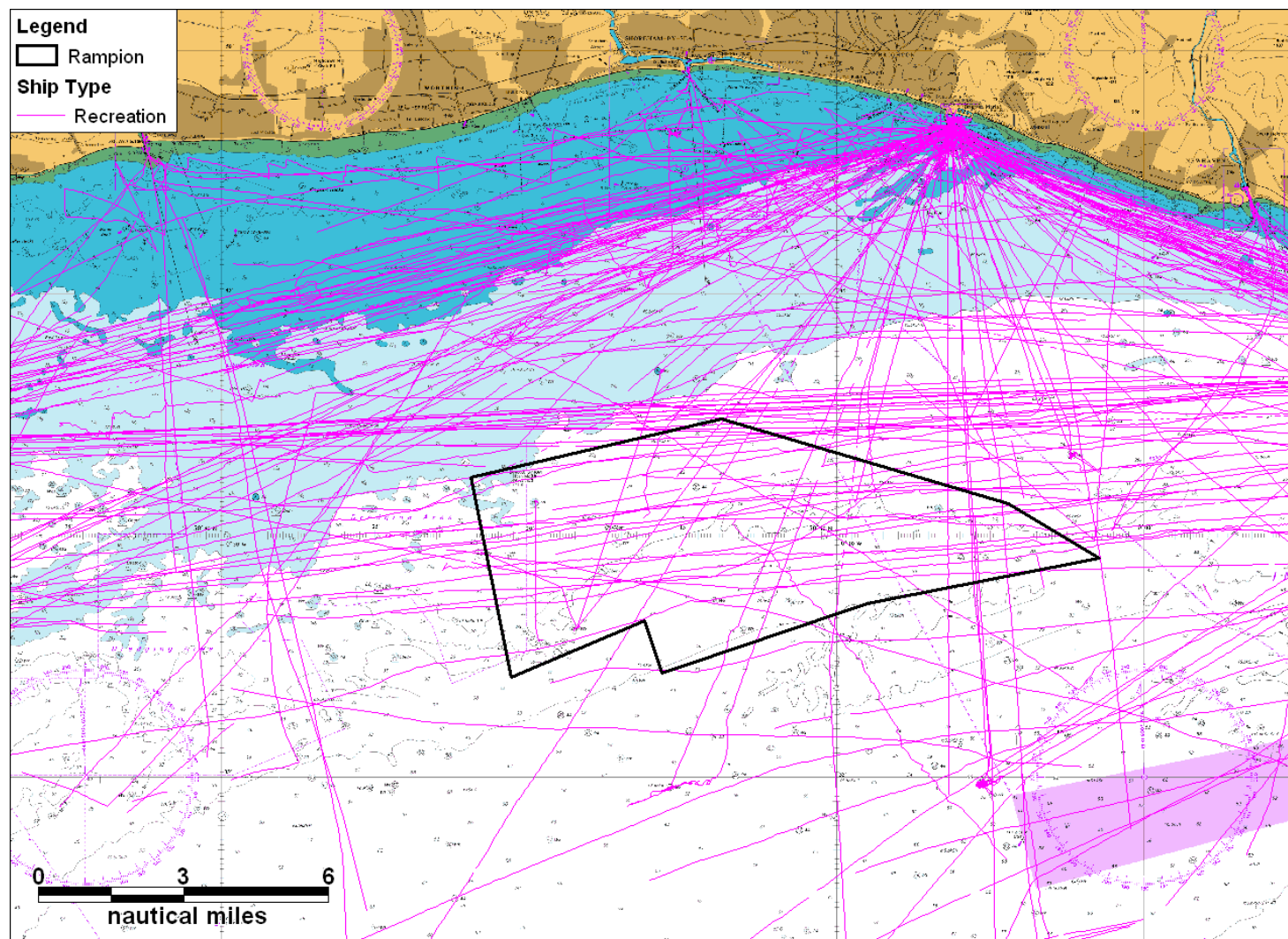


Figure 14.16: All Recreation Vessel Tracks 16th – 30th July 2011 (14 days)

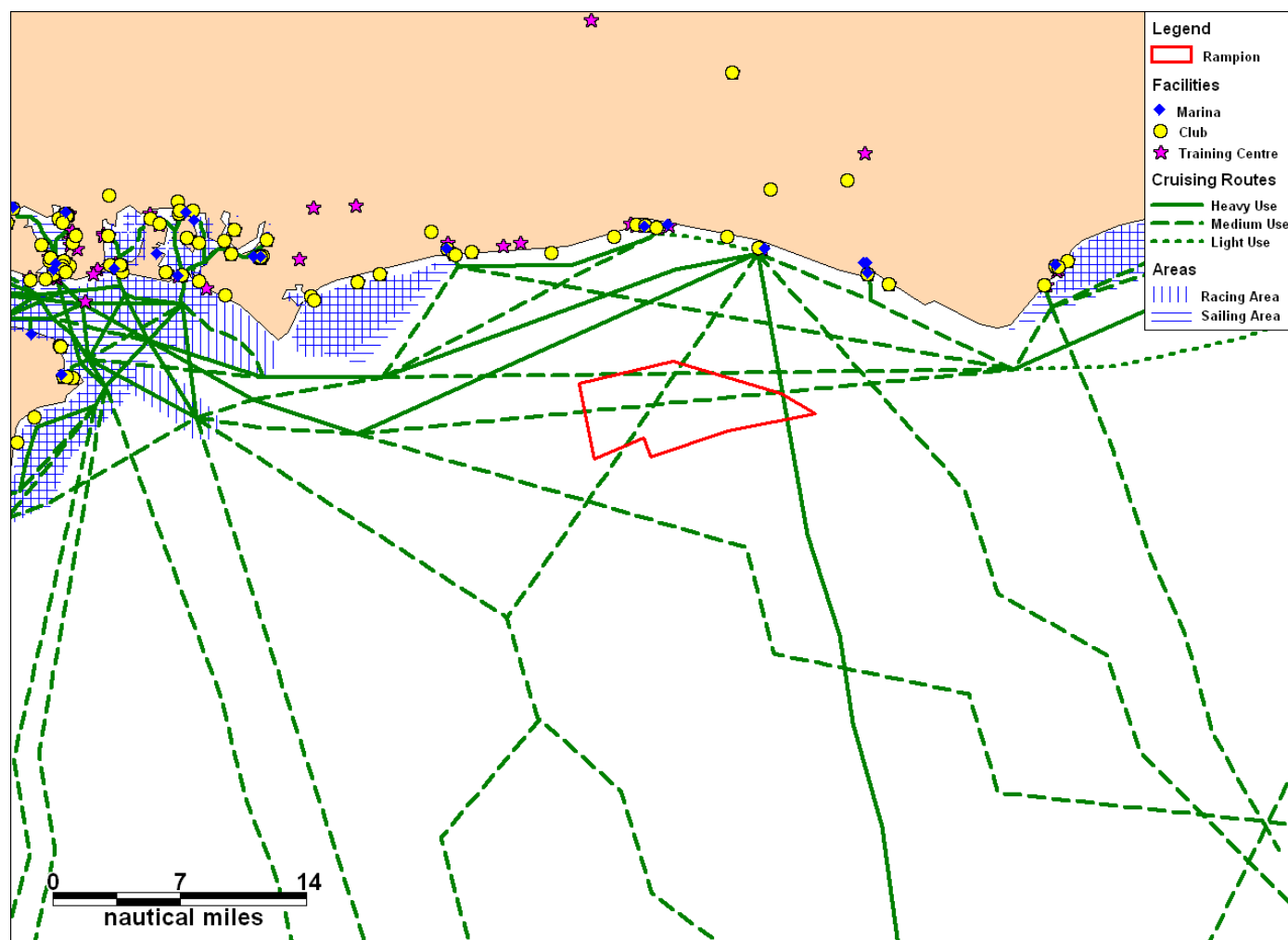


Figure 14.17: Recreational information for Offshore Project Sea Area

14.6.40 The recreational craft activity and facilities in the vicinity of the Offshore Project wind farm site are presented in Figure 14.18.

14.6.41 Based on the RYA published data, the Offshore Project site is intersected by two 'medium use' cruising routes passing east/west through the site, and two cross-channel routes from Brighton, one 'heavy use' and one 'medium use'.

14.6.42 It is noted that there are also deep sea races that would pass through the Offshore Project site. The Sussex Yacht Club program for 2011 included the Pactolus race from Shoreham to Fécamp, and the Royal Escape race from Brighton to Fécamp, both of which would pass through the Offshore Project site. The Pactolus race was scheduled to take place during the July survey period, but was cancelled due to lack of participants.

Dredgers and Underwater Operations Vessels

14.6.43 A chart of dredgers and underwater operations vessels within 20nm of the survey location is presented in Figure 14.19.

14.6.44 The majority of dredgers and underwater operations vessels tracked were associated with Shoreham, and passed to the northwest of the Offshore Project site. In terms of vessels passing through the site, the vessel *Sospan Dau* passed east/west through the site on nine occasions during the summer survey period only, generally between Pevensey (East Sussex) and the Owers Bank dredge area to the west of the site. During the January survey period the *Sospan Dau* was operating within the port approaches of Newhaven and Shoreham.

14.6.45 In consultation with Newhaven Port during July 2011, it was noted that Newhaven was closed for dredging operations during the first survey in January 2011, and therefore no dredgers associated with Newhaven were recorded. It was stated that dredgers from Newhaven operate at the Nab and Owers bank dredging areas. At the time of the meeting, the plant was due to reopen, however, as can be seen from the figure above these vessels were not observed during the summer survey in late July.

14.6.46 Therefore, the routing of dredgers operating out of Newhaven has been assessed through on-going AIS data collection from Shoreham. A plot of 28 days of AIS data from November and December 2011, during which time dredgers were recorded operating out of Newhaven, is presented in Figure 2.23. It can be seen that the dredgers associated with Newhaven tended to pass through or in close proximity to the northern part of the Offshore Project site.

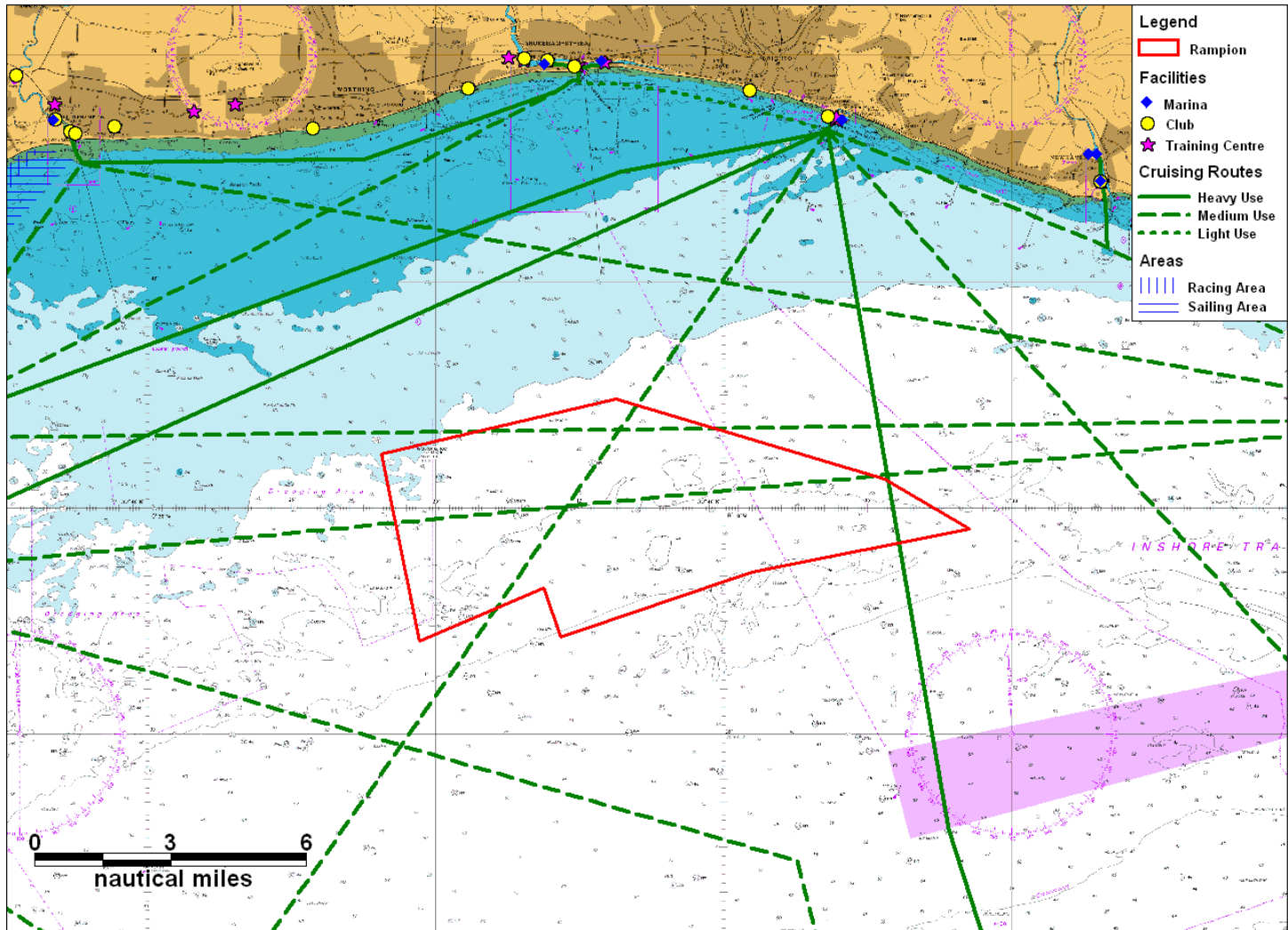


Figure 14.18: Detailed Recreational Data for the Offshore Project Site

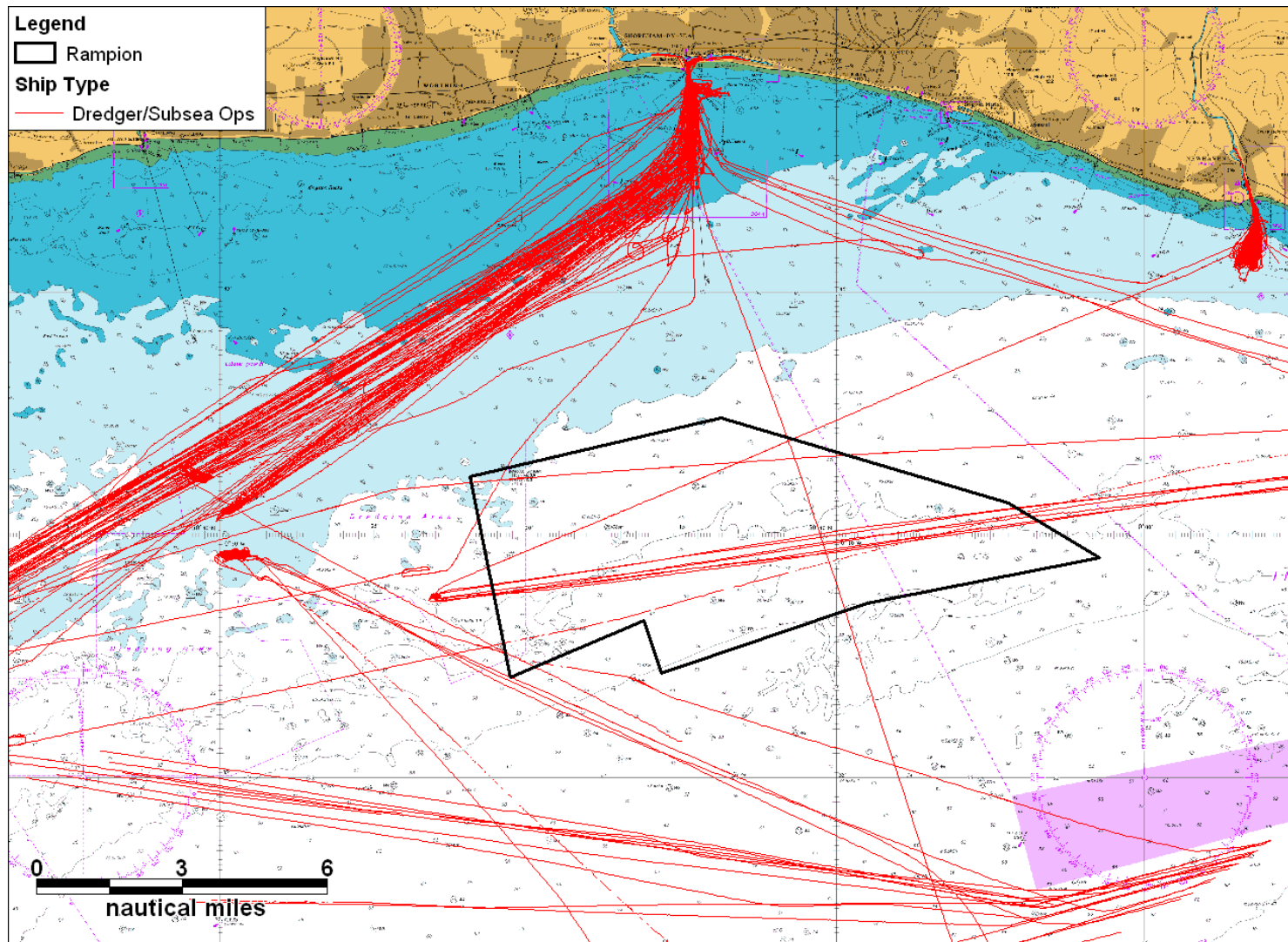


Figure 14.19: Dredgers and Underwater Operations Vessels (28 days)

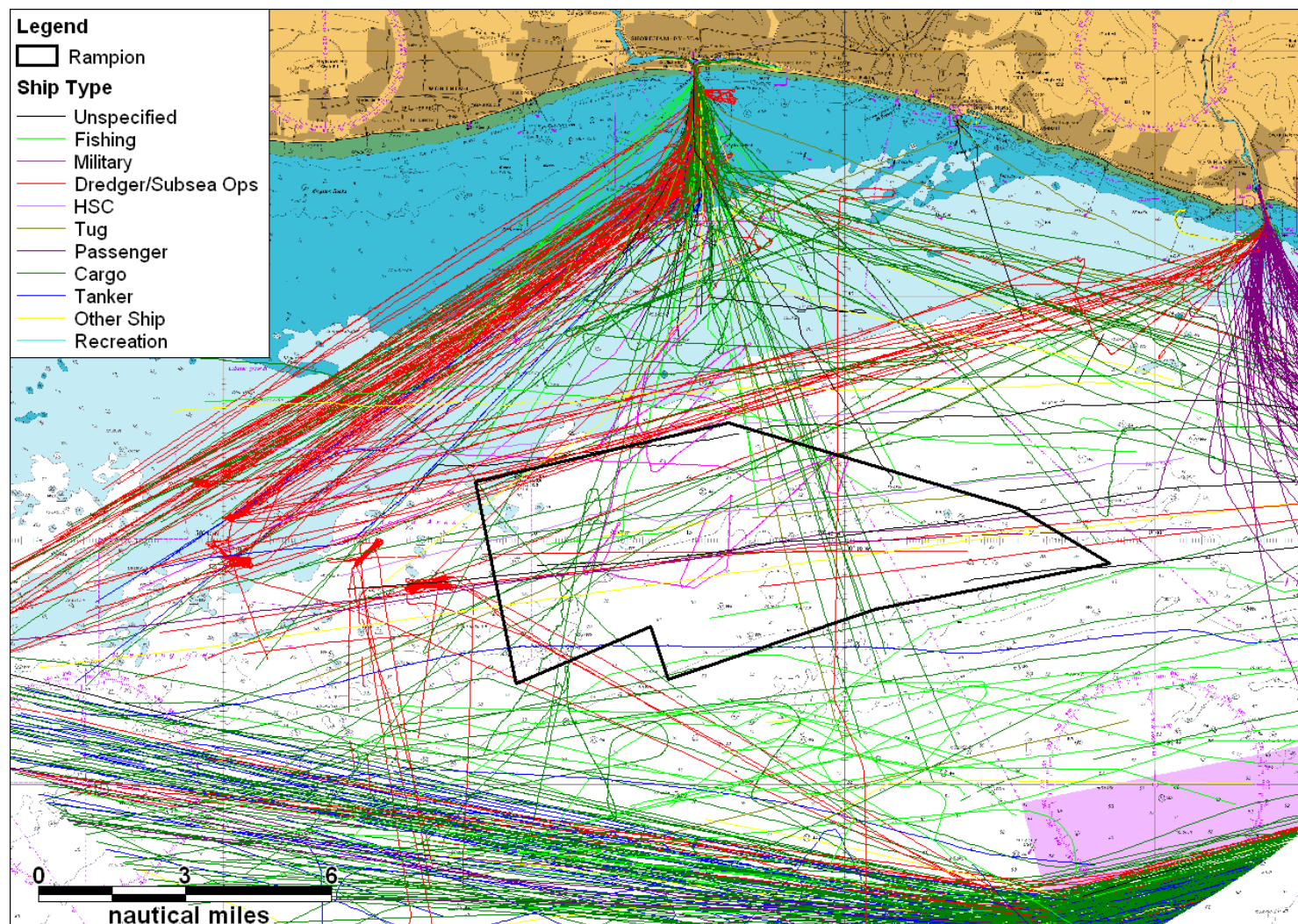


Figure 14.20: AIS Tracks by Type (28 days, November – December 2011)

Anchored Vessels

- 14.6.47 The positions of vessels at anchor recorded during the combined 28 day survey period (January and July 2011) are presented in Figure 14.21.
- 14.6.48 Overall, 23 unique vessels broadcast their navigation status on AIS as 'at anchor' within 20nm of the Shoreham survey location over the 28 days, with a number of these vessels recorded anchoring on more than one occasion.
- 14.6.49 The majority of vessels were anchored either off Shoreham or Newhaven. Vessels anchored off Shoreham tended to be from 1.5 to 3.5nm from the coast, with the majority of this anchoring activity to the east of the export cable route.
- 14.6.50 Given the location of the anchoring activity off Shoreham relative to the export cable route, further assessment of the anchoring activity in the area was undertaken based on the long term AIS data collection from Shoreham. AIS data from April 2011 to February 2012, with an effective survey period of approximately 284 days, were analysed. A detailed plot of all vessels identified to be at anchor in proximity to the charted anchorage off Shoreham is presented in Figure 14.22.
- 14.6.51 It can be seen that the majority of anchoring activity is between 1.7nm and 3nm to the south of Shoreham, in the vicinity of the charted anchorage and pilot station. The area of greatest anchoring density lies to the east of the proposed export cable corridor, which was revised in order to minimise the risk of cable/anchor interaction.

Maritime Incidents

- 14.6.52 This section reviews maritime incidents that have occurred in the vicinity of the Offshore Project site in recent years.
- 14.6.53 The analysis is intended to provide a general indication as to whether the area of the proposed development is currently a low or high risk area in terms of maritime incidents. If it was found to be a particular high risk area for incidents, this may indicate that the development could exacerbate the existing maritime safety risk in the area.
- 14.6.54 Data from the following sources have been analysed:
- Marine Accident Investigation Branch (MAIB); and
 - Royal National Lifeboat Institution (RNLI).

(It is noted that the same incident may be recorded by both the sources.)

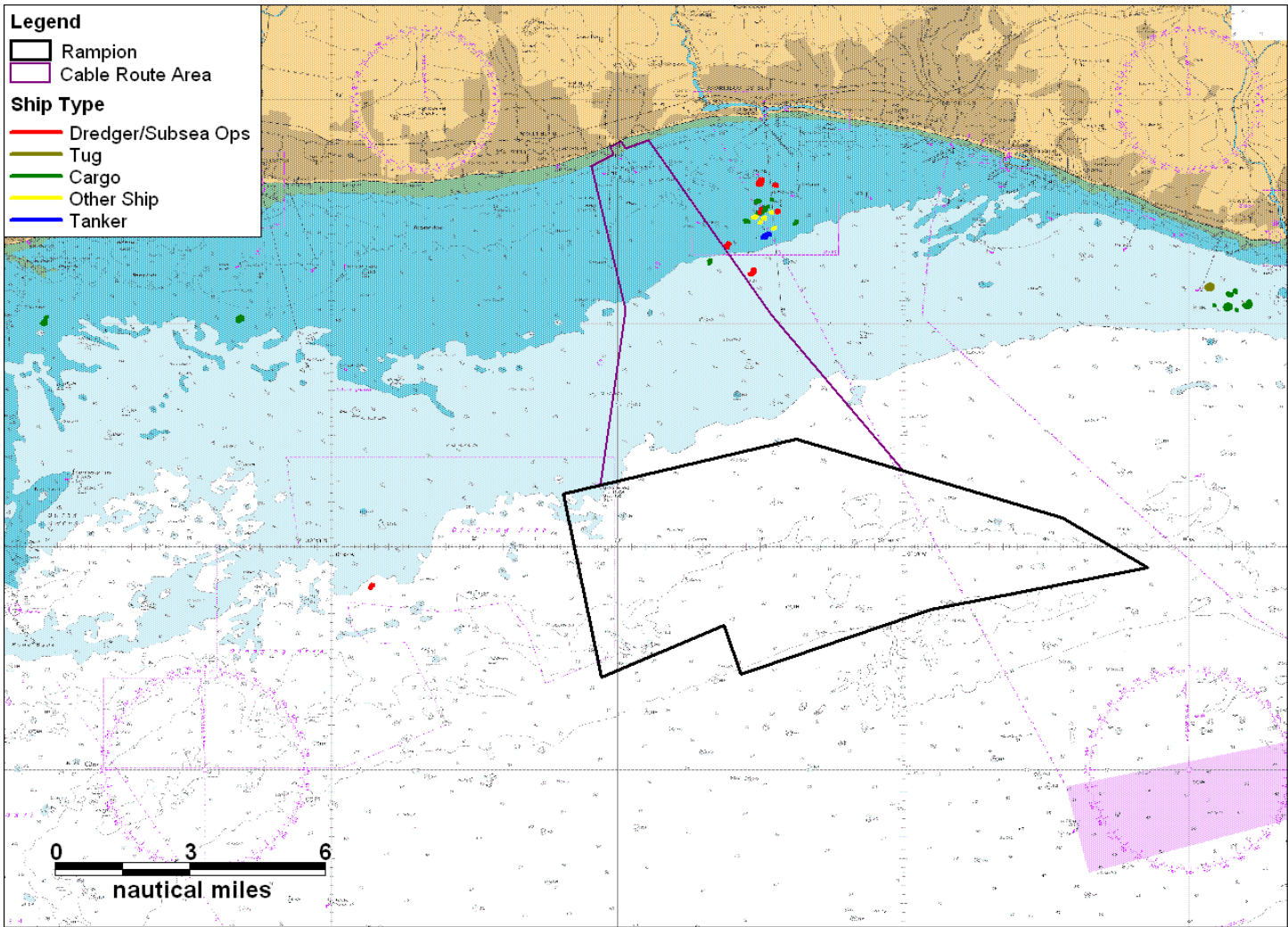


Figure 14.21: All Anchored Vessels during Surveys



MAIB

- 14.6.55 The locations¹ of accidents, injuries and hazardous incidents reported to MAIB within 10nm of the Offshore Project site for the last ten years between January 2001 and December 2010 are presented in Figure 14.23, colour-coded by type.
- 14.6.56 A total of 142 unique incidents involving 160 vessels were reported in the area, corresponding to an average of just over 14 incidents per year. It is noted that this includes a number of incidents within port/harbour areas. Excluding the incidents within ports, a total of 101 incidents involving 114 vessels were recorded within 10nm of the Offshore Project site (equating to an average of a little over 10 incidents per year).
- 14.6.57 Seven incidents, involving a total of eight vessels, were reported within the Offshore Project site. Of these, 4 incidents were reported as 'Machinery Failure', 2 were reported as 'Hazardous Incidents' and 1 as 'Accident to Person'.

RNLI

- 14.6.58 Data on RNLI lifeboat responses within 10nm of the Offshore Project site in the ten-year period between 2001 and 2010 have been analysed. A total of 1,965 launches were recorded by the RNLI (excluding hoaxes and false alarms).
- 14.6.59 Figure 14.24 presents the geographical location of incidents colour-coded by casualty type.
- 14.6.60 The RNLI tended to respond to incidents near to the shore (to the north of the Offshore Project site).
- 14.6.61 There were a total of 17 launches to 17 unique incidents within the Offshore Project site over the 10 year period analysed. Details of these incidents are given below:
- Fouled propeller on a large power boat; Inshore Lifeboat (ILB) from Brighton launched on 12th May 2001;
 - Machinery failure on a large power boat; Shoreham All-weather Life Boats (ALB) responded on 28th June 2002;
 - Machinery failure on an angling vessel; ILB from Littlehampton responded on 21st July 2002;
 - Fouled propeller on a yacht; ALB from Shoreham responded on 1st May 2003;
 - Machinery failure on a large power boat; Shoreham ALB responded on 3rd October 2003;

¹ MAIB aim for 97% accuracy in reporting the locations of incidents.

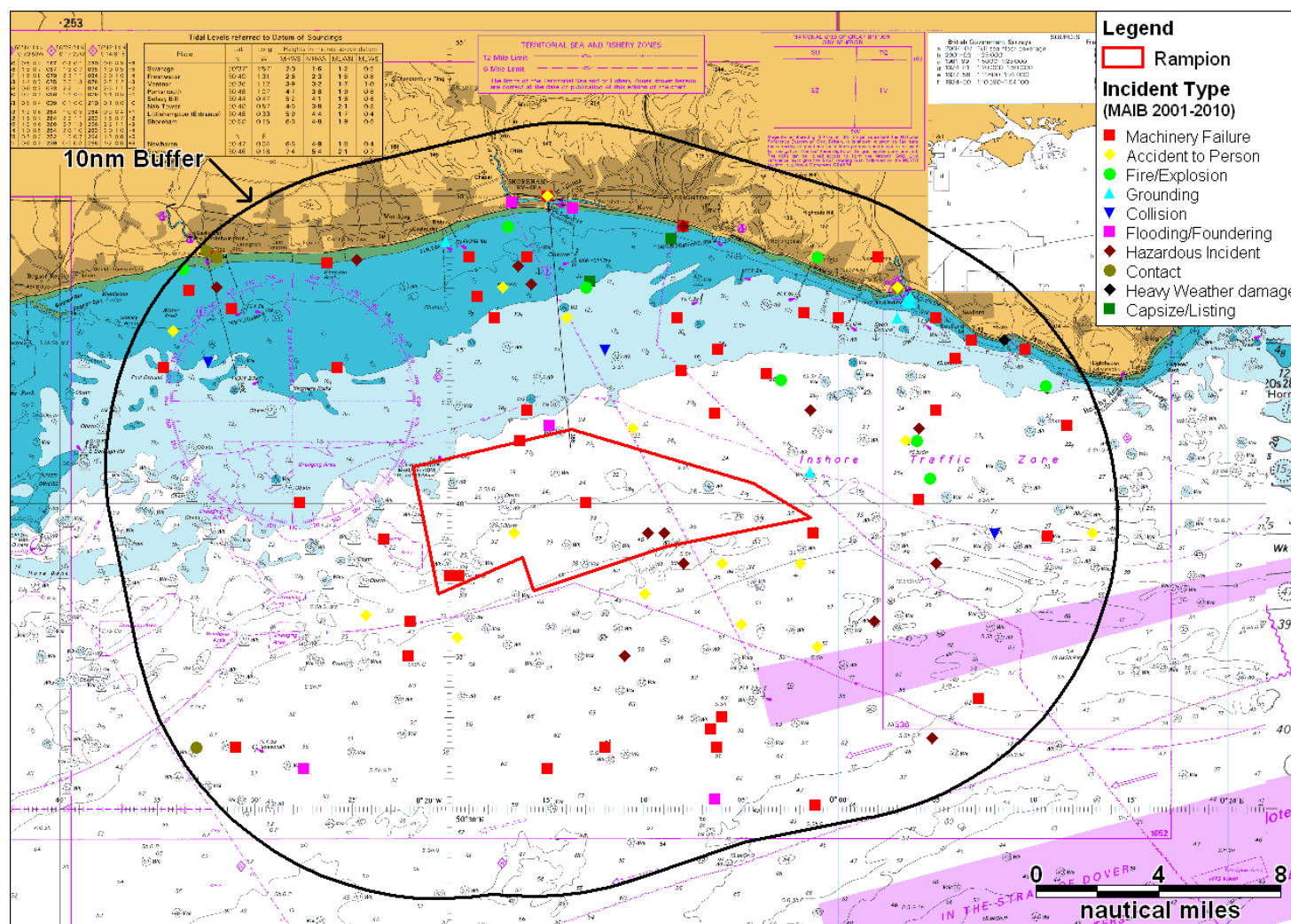


Figure 14.23: MAIB Incident by Type within 10nm of the Offshore Project Site

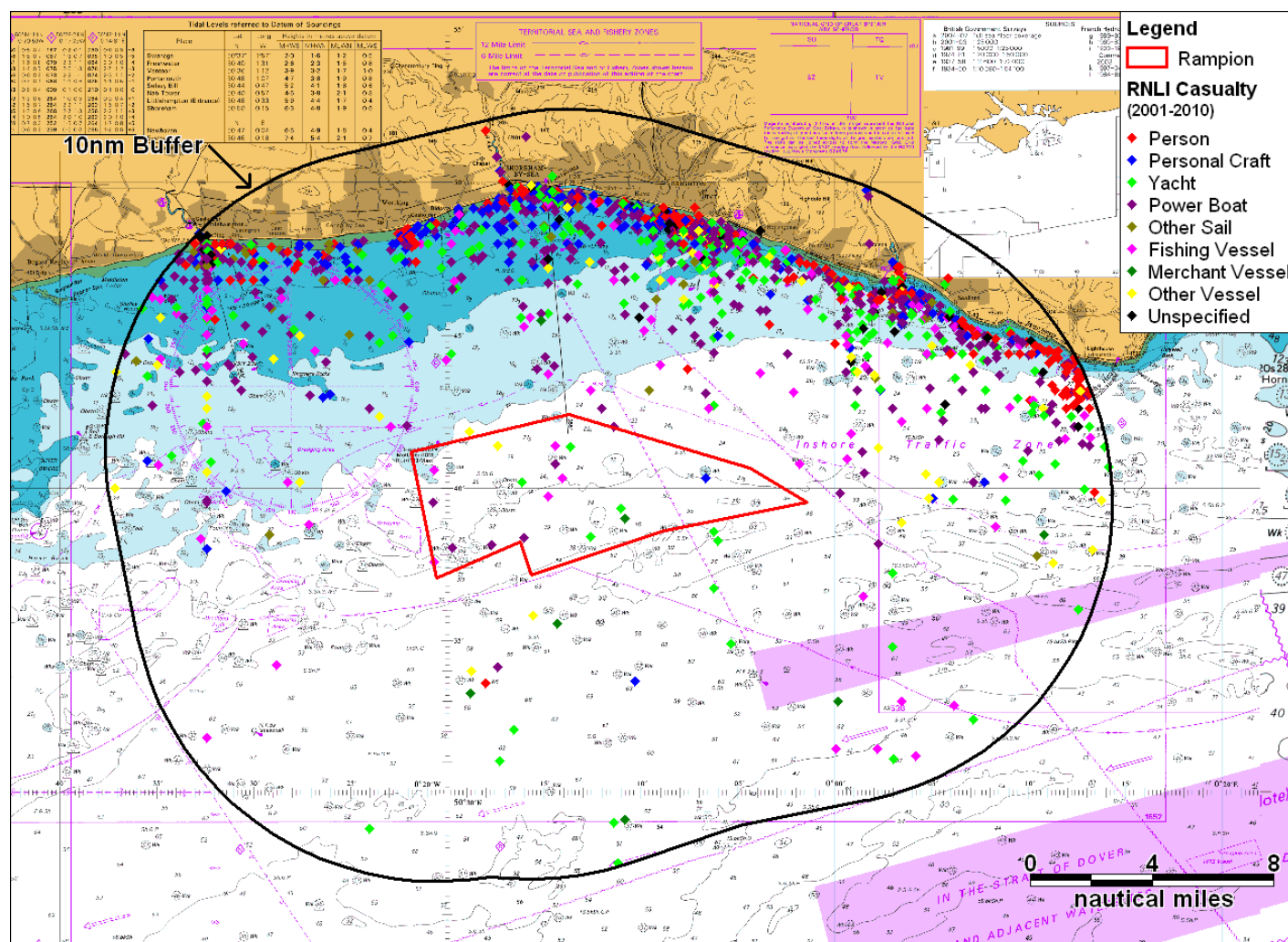


Figure 14.24: RNLI Incidents by Casualty Type within 10nm of the Offshore Project Site

- Fouled propeller on a large power boat; Shoreham ALB responded on 21st December 2004;
- Sail failure on a yacht; ALB from Shoreham responded on 16th May 2005;
- Ill leisure diver; Brighton ILB responded on 03 July 2005;
- Ill crewman on a large fishing vessel; Shoreham ALB responded on 10th August 2005;
- Machinery failure on a small fishing vessel; Shoreham ALB responded on 16th August 2005;
- Machinery failure on a large fishing vessel; ALB from Shoreham responded on 3rd August 2006;
- Ill crewman on a small merchant vessel; Shoreham ALB responded on 28th February 2008;
- Machinery failure on a small power boat; ALB from Shoreham responded on 9th June 2008;
- Machinery failure on a diver support craft; ALB from Shoreham responded on 3rd May 2009;
- Leak and swamping on a yacht; ALB from Shoreham responded on 3rd July 2009;
- Fouled propeller on a small fishing vessel; Shoreham ALB responded on 10th August 2009; and
- Machinery failure on a sailing yacht; Shoreham ALB responded on 9th May 2010.

14.6.62 The stations and types of lifeboat responding to incidents (ALB and ILB) are illustrated in Figure 14.25.

14.6.63 The majority of incidents within 10nm of the site were responded to by Brighton ILB (27%), Littlehampton ILB (22%), Newhaven ALB (18%) and Shoreham ILB (17%). It can be seen that the ALBs generally responded to the incidents further from the coast, including the majority of incidents within the Offshore Project site.

14.6.64 Figure 14.27 in the following section presents the RNLI lifeboat stations and other SAR resources relative to the Offshore Project site.

Search and Rescue (SAR)

14.6.65 This section summarises the existing Search and Rescue resources in the region and the issues being considered in relation to the design of a wind farm site within the Offshore Project site.



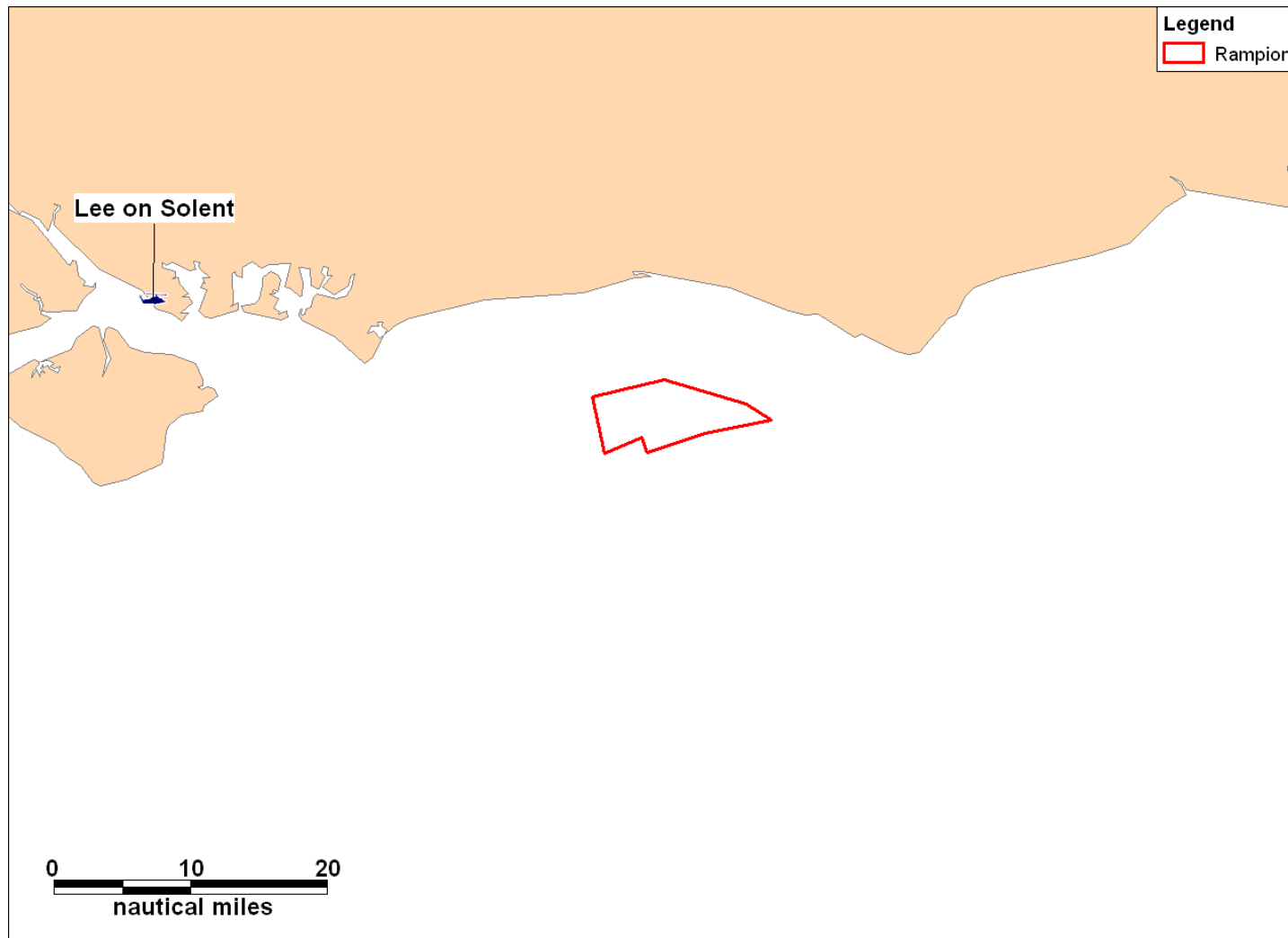


Figure 14.26: SAR Helicopter Bases relative to the Offshore Project Site

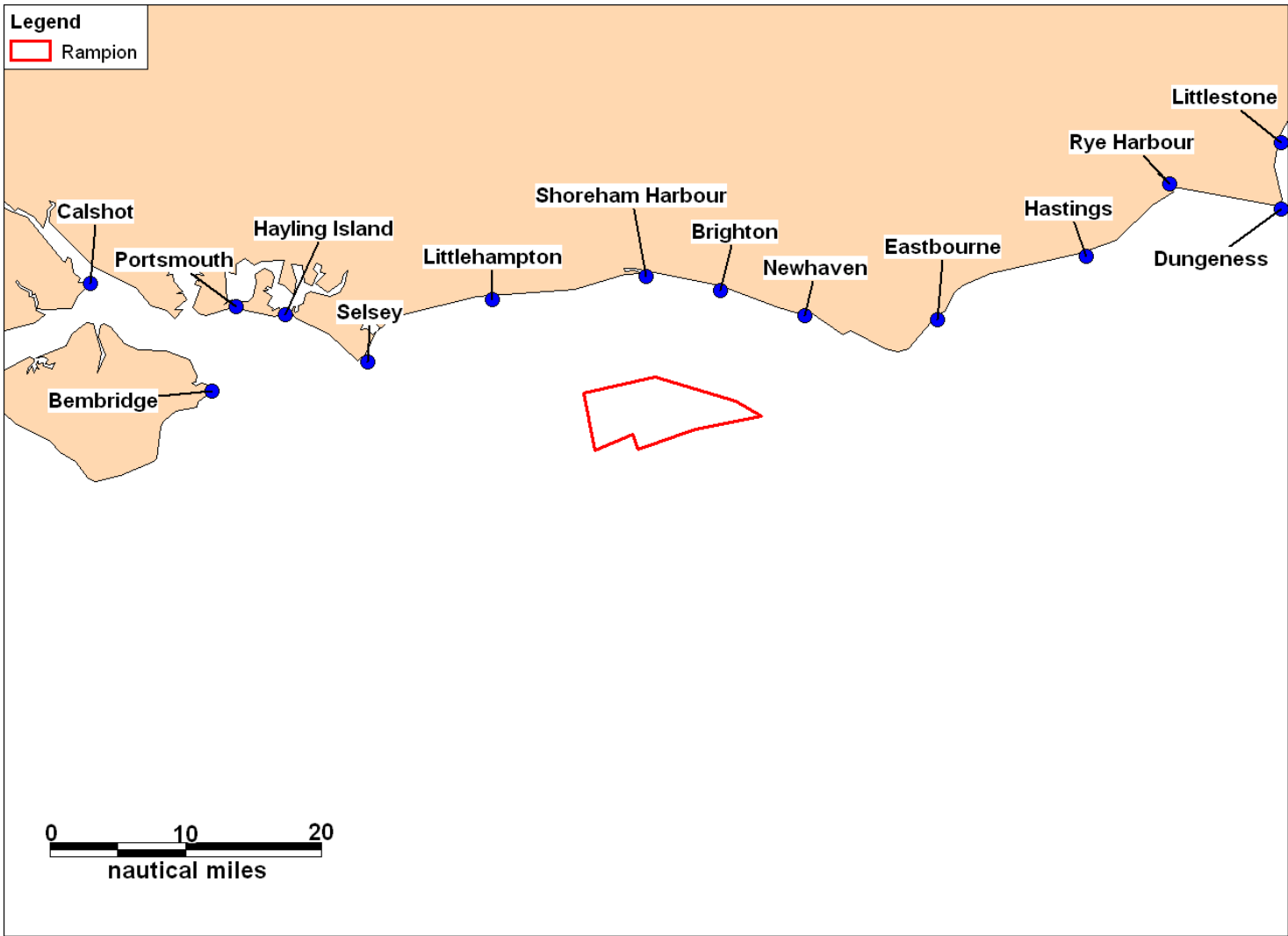


Figure 14.27: RNLI Bases relative to the Offshore Project Site

- 14.6.66 A detailed review of the historical incidents in the area, including RNLI launches, has been presented in Section 14.5.50.

SAR Helicopters

- 14.6.67 A review of the assets in the area of the Offshore Project site indicated that the closest SAR helicopter base is located at Lee-on-Solent, operated by the MCA, approximately 32.5nm to the WNW of the Offshore Project site. This base has AW139 helicopters with a maximum speed of 150 mph and a radius of action of approximately 210nm which easily covers the Offshore Project development. One helicopter is available at 15 minutes readiness between 0730 and 2100 hours. Between 2100 and 0730 hours, one helicopter is held at 45 minutes readiness.
- 14.6.68 The SAR helicopters are equipped for full day/night all weather operations over sea and limited night overland capability (some limitations exist with regard to freezing conditions, but in general terms the helicopters are all weather capable).
- 14.6.69 Based on the above information, the day-time response to the wind farm will be approximately 30 minutes. At night time this will increase by 30 minutes to approximately 1 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.

RNLI Lifeboats

- 14.6.70 The RNLI maintains a fleet of over 400 lifeboats of various types at 235 stations round the coast of the UK and Ireland.
- 14.6.71 The RNLI stations in the vicinity of the Offshore Project site are presented in Figure 14.27.
- 14.6.72 At each of these stations crew and lifeboats are available on a 24-hour basis throughout the year. Table 14.6 provides a summary of the facilities at the stations closest to the Offshore Project site.

Table 14.6: Lifeboats Held at nearby RNLI stations

Station	Lifeboats	ALB Spec	ILB Spec	Distance to Site Boundary
Shoreham Harbour	ALB & ILB	Tamar	D Class	7.4nm
Brighton	ILB	-	B Class	7.4nm
Newhaven	ALB	Severn	-	7.9nm
Littlehampton	ILB (x 2)	-	B Class D Class	9.5nm

- 14.6.73 Based on the offshore position of the development it is likely that ALBs would respond to an incident within the Offshore Project site from Shoreham and Newhaven. This is confirmed when reviewing the historical incident data, with ALBs responding to 82% of incidents within the Offshore Project site from 2001 to 2010 (see Section 14.5.50)

Coastguard Stations

- 14.6.74 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).
- 14.6.75 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.
- 14.6.76 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.
- 14.6.77 The proposed Offshore Project Offshore Wind Farm currently lies within the East of England Region with the nearest rescue coordination centre being MRCC Solent. MRCC Solent's area of responsibility provides search and rescue coverage from Beachy Head to the Hampshire/Dorset Border.
- 14.6.78 The proposed changes to the UK MRCC structure will result in the Offshore Project site being in the area of responsibility of the Maritime Operations Centre (MOC) based in Southampton/Portsmouth. This will cover a much wider area of the south coast than the current MRCC Solent, and will also be the controlling centre for UK Coastguard operations; however it will continue to respond to any incidents within the Offshore Project site.

Salvage Tugs

- 14.6.79 Each MRCC 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.
- 14.6.80 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.

- 14.6.81 The Emergency Response Co-operation Plan (ERCoP) for the Offshore Project wind farm will identify the developers methodology for obtaining towing vessels to assist any damaged/drifted vessels, and will include comprehensive identification of tugs that are capable of assisting and their base port.

14.7 Predicted Impacts

The Rochdale Envelope

- 14.7.1 In line with the use of the “Rochdale Envelope” (see Section 5), the assessment in this section has been based on a development scenario which is considered to be the worst case in terms of impacts to designated features. Table 14-7 lists the components of the design of the marine part of the project that could influence the magnitude of impacts.

Table 14-7: Wind farm design features and their influence on the Rochdale envelope for Shipping and Navigation

Design feature	Design options
Wind Farm Site Layouts	Two wind farm layouts have been assessed, both assessing the maximum number of Wind Turbine Generators (WTGs) which will represent the greatest risk to navigational safety. A layout which fills the red line boundary (greatest reduction in navigable sea room) and a layout with the closest WTG spacing proposed for the site have been considered.
Wind Turbines	If smaller turbines are selected, a higher number will be installed within the red line boundary. A greater number of turbines within the development boundary will represent a worst case scenario.
Foundations	Maximum foundation dimensions at sea level represents worst case (greatest collision risk). The maximum width of IBGS jacket at seabed was used, as sea level dimensions were unavailable.
Offshore Substation	Maximum dimensions used - 45m x 45m (greatest collision risk). Peripheral locations worst case where there is greater exposure to collision risk.
Cables	Maximum inter-array cable length. Maximum number of export cables and maximum separation distance.
Navigation and Aviation Marking	Worst case is considered to be that E.ON only complies with minimum standards for marking and lighting.
Construction and Installation	Maximum duration of installation period, and maximum number of construction vessels. These situations are likely to arise if many small WTGs are installed.
Operation and Maintenance	The estimated frequency of maintenance visits to each WTG is the same whether it is large or small. More vessel traffic will be generated by more turbines; therefore higher number of small WTG would be a worst-case.
Decommissioning	Similar considerations need to be made for the decommissioning operations as for construction and installation. Higher levels of decommissioning vessel traffic would result from higher numbers of installed turbines.

- 14.7.2 For the shipping and navigation impact assessment, two indicative layouts have been used. Scenario 1 consists of the maximum number of WTGs (175 machines) with turbines filling the red line boundary and Scenario 2 having the maximum number of WTGs and the closest turbine spacing proposed for the site. Two indicative worst case (for shipping and navigation) locations for offshore substations and the proposed Met Mast location have also been modeled in both layouts.

Construction

- 14.7.3 Whilst the same impacts exist during the operational phase, there are additional impacts associated with the construction phase of the project that will require different risk control measures.
- 14.7.4 During construction there will be an increased level of vessel activity within the Offshore Project Offshore Wind Farm development and along the export cable route which will be associated with the construction activity (this will include transfer vessels and jack-ups/barges etc). The presence of the construction vessels is likely to increase encounters and therefore create additional navigational safety risk. It is however noted that the construction vessels could also provide additional emergency response facilities and therefore increase risk mitigation.

Impact of Wind Farm Construction on Commercial Ship Routeing (Including Dredgers)

- 14.7.5 Based on the analysis of the maritime traffic survey data gathered for the site, the majority of vessels pass clear of the site within shipping routes associated with the westbound lane of the TSS. However, there are routes that will be impacted during the construction phase, including vessels headed to/from local ports (Shoreham and Newhaven) and vessels routeing east/west within the ITZ.
- 14.7.6 Due to unrestricted water depths and minimal offshore development/structures in the area, there is sufficient sea room surrounding the Offshore Project Offshore Wind Farm development site for vessels to safely deviate around the construction works. Vessels routeing within the ITZ are expected to deviate both inshore and offshore of the development.
- 14.7.7 The largest deviations will be for those vessels routeing between the port of Shoreham and the TSS lanes to the south of Offshore Project Offshore Wind Farm. These vessels currently pass through the centre of the proposed wind farm site, and are likely to deviate to the west or east of the construction activities. However, vessels routeing to Shoreham from the westbound TSS lane have the option, in accordance with the requirements of Rule 10 of the COLREGS, of leaving the TSS lane early and routeing through the ITZ to Shoreham, resulting in a reduction in route length.

- 14.7.8 In the planning of the construction phase of the wind farm, consideration will be given to the use of phased safety zones where feasible, in order to minimise the impact of wind farm construction on commercial vessel routeing.

Impact of Wind Farm Construction on Fishing Vessels

- 14.7.9 Fishing vessels could be impacted during the construction phase of the project as temporary exclusion zones will be implemented during the WTG installation activities. From the maritime traffic surveys, a relatively high number of fishing vessels, generally less than 30m in length, were recorded within the Offshore Project site.
- 14.7.10 Promulgation of information for fishing vessels will ensure that they are informed of the construction works at the Offshore Project Offshore Wind Farm; this will include Notices to Mariners and local fisheries liaison.
- 14.7.11 It is likely that the smaller fishing vessels currently operating in the area will be able to deviate around construction activities when engaged in fishing or transiting between ports. There is available safe sea room around the site, should vessels be displaced.
- 14.7.12 In the planning of the construction phase of the wind farm, consideration will be given to the use of phased safety zones where feasible, in order to minimise the displacement of fishing vessels due to the wind farm construction.

Impact of Wind Farm Construction on Recreational Craft

- 14.7.13 During the maritime traffic survey during July 2011, a relatively high level of recreational craft activity was recorded within the Offshore Project development area, with the majority of craft being either associated with Brighton Marina or routeing east/west through the site. The RYA data indicates that the site is intersected by three medium use recreational routes and one heavy use route.
- 14.7.14 In suitable conditions, i.e., during good visibility and calm sea conditions, recreational craft will be able to pass between the construction works and temporary safety zones, as well as being able to deviate around the wind farm activities.
- 14.7.15 In addition to the recreational craft transiting through the Offshore Project Offshore Wind Farm development, other recreational activities known to take place in the area include recreational fishing and diving. A recreational dive craft was recorded over wrecks within and in the vicinity of the site during the maritime traffic survey. Exclusion zones will be implemented during WTG installation, and these would prevent access in close proximity to WTGs for activities such as these. However, this restriction in access will be of limited in duration, due to the temporary nature of the construction works.

- 14.7.16 In the planning of the construction phase of the wind farm, consideration will be given to the use of phased safety zones where feasible, in order to minimise the displacement of recreational routes and the restriction of access within the site for recreational craft during the construction phase.

Impact of Cable Installation on Commercial Shipping (Including Dredgers)

- 14.7.17 The presence of cable installation vessels within the proposed export cable corridor can pose additional risk to navigation, due to an increased level of vessel activity and the limited manoeuvrability of the cable installation vessels (restricted in their ability to manoeuvre under COLREGs). This could potentially lead to an increase in vessel-to-vessel encounters and an increased risk of collision.
- 14.7.18 The majority of commercial shipping intersecting the export cable corridor is associated with the port of Shoreham and passes to the northwest of the Offshore Wind Farm site. Other commercial routes intersecting the export cable route include vessels associated with the port of Newhaven and the east/west traffic associated with the ITZ. These vessels will therefore be exposed to a greater level of vessel-to-vessel collision risk during the installation of the export cables. There will also be an impact on commercial vessel routeing due to avoidance of the cable installation vessels; however, there is safe navigable sea room for vessels to deviate around the installation activities resulting in a slight change in the baseline routeing and of limited duration, due to the temporary nature of the cable installation works.
- 14.7.19 The physical presence of inter-array and export cables (including partially constructed cables) which may be exposed or partially buried, could cause an anchor snagging risk for commercial vessels. Promulgation of information and navigation marking in accordance with THLS will ensure that vessels are well informed of current or partially completed activities, with Guard Vessels in place to protect sensitive areas of installation.

Impact of Cable Installation on Fishing Vessels

- 14.7.20 The impacts on transiting fishing vessels of cable installation vessels within the proposed export cable corridor are generally similar to those for commercial vessels, with the potential for increased vessel-to-vessel collision risk and deviations around the cable installation.
- 14.7.21 Fishing vessels will be aware of cable installation works through effective promulgation of information including Notices to Mariners and fisheries liaison. Other fishing vessels will become aware of the activities through navigational day marks and lights used by the cable installation vessels which will notify them of their status as currently 'restricted in their manoeuvrability'.

14.7.22 Fishing vessels will be able to deviate around the cable installation vessels, given the available sea room, with a minor alteration to current routes. Due to the temporary nature of the cable installation works, the impacts will be for a limited duration.

14.7.23 In addition, the physical presence of inter-array and export cables (including partially constructed cables) which may be exposed or partially buried, could cause a gear snagging risk for commercial fishing vessels operating in the area. Promulgation of information and navigation marking in accordance with THLS will ensure that fishing vessels are well informed of current or partially completed activities, with Guard Vessels in place to protect sensitive areas of installation. It is likely that fishing vessels will avoid installation areas.

Impact of Cable Installation on Recreational Craft

14.7.24 Based on the RYA data, three heavy use and four medium use recreational routes intersect the proposed export cable corridor. Routes used by recreational craft were also recorded on AIS and radar during the 14 day summer survey from Shoreham, with the majority of recreational craft intersecting the cable corridor routeing either east / west (between Beachy Head and Selsey Bill) or associated with Brighton. There is the potential for increased vessel-to-vessel collision risk and deviations around cable installation works for these recreational craft.

14.7.25 There is available safe sea room for recreational craft to pass clear of cable installation vessels, with a small change in routeing and extensive promulgation of information will ensure recreational users are aware of current activities. Due to the temporary nature of the cable installation works, the impacts will be for a limited duration.

Impact of Cable Installation on Port Operations

14.7.26 Installation of the export cable could restrict vessel access to the port of Shoreham from the west. This impact will be temporary, during construction and likely be focused in the deeper water of the proposed export cable route only (i.e. 3 to 7nm off the coast) where vessels restricted in their draught may not be able to cross the shallower waters.

14.7.27 Promulgation of information, liaison with Shoreham and effective works vessel management will ensure that there is not a significant increase in navigational safety risk and that vessels are kept well informed of planned activities to aid passage planning.

Operation

14.7.28 A revised ship routeing pattern following construction of the Offshore Project Offshore Wind Farm been estimated based on the review of the baseline shipping data. Four risk assessments were carried out as outlined below:

- 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.

14.7.29 The following scenarios were investigated in detail:

- Vessel-to-vessel collisions; and
- Vessel-to-wind farm structure collisions (powered and drifting).

14.7.30 The impacts associated with the Offshore Project in terms of shipping and navigation, SAR resources and Radar impacts are assessed for the operational phase of the project in the following subsections.

Impact on Commercial Ship Routeing

14.7.31 The main impact on commercial ship routeing is the displacement of vessels routeing north/south through the Offshore Wind Farm site on approach/departure to Shoreham Port. The current position of this route, based on the long term AIS data collection from Shoreham, is presented in Figure 14.28.

14.7.32 An average of a little over one vessel every two days uses this route to/from the port of Shoreham. Vessels are generally associated with the Dover Strait TSS, although a small proportion of vessels are routeing between the port of Shoreham and northern France.

14.7.33 Vessels routeing from Shoreham to join the eastbound lane of the TSS are likely to route to the west of the site at a distance of approximately 1nm from the site's western boundary, which will result in an increase in voyage distance of 6.0nm corresponding to an increase in transit time of approximately 45 minutes based on the average speed of vessels on this route (8.2 knots).

14.7.34 Vessels routeing from the westbound TSS lane to Shoreham would have the options of routeing to the east or west of the Offshore Project site or exiting the lane early and use the ITZ to Shoreham. Historical route preference has encouraged vessels routeing to Shoreham to remain within the TSS until the termination before heading to Shoreham. A route through the Inshore Traffic Zone would mean a break to this traditional routeing, however, a number of vessels already use this alternative route to Shoreham, leaving the lane after either the CS2 or CS3 buoy.

14.7.35 Routeing east of the site would result in an increase in route length of 5.3nm (corresponding to an increase in time of approximately 40 minutes for a typical vessel on this route), whereas routeing to the west would result in an increase in route length of 8.5nm. The alternatives using the ITZ are 10 to 13nm shorter than the current route (depending on the point at which vessels leave the TSS).

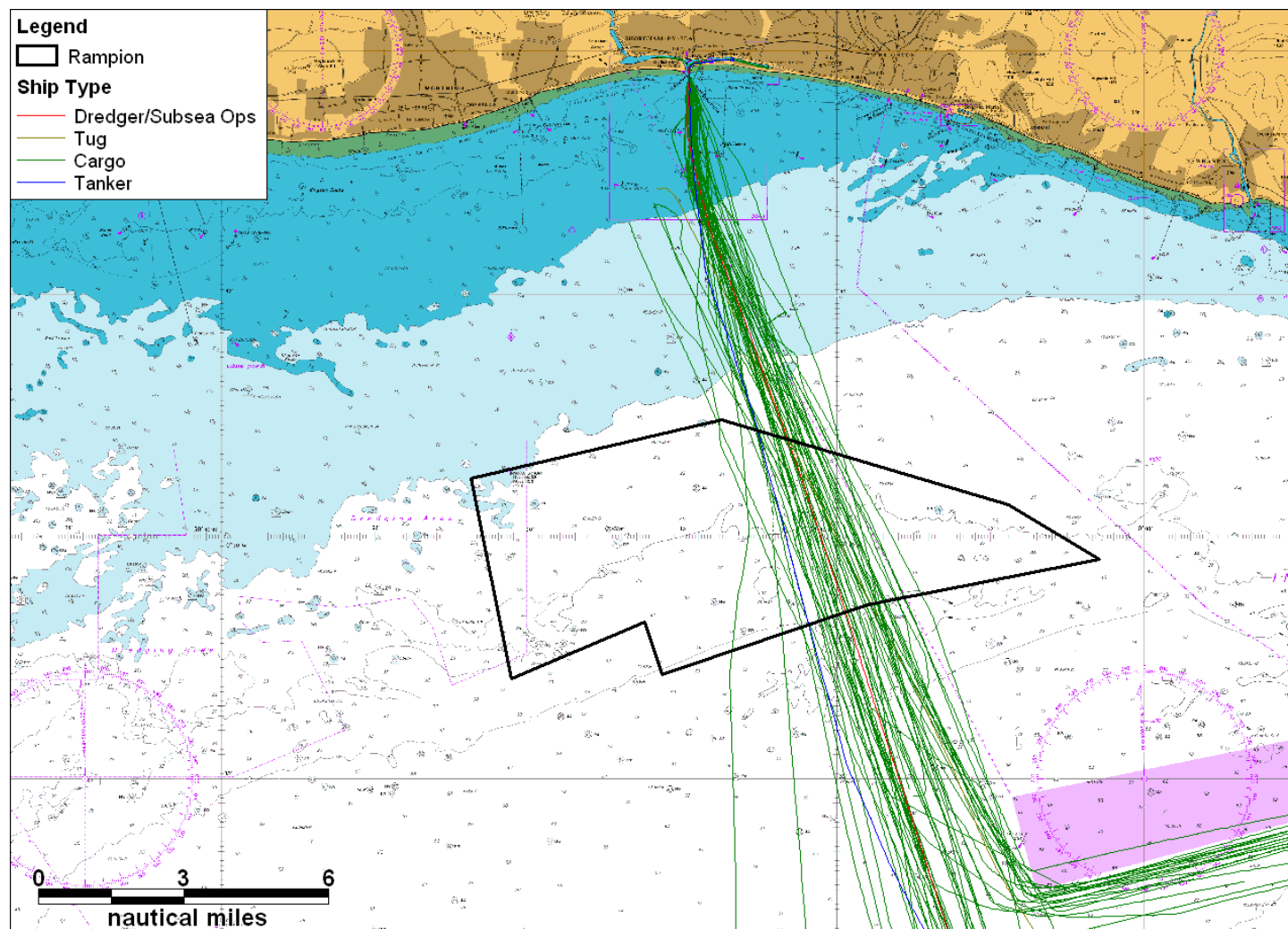


Figure 14.28: North/South Shipping through Offshore Project (April to July 2011, 110 days)

- 14.7.36 Vessels on this route include those routeing to/from ports in The Netherlands and Belgium (e.g., Rotterdam and Antwerp) and Sodertälje (Sweden). Based on the worst case increase in route length for a vessel routeing to Shoreham and routeing to the west of the Offshore Project site (8.5nm), the percentage increase in overall route length for a transit from Antwerp to Shoreham is 4%, whereas for a vessel routeing from Sodertälje to Shoreham the increase is 0.7% of the current route length.
- 14.7.37 These alternative routes are presented in Figure 14.29.
- 14.7.38 Commercial vessels routeing within the ITZ will also be displaced by the wind farm. Various types of vessels route east/west through the Offshore Project site within the ITZ, including commercial vessels such as cargo vessels, tugs and marine aggregate dredgers.
- 14.7.39 To the east, these vessels generally pass within 5nm of Beachy Head, whilst to the west, vessels are associated with ports within the Solent or transits to the south of the Isle of Wight. Following the construction of the Offshore Wind Farm these vessels are likely to pass both north and south of the proposed site. The worst case deviations will be for those vessels routeing to/from the Solent, but the increase in route distance for these vessels is approximately 1nm.
- 14.7.40 Alternative routes between Eastbourne and Southampton, based on a transit of the tug *MTS Indus*, are presented in Figure 14.30.
- 14.7.41 Those alternative routes identified which result in an increase in mileage and time would have commercial impacts on vessels and may impact an operator's ability to meet schedules, potentially increase manning requirements and fuel costs. Furthermore, deviations leading to increased sailing times for vessels routeing to Shoreham could result in vessels missing the tidal opportunity to enter the port.

Impact on Commercial Shipping Collision Risk

- 14.7.42 The change in vessel-to-vessel collision frequency due to the Offshore Wind Farm was estimated by modeling the baseline collision risk level, pre-wind farm development and modeling the revised traffic pattern (with wind farm).
- 14.7.43 For the worst case scenario of WTGs throughout the site, resulting in the maximum loss of navigable sea room, the change in collision frequency due to the wind farm was assessed to be relatively low, 1.5×10^{-3} (one additional collision every 690 years).
- 14.7.44 In terms of a vessel under power deviating from its route to the extent that it comes into proximity with structures within the wind farm, the worst case collision return period was estimated to be 1 every 5,100 years, based on the maximum number of WTGs with minimum spacing (Scenario 2). This is below the historical average of 5.3×10^{-4} per installation-year for offshore installations on the United Kingdom Continental Shelf (1 in 1,900 years).

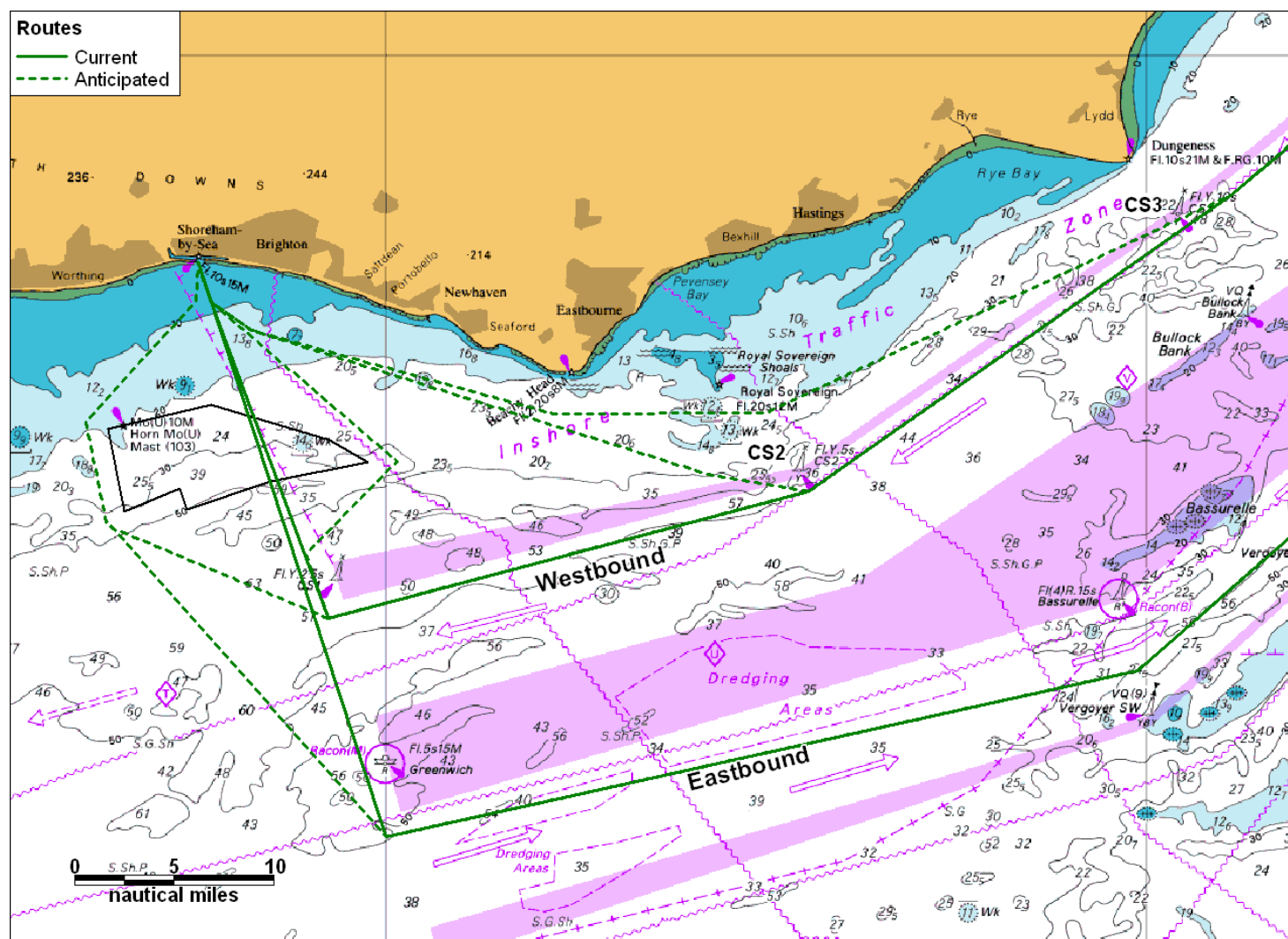


Figure 14.29: Current and Anticipated Mean Route Positions for Shoreham Traffic

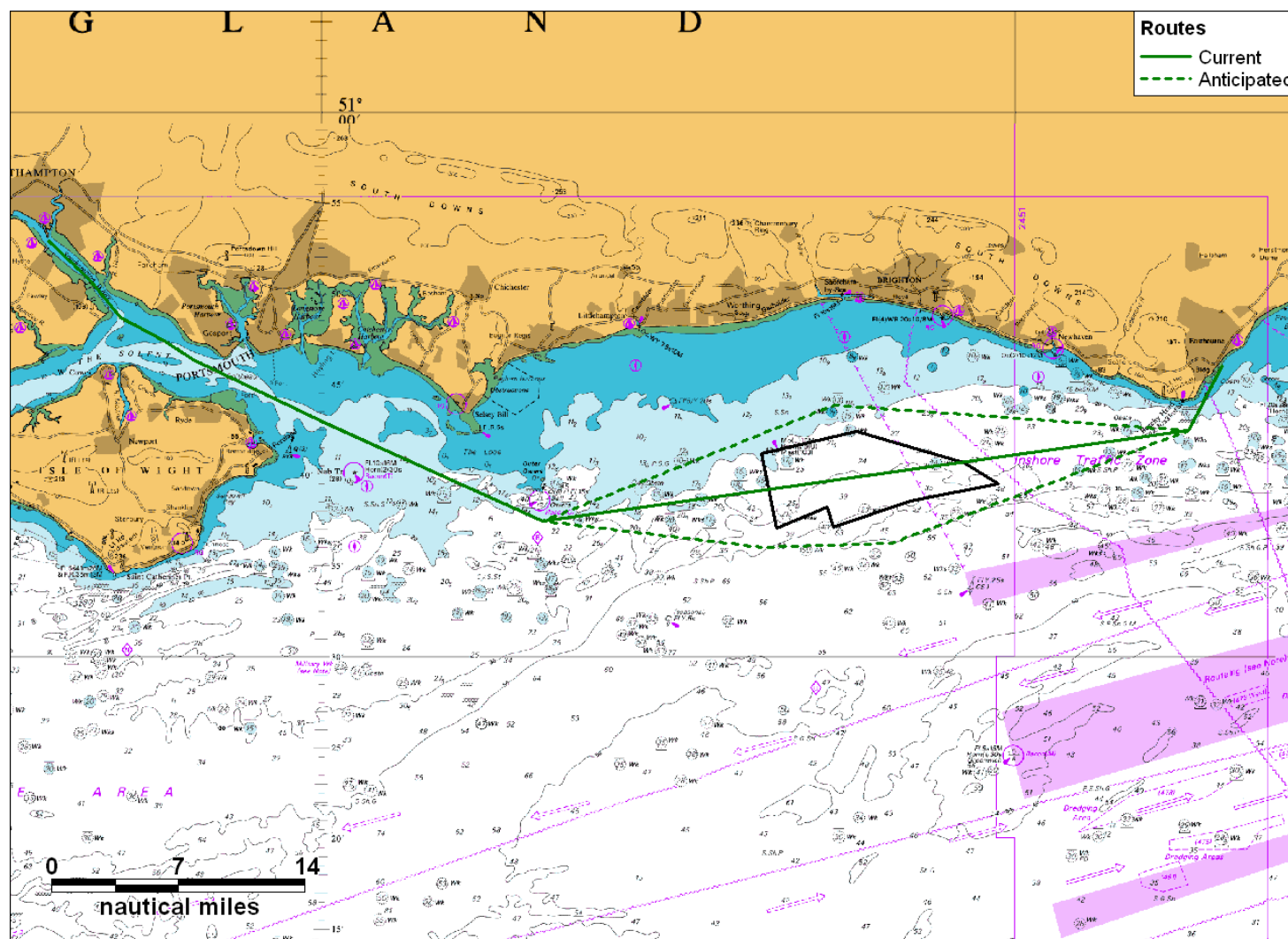


Figure 14.30: Eastbourne – Southampton Current and Anticipated Routes

- 14.7.45 Based on the modeling of the two indicative turbine layouts, the worst case drifting collision risk with the wind farm structures has been identified as one every 9,600 years (Scenario 2).
- 14.7.46 At the Hazard Review Workshop it was noted that drifting vessels at the exit of the westbound lane of the TSS, to the south of Shoreham are relatively common. Vessels encountering engine problems within the lanes are likely to continue if possible, before attempting repairs on leaving the TSS. At the Hazard Review Workshop, it was identified that if vessels are unable to anchor, then they may drift towards the Offshore Project site with prevailing south-westerly winds. There is approximately 6.4nm between the exit of the westbound TSS lane and the Offshore Wind Farm site boundary, therefore, based on a typical drift speed in moderate conditions (Beaufort 4-7) of 1.5 knots (OCIMF, 1993), it would take a little over 4 hours for a vessel to drift from the exit of the TSS lane into the wind farm site. In severe conditions, with a drift speed of 3 knots it would take approximately 2 hour 10 minutes to reach the wind farm. The currents in the area set in a generally easterly/north easterly direction on the flood and westerly/south westerly on the ebb, and so whilst a southerly wind may result in a vessel drifting towards Offshore Project, the speed of drift towards the site is not likely to be compounded by currents.
- 14.7.47 Based on discussions at the Hazard review Workshop, in the event of a drifting vessel in the vicinity of the wind farm, local harbour tugs may not have the capability to take a large vessel in tow. The nearest powerful tugs are from Southampton (over 50nm passage from the southern part of the Offshore Project site). Therefore, the steaming time to reach Offshore Project may be too high for a tug to intervene, dependent on the situation of the vessel in trouble and weather and sea conditions.
- 14.7.48 In terms of vessel-to-vessel collisions, displacement of vessels due to the development of the wind farm may cause increased congestion in combination with the displacement of commercial fishing vessels, recreational craft and the increase in traffic associated with the wind farm development. Although the development will result in vessels taking a new route, vessels when in compliance with COLREGS adapt to the new navigational circumstances, and it should not present navigational circumstances vessels are not already dealing with. Promulgation of information, effective marine coordination and the ability for small craft to continue to transit through the array will go some way to mitigating this impact.

Impact on Marine Aggregate Dredging

- 14.7.49 The routing of dredgers operating within the aggregate license areas to the south west of Shoreham will be impacted by the physical presence of structures within the Offshore Wind Farm. Dredging routes were identified through the movements recorded during the two maritime traffic surveys and long term AIS data collection for the area.

- 14.7.50 Dredgers operating out of Newhaven were not recorded during the 28 days of AIS and radar surveying, due to the plant at Newhaven being closed at the time of the surveys. During consultation it was identified that dredgers operating out of Newhaven operate at the Nab and Owers Bank dredging areas. Therefore, these vessel movements were identified through long term AIS gathering and showed a tendency to pass through or in close proximity to the north of Offshore Wind Farm site (see Figure 14.31). The vessels on this route are expected to increase their closest point of approach from the site to around 1nm, requiring only minor deviations from the current routes.
- 14.7.51 Dredgers were also tracked routeing from the TSS to the dredge areas to the west Offshore Wind Farm, intersecting the southwest corner of the site. These vessels will be displaced further to the southwest of the site (dependent on the final positions of any WTGs within the southwest part of the site).
- 14.7.52 Average tracks for dredgers operating out of Newhaven and those routeing from the TSS lane, prior to and after wind farm construction, are presented in Figure 14.31.
- 14.7.53 Other dredge routes which have been identified as passing through the Offshore Project site are those of the *Sospan Dau* when engaged in beach replenishment works. Through long term AIS data collection two different routes have been identified from when the vessel was operating within different licensed dredging areas.
- 14.7.54 When routeing between dredge area 435/2 and Pevensey or Hastings (both East Sussex) the *Sospan Dau* tended to pass through the northern part of the Offshore Project wind farm site. However, when routeing between Pevensey and dredge area 124/1 B the vessel's route passed through the centre of the site (Figure 14.19).
- 14.7.55 The increase in route distance for the route displaced from the centre of the site is estimated to be 2.8nm (Figure 14.32). It is noted that the beach replenishment operations are dependent on the dredger being able to get to and from the dredging area in the time between high tides, and the operator of this vessel, Westminster Dredging Company Limited, indicated that dependent on WTG spacing within the wind farm, the vessel may route through the wind farm, which would lead to an increase vessel to WTG collision risk.
- 14.7.56 In addition to the impact on dredgers when they are on transit, the physical presence of the wind farm structures may lead vessel to WTG collision risk for vessels engaged in dredging in close proximity to the wind farm.

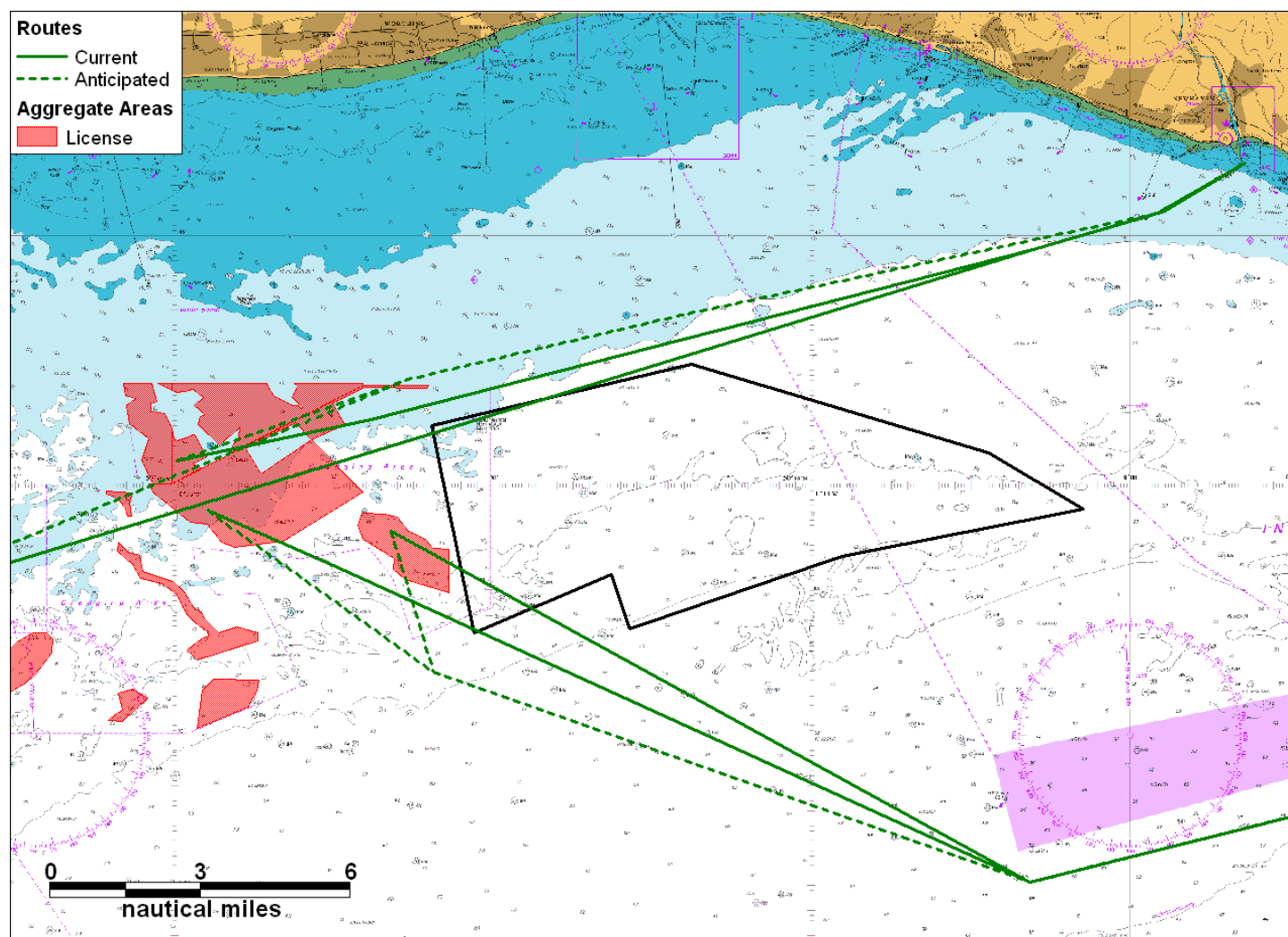


Figure 14.31: Current and anticipated Dredging Routes from Newhaven and the Westbound TSS Lane

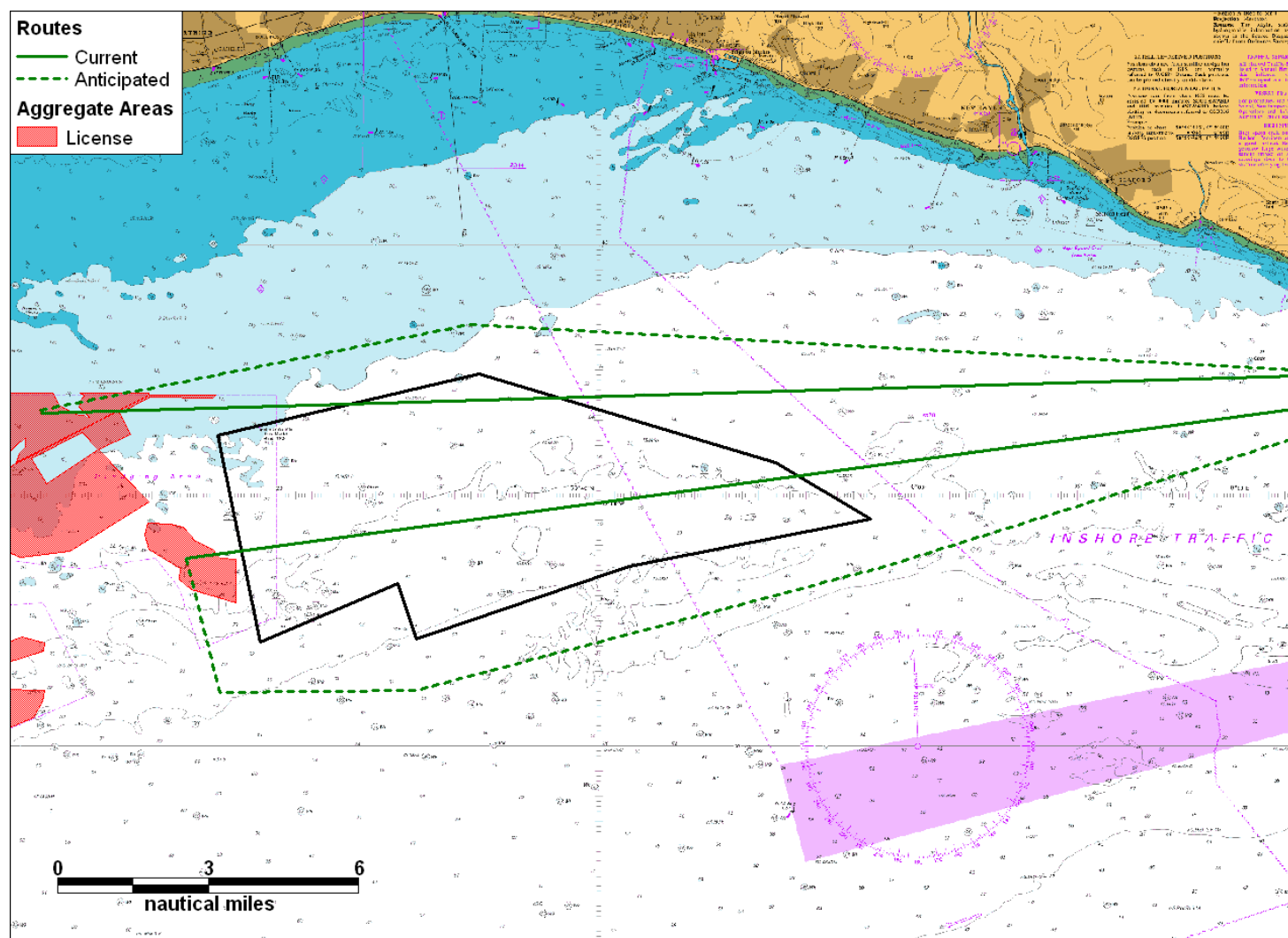


Figure 14.32: Current and Anticipated Routeing for the Dredger *Sospan Dau*

- 14.7.57 The nearest licensed marine aggregates dredging area to Offshore Project is 280m to the west of the site boundary, and there is a pre application area intersecting the southwest part of the site. Marine aggregate dredgers are highly manoeuvrable vessels with a high level of navigational accuracy. With appropriate separation (i.e., a buffer) between licensed areas and WTGs, dredgers should be able to safely manoeuvre within a licensed area and in proximity to the wind farm.
- 14.7.58 However, in the event of a machinery failure on board a dredger operating in close proximity to the site's western boundary, the vessel may drift towards the wind farm (currents in the area set in a generally north easterly direction on the flood). This has the potential to result in vessel to structure collisions as well as interaction between the suction pipe and subsea cabling associated with the wind farm.
- 14.7.59 The physical presence of the Offshore Wind Farm may displace commercial vessels, fishing vessels and recreational craft into marine aggregates dredging areas, leading to an increase in vessel to vessel collision risk for vessels engaged in dredging. For example, vessels routeing to the west of the Offshore Wind Farm will tend to pass through the dredge areas adjacent to the wind farm site.

Impact on Fishing Vessels

- 14.7.60 A study of the impacts on fishing activity in vicinity of the Offshore Project site has been performed as part of the Commercial Fisheries Assessment (Chapter 18).
- 14.7.61 Based on analysis of the baseline fishing data for the area, a high density of fishing vessel activity was recorded within and in proximity to the Offshore Project site. The worst case fishing vessel to wind farm structure collision risk has been identified as 1 every 7 years. The estimated collision frequency is high due to the relatively high density of fishing vessels operating in the area, and it is assumed that the fishing vessel activity within the site will continue during the operational phase. The collision frequency is much higher than for commercial vessels as it is assumed that commercial vessels will route around the site. It is anticipated that the majority of fishing vessel collisions will be relatively minor impacts during fishing itself, with low collision energies.
- 14.7.62 The estimated collision frequencies are high and reflect the maximum area of the wind farm covered by foundations (IBGS jackets provide this case). It also assumes that the fishing vessel density through the operational life of the wind farm will remain at the current levels.
- 14.7.63 The impact on transiting fishing vessels routeing through the site to and from fishing grounds can be considered similar to other transiting vessels (i.e., commercial vessels). However, due to the smaller size of fishing vessels operating in the area and the proposed spacing between WTGs, there is potential for fishing vessels to navigate through the wind farm site. 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 the wind farm. This decision is likely to be based on the type and size of fishing vessels along with sea, weather and visibility conditions at the time.

- 14.7.64 Additionally, the physical presence of the Offshore Wind Farm may displace commercial vessels and recreational craft into areas used by fishing vessels, and vice versa with fishing vessels displaced into areas used by other craft, leading to an increased vessel to vessel collision risk for fishing vessels. During the operational phase of the wind farm there is likely to be an increase in shipping density in areas adjacent to the wind farm as vessels route around the site. The displacement of ITZ traffic inshore of the wind farm will result in an increase in vessel density in areas used by smaller fishing vessels, including single handed vessels, leading to an increase in collision risk for these vessels.

Impact on Recreational Craft

- 14.7.65 The air clearance between the WTG rotors and sea level conditions at Mean High Water Springs (MHWS) will not be less than 22m, in accordance with MCA guidance and RYA recommendations. This minimises the risk of interaction between rotor blades and yacht masts.
- 14.7.66 In terms of recreational craft routeing, there are three medium use cruising routes and one heavy use route passing through the Offshore Project site. Recreational craft should be able to pass between WTGs in suitable conditions (i.e. during good visibility and calm sea conditions), as well as being able to pass inshore (north) and offshore (south) of the wind farm as there is available sea room surrounding the site.
- 14.7.67 In addition to cruising routes, water based racing events take place in the vicinity of the Offshore Project site, with a number of races passing through the site, such as cross channel races from Shoreham and Brighton to Fécamp. It is considered unlikely that any races would pass through the wind farm during the operational phase, based on consultation meetings, including the hazard workshop, it is expected that the route of the races would be changed to pass round the wind farm, which would limit the risk of collisions with WTGs. Routeing around would result in deviations for races, potentially lengthening the course and leading to races not being completed within the hours of daylight. Racing routes displaced and passing around the wind farm would pass through areas used by other vessels displaced from the site (such as commercial shipping routeing around Offshore Project), increasing the frequency of vessel-to-vessel encounters and hence collisions.
- 14.7.68 Recreational activities such as recreational diving and recreational fishing are known to take place in the Offshore Project area. Recreational craft were recorded over wrecks within and in proximity during the Offshore Project site during the July survey period. Recreational craft operating within the wind farm site, including those engaged in fishing and diving activities are likely to be clear

of larger vessels navigating around the wind farm, which is likely to result in a reduction in encounters for these vessels.

- 14.7.69 However, vessels operating outside of the WTG array and in close proximity to the wind farm boundary are likely to see an increased rate of vessel-to-vessel encounters as a result of displaced traffic routing around the wind farm. For example, recreational dive craft operating out of Brighton were recorded over a wreck to the south of Offshore Project (Figure 14.16). There is likely to be an increase in shipping density in this area due to the reduction in sea room within the ITZ, with a separation of 4.4nm between the site and the Traffic Separation Zone, and shipping displaced to the south of the site.

Impact on Search and Rescue

- 14.7.70 The proposed Offshore Project lies within the East of England Region with the nearest rescue coordination centre being MRCC Solent. It is noted that under the revised MCA SAR proposals (MCA, 2011) that MRCC Solent will be closed (the provisional earliest date for the closure of MRCC Solent is during 2014), and the nearest centre will become the Maritime Operations Centre (MOC) based in Southampton/ Portsmouth.
- 14.7.71 In the event of an emergency arising, within or adjacent to the Offshore Project site, search and rescue would be carried out by RNLI All-weather Life Boats (ALBs) from either Shoreham or Newhaven, and/or SAR helicopter from Lee on Solent.
- 14.7.72 There will be Project vessels working in the area, and response equipment on maintenance vessels could provide increased SAR facilities. This would need to be coordinated with the coastguard.
- 14.7.73 There is the potential for the operational phase of the proposed project to impact on SAR helicopter access within the site. The wind farm site will be designed to satisfy the requirements for emergency response in the event of a SAR operation in or around the wind farm, as per MGN 371 requirements (see Section 14.8 Mitigation Measures).
- 14.7.74 During the selection of the final WTG layout, liaison will take place with the MCA on issues relating to search and rescue within and in the vicinity of the wind farm site. This will include issues such as identification and lighting and the formulation of the Emergency Response Co-operation Plan (ERCoP) for the wind farm.
- 14.7.75 A review of historical incidents indicated that the accident levels in the immediate vicinity of the Offshore Project site have tended to be relatively low. However, the development will have an impact on these accident levels, though it is still considered unlikely that the operational phase of the proposed site will significantly exacerbate maritime safety risks in the area.

Impact on Pollution and Salvage Response

- 14.7.76 There is the potential for pollution and salvage response efforts to be hampered by the physical presence of the Offshore Wind Farm and increased activity within the site.
- 14.7.77 In the event of an oil spill within the Offshore Project or a spill drifting into the site), the physical presence of the wind farm will result in the clean-up operation being more difficult due to reduced access to the site for vessels dealing with the incident.
- 14.7.78 Similarly, in the event of an incident within the wind farm array requiring the recovery of a vessel casualty, the presence of the wind farm may hamper the recovery operation within the site.

Impact on Marine Radar Systems

- 14.7.79 Trials on the impact of offshore wind farms on marine radar systems have been carried out at North Hoyle (QinetiQ, 2004) and Kentish Flats (BWEA, 2007). The results of these trials indicate that the onset range from the WTG structures of false returns is about 1.5nm, with progressive deterioration in the radar display as the range closes.
- 14.7.80 Shipping passing inside the 1.5nm range from the WTGs include fishing vessels, recreational craft and commercial shipping associated with Shoreham, Newhaven and routing through the ITZ. Following the development, commercial vessels are likely to pass 1 to 1.5nm from the wind farm boundary, therefore they will be subject to radar interference. Recreational craft and fishing vessel activity are expected to continue within close proximity following construction and will be subject to radar interference.
- 14.7.81 Given the non-AIS vessel activity anticipated within the Offshore Project during the operational phase, radar interference will result in reduced detection of such craft exiting the wind farm, potentially into areas used by passing shipping. This will increase the risk of vessel-to-vessel collisions.
- 14.7.82 Potential radar interference is mainly a problem during periods of bad visibility when mariners may not be able to visually confirm the presence of other vessels, such as those without AIS installed (usually fishing and recreational craft). There is sea room available on all sides of the wind farm for vessels to increase their clearance should they consider it necessary.

Impact of Wind Farm on Port Access

- 14.7.83 There is the potential for reduced access to local ports due to the presence of turbines and the associated displacement of traffic. The displaced routes will no longer be able to use preferred approaches and potentially aids to navigation.

- 14.7.84 The current routing from the exit of the TSS to Shoreham enables vessels to keep the weather on their stern quarter during southerly winds. Following the development of the wind farm, vessels routeing to Shoreham through the ITZ would be beam-on to a southerly wind, which has potential health and safety implications for both vessels and crew. However, it is considered that due to the available navigable sea room to the northeast of the Offshore Project site, vessels leaving the TSS early to approach Shoreham will be able to take a range of headings on approach to the port, depending on the conditions. For example, as opposed to routeing off Beachy Head (as shown in
- 14.7.85 Figure 14.29), vessels may leave the TSS later, and pass in closer proximity to the eastern boundary of the site and head northwest to Shoreham.
- 14.7.86 The Offshore Project site is aligned with the leading lights for approach to the Port of Shoreham. However, given the distance between Shoreham and the proposed wind farm (7.2nm) it is considered that vessels on the approach to Shoreham Port will still be able to obtain a leading transit using the leading lights.
- 14.7.87 It is noted that lighting and marking on the constructed wind farm will provide an Aid to Navigation in itself.

Impact of Cable Route on Commercial Shipping (Including Dredgers)

- 14.7.88 The proposed export cable corridor runs from the northern boundary of the Offshore Project site and is crossed by a relatively busy shipping lane associated with Shoreham Port (used by marine aggregates dredgers, cargo vessels and tankers) in addition to commercial vessels routeing east/west within the ITZ. These vessels tend to keep a minimum of 1.5nm to 2m off the coast, clear of the shallowest areas where there may be a risk of grounding.
- 14.7.89 In terms of impact to vessels anchoring, displacement and risk of dragging anchor, there is a charted anchorage to the east of the export cable corridor (off Shoreham). Commercial vessels were identified anchoring in the area during the maritime traffic surveys and through analysis of long term AIS data gathered from Shoreham. The vast majority of anchoring activity off Shoreham is in close proximity to the charted anchorage and pilot station, and tends to be to the east of the proposed export cable route, which was revised in order to minimise the impact on current anchoring practices.
- 14.7.90 Vessels may also require to anchor in an emergency should they suffer machinery failure. In the event of an emergency on a vessel in the vicinity of the export cable route, the vessel may be drifting towards a hazard (grounding or the wind farm) and is likely to anchor, if possible. Before releasing anchor a vessel would assess the risk in the area and, where possible, avoid anchoring in proximity to a cable. However, it is recognised that in an emergency situation a vessel drifting towards a hazard will want to anchor as soon as possible.

14.7.91 As noted above, the route of the export cable was revised giving consideration to the anchorage off Shoreham, in order to minimise the displacement of anchoring activity associated with the port and the risk of anchor interaction with the cables.

14.7.92 Cables associated with the development will be buried where seabed conditions allow, with a burial target depth of 1m for inter-array cables and 1-2m for the export cable or will be protected by suitable methods such as rock dumping or mattressing, reducing the risk of anchor interaction. Periodic inspections of subsea cable routes will ensure that the cables remain buried/protected.

Impact of Cable Route on Fishing Vessels

14.7.93 The impact on fishing vessels in terms of loss of fishing grounds is assessed in Section 18 - Commercial Fisheries.

14.7.94 The main risk to fishing vessels in terms of safety is related to gear snagging on unprotected or exposed cables or those running over spans, leading to damage/loss of fishing gear and potentially the vessel capsizing. The fishing activity in the vicinity of the export cable route includes demersal (beam) trawling and scallop dredging, with gill netters and potters/whelkers operating in proximity to the shore.

14.7.95 At the Hazard Review Workshop, it was confirmed that all cabling associated with the project will be buried/protected, and the proposed burial depth was considered sufficient to prevent gear snagging on the cables. Likely seabed penetration of fishing gear is around 2.5cm, and around 7.5cm for scallop dredging. It was not considered likely that repeated scallop dredging in an area could lead to the cable becoming exposed. However, there is a risk of the export cables becoming exposed to fishing gear interaction due to seabed mobility and/or a poor maintenance regime.

Impact of Cable Route on Recreational Craft

14.7.96 Electromagnetic interference on ship-borne equipment including compasses has been identified as a potential impact to craft when in close proximity to ferrous structures or high voltage cables. The export cables will be buried where possible (to a target depth of 1-2m), and any effects generated by electromagnetic fields are expected to be within negligible regions.

Decommissioning

14.7.97 The potential impacts associated with the decommissioning of the Offshore Project and subsea cables will be dependent upon the method used for decommissioning. It is considered that the impacts on shipping and navigation are likely to be similar for both the construction and decommissioning phases of the project and will result in temporary increases to navigational safety risk.

14.8 Mitigation Measures

- 14.8.1 Mitigation and safety measures will be applied to the Offshore Project appropriate to the level and type of risk determined. The specific measures to be employed will be agreed in consultation with the MCA Navigation Safety Branch, Trinity House Lighthouse Services and other relevant statutory stakeholders where required.
- 14.8.2 During the selection of the final WTG layout, liaison will take place with the MCA on issues relating to search and rescue within and in the vicinity of the wind farm site. This will include issues such as identification and lighting and the formulation of the Emergency Response Co-operation Plan (ERCoP) for the wind farm. Liaison will also take place with Trinity House at this stage regarding the marking of the site.
- 14.8.3 During the construction, operation and decommissioning phases of the Offshore Project, industry standard mitigation measures will be in place as listed below:
- Marine Aids to Navigation (AtoNs) will be provided in accordance with Trinity House requirements, which will comply with the International association of Lighthouse Authorities (IALA) standard O-139 on the Marking of Offshore Wind Farms (IALA, 2008). Any additional markings required (e.g., RACONs. AIS transponders and buoyage) will be agreed in consultation with Trinity House once the final WTG layout has been selected;
 - WTGs will be designed in accordance with MGN 371 standards and procedures will be put in place 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;
 - Marking of wind farm structures and cabling on appropriate scale admiralty charts by the United Kingdom Hydrographic Office (UKHO);
 - Promulgation of information and appropriate liaison, to ensure information on the wind farm development and special activities will be circulated in Notices to Mariners, Navigation Information Broadcasts and other appropriate media to allow vessels to effectively and safely navigate around the Offshore Project;
 - Cables will be trenched and buried where seabed conditions allow or they will be protected using suitable methods to ensure the risk of fishing gear snagging or anchor interaction is mitigated. The subsea cable routes will be subject to periodic inspection to ensure the cables remain buried;
 - Minimum blade tip clearance of 22m above Mean High Water Springs (MHWS) as per MCA guidance and RYA recommendations;

- The SAR Emergency Response and Cooperation Plan (ERCoP) will be developed and put in place for the construction, operation and the decommissioning phases of the wind farm development; and
- An Active Safety Management System (ASMS) will be developed to ensure the effective coordination of emergency response at the Offshore Project.. It will be designed to ensure that the risks related to marine operations specific to the project are managed carefully and over the long term.

During Construction

- 14.8.4 During the construction phase of the Offshore Project Notices to Mariners, Radio Navigational Warnings, NAVTEX and/or broadcast warnings will be promulgated in advance of any proposed works, where required.
- 14.8.5 500m temporary Safety Zones will be in place around each WTG and construction vessels during the construction phase in order to minimise risk and disruption to mariners and other users of the sea by ensuring they are aware of where the activities are occurring. Safety zones are likely to be established on a 'rolling' basis, covering only those areas of the wind farm in which construction activities are actually taking place at a given time. Once that activity has been completed, the safety zone will then 'roll on' to cover the next specific location within the site at which such activity is taking place.
- 14.8.6 Where necessary along the export cable route, guard vessels will be employed to guard specific points of exposure (such as unburied sections of newly laid cable and cable crossings before rock dumping protection is laid). In addition, guard vessels will be used to monitor passing vessels and warn of /record any safety zone infringements.

During Operation

- 14.8.7 During the operational phase of the wind farm a Marine Control Centre monitoring AIS and/or CCTV could be used to monitor and record the movements of vessels around the wind farm (work boats and passing vessels). Such a centre will meet the requirements of MGN 371:
- The Marine Control Centre, or mutually agreed single contact point, should be manned 24 hours a day;
 - The Marine Control Centre operator, or mutually agreed single contact point, should have a chart including the GPS position and unique identification numbers of each of the wind farm structures (WTGs, met mast and offshore substations);
 - All MRCCs/MRSCs will be advised of the contact telephone number of the Marine Control Centre operator, or single contact point (and vice versa);

- All MRCCs/MRSCs will have a chart indicating the GPS position and unique identification number of each of the wind farm structures;
- All search and rescue helicopter bases will be supplied with an accurate chart including GPS Positions of all the wind farm structures; and
- The Civil Aviation Authority (CAA) shall for civil aviation navigation charting purposes be supplied with accurate GPS positions of all wind farm structures.

14.8.8 There will also be vessels regularly operating in the site, for example during maintenance, which can monitor third party vessel activity both visually and on radar, although this will not be their primary function.

14.8.9 During the operational phase of the wind farm, fenders/bollards could be installed on WTGs to mitigate low speed collisions with the structures.

During Decommissioning

14.8.10 The mitigation measures associated with the decommissioning of the Offshore Project are anticipated to be similar to those identified for the construction phase; however, measures will be dependent on the method of decommissioning.

14.9 Significance of Residual Effects

14.9.1 This section presents the assessment of the impacts which are predicted to remain following the imposition of the mitigation measures proposed above.

During Construction

Impact of Wind Farm Construction on Commercial Ship Routeing (Including Dredgers)

14.9.2 In terms of commercial vessel routeing, the main impact of the wind farm construction is considered to be on vessels routeing between Shoreham and the TSS lanes to the south of Offshore Project, in particular, vessels departing Shoreham. Given the level of shipping on this route in the approaches to Shoreham port, the sensitivity is considered to be **medium**.

14.9.3 Initially, the deviations required to route around the construction site will be minor, but will increase as the site becomes more developed, aligning itself with the operational phase impact. Overall, the magnitude of the impact of the construction activities on commercial ship routeing is considered to be **medium**.

14.9.4 The residual effects are therefore considered to be of **moderate** significance.

Impact of Wind Farm Construction on Fishing Vessels

- 14.9.5 The Offshore Project site is in an area of relatively high commercial fishing vessel activity, demonstrated by the sightings and satellite data, in addition to the AIS and radar surveys of the area. The potentially impacted fleet includes UK-registered vessels as well as vessels from France and Belgium. The sensitivity of the receptor is therefore considered to be **medium**.
- 14.9.6 There is available sea room around the Offshore Project site, and the sizes of fishing vessel recorded in the area will be able to navigate around construction activities. However, given the locations of fishing grounds, deviations around construction works and the associated safety zones will result in increased steaming distances. Therefore, the magnitude of the impact on fishing vessels will be **medium**.
- 14.9.7 The residual effects are therefore considered to be of **moderate** significance.

Impact of Wind Farm Construction on Recreational Craft

- 14.9.8 Given the heavy and medium use recreational routes intersecting the wind farm site, and the relatively high level of recreational craft activity recorded during the maritime survey in July 2011, the receptor sensitivity is considered to be **high**.
- 14.9.9 Given that recreational craft should be able to pass between the construction works in suitable conditions, and there is available sea room surrounding the site to route around construction works, a minor change in recreational craft routing is anticipated. Deviations around safety zones will be of limited duration due to the temporary nature of the safety zones.
- 14.9.10 Likewise, the restriction of access to the site for recreational activities including sport diving and fishing, due to construction works and the associated safety zones, will be temporary.
- 14.9.11 Overall the magnitude of the impact is considered to be **small**.
- 14.9.12 Therefore, the residual effects are considered to be of **moderate** significance.

Impact of Cable Installation on Commercial Shipping (Including Marine Aggregates Dredgers)

- 14.9.13 The majority of commercial vessels intersecting the proposed export cable corridor are those headed to/from Shoreham Port. This route, approaching Shoreham Port from the west is considered to be of **medium** sensitivity.
- 14.9.14 Vessels used during the cable installation works will be 'fit for purpose' for the development activities including being marked in accordance with the International Regulations for the Prevention of Collisions at Sea (COLREGS). 500m safety zones will be in place around vessels engaged in cable installation works in

order to minimise risk and disruption by ensuring they are aware of where the activities are occurring to mariners and other users of the sea.

- 14.9.15 Commercial vessels will be able to deviate around the cable installation works given the available sea room, with a slight change in the baseline shipping and navigation routeing. Assuming industry standard management and mitigation procedures are in place and adhered to, it is predicted that cable installation works can be carried out safely with a slight change in the baseline collision risk. Also, the changes in the baseline routeing and collision risk will be temporary, given the nature of the cable installation works.
- 14.9.16 In terms of the anchor snagging risk due to partially constructed cables which may be exposed or partially buried, this risk will be mitigated through the use of guard vessels during cable installation, clear notification of works (especially pre charting of cables) and monitoring and inspection to ensure that cables are not left exposed and/or unmarked.
- 14.9.17 Therefore, overall, the magnitude of this impact is considered to be **small**.
- 14.9.18 The residual effects are therefore considered to be of **minor** significance.

Impact of Cable Installation on Fishing Vessels

- 14.9.19 Given the level of commercial fishing vessel activity within the proposed export cable corridor, including both vessels engaged in fishing and in approaches to local ports, the sensitivity of the receptor is considered to be **medium**.
- 14.9.20 Vessels used during the cable installation works will be 'fit for purpose' for the development activities including being marked in accordance with the International Regulations for the Prevention of Collisions at Sea (COLREGS). 500m safety zones will be in place around vessels engaged in cable installation works in order to minimise risk and disruption to mariners and other users of the sea by ensuring they are aware of where the activities are occurring. Fishing vessels will be made aware of the cable installation works through promulgation of information and fisheries liaison.
- 14.9.21 Assuming industry standard management and mitigation procedures are in place and adhered to, it is predicted that cable installation works can be carried out safely with a slight change in the baseline collision risk. A change in fishing vessel routeing is anticipated, with fishing vessels able to deviate around the works, due to the available sea room, resulting in increased steaming times to fishing grounds. The changes in the baseline routeing and collision risk will be temporary, given the nature of the cable installation works.
- 14.9.22 In terms of the gear snagging risk for commercial fishing vessels due to partially constructed cables which may be exposed or partially buried, this risk will be mitigated through the use of guard vessels during installation works, clear notification of works (especially pre charting of cables) and monitoring and inspection to ensure that cables are not left exposed and/or unmarked.

14.9.23 Therefore, the magnitude of this impact is considered to be **medium**.

14.9.24 The residual effects are therefore considered to be of **moderate** significance.

Impact of Cable Installation on Recreational Craft

14.9.25 Given the recreational craft routes crossing the export cable corridor in the RYA data, including heavy use routes, and the recreational craft activity observed during the AIS and radar surveying of the area, the receptor sensitivity is considered **high**.

14.9.26 Vessels used during the cable installation works will be 'fit for purpose' for the development activities including being marked in accordance with the International Regulations for the Prevention of Collisions at Sea (COLREGS). 500m safety zones will be in place around vessels engaged in cable installation works in order to minimise risk and disruption by ensuring they are aware of where the activities are occurring to mariners and other users of the sea.

14.9.27 Assuming industry standard management and mitigation procedures are in place and adhered to, it is predicted that cable installation works can be carried out safely with a slight change in the baseline collision risk for recreational craft. A slight change in the routeing of recreational craft is anticipated, with craft able to deviate around the works, due to the available sea room. The changes in the baseline routeing and collision risk will be temporary, given the nature of the cable installation works. Therefore, the magnitude of this impact is considered to be **small**.

14.9.28 The residual effects are therefore considered to be of **moderate** significance.

Impact of Cable Installation on Port Operations

14.9.29 The presence of the cable installation vessels along the export cable route could restrict access to Shoreham Port from the west and the receptor sensitivity is considered **medium**.

14.9.30 Promulgation of information on the cable installation operations and effective work vessel management will ensure that there is no significant increase in navigational safety risk.

14.9.31 Given that the impact will be temporary during the cable installation works in the deeper water areas of the export cable route, the magnitude of the impact is considered to be **small**.

14.9.32 The residual effects are considered to be of **minor** significance.

During Operation

Impact on Commercial Ship Routeing

- 14.9.33 In terms of commercial vessel routeing, the main impact of the wind farm is considered to be the displacement of vessels routeing between Shoreham and the TSS lanes to the south of Offshore Project, in particular, vessels departing Shoreham. Given the location of this route in the approaches to Shoreham port, the sensitivity is considered to be **high**.
- 14.9.34 In assessing deviations for the commercial vessel routes displaced by the wind farm, it has been assumed that vessels will be able to pre-plan their revised passage in advance of encountering the wind farm due to effective mitigation in the form of promulgation of information distribution through Notices to Mariners (local and national), updated charts and liaison with ports.
- 14.9.35 Typical vessels departing Shoreham and joining the eastbound TSS lane are expected to route to the west of the Offshore Wind Farm resulting in an increase in route distance of approximately 6.0nm.
- 14.9.36 A proportion of vessels routeing to Shoreham from the east are expected to leave the westbound TSS early resulting in a reduction in route length compared with the current route. If vessels route to the east of the Offshore Project then this will result in a deviation of approximately 5.3nm whereas routeing to the west will result in a deviation of approximately 8.5nm.
- 14.9.37 Given that the deviations will be necessary for the duration of the operational phase the magnitude is considered to be **medium**.
- 14.9.38 The residual effects are therefore considered to be of **major/moderate** significance.

Impact on Commercial Shipping Collision Risk

- 14.9.39 Due to the Offshore Project site location relative to IMO adopted routeing measures, and therefore the risk of collisions for vessels associated with the TSS and ITZ, the sensitivity is considered **high**.
- 14.9.40 The increase in commercial vessel collision risk due to the proposed Offshore Wind Farm has been assessed to be relatively low, assuming industry standard mitigation measures.
- 14.9.41 Given the minor increase in collision frequency, and the duration of the impact throughout the operational phase, the magnitude of the impact is considered **small**.
- 14.9.42 The residual effects are therefore considered to be of **moderate** significance.

Impact on Marine Aggregates Dredging

- 14.9.43 Given the presence of licensed dredge areas in close proximity to the Offshore Project, and regularly used transit routes, the sensitivity is considered to be **medium**.
- 14.9.44 The presence of the wind farm will result in minor deviations for marine aggregates dredgers operating out of Newhaven, and deviations of up to 2.8nm for the vessel engaged in beach replenishment works.
- 14.9.45 In order to mitigate the risk to dredgers operating in close proximity to the wind farm boundary, buffer zones between extraction areas and WTGs should be finalised in consultation with dredging operators, based on the conditions in the area (wind, strength and direction of tides). Procedures in the event of a drifting vessel dragging its pipe also need to be identified in order to mitigate the risk of interaction with subsea cabling (i.e., should the vessel anchor).
- 14.9.46 Consideration will be given to the installation of fenders/bollards on the wind farm structures in order to mitigate low speed collisions.
- 14.9.47 There is a potential in-combination impact for vessels engaged in marine aggregates dredging, as vessels displaced to the west of Offshore Project, for example a proportion of vessels routeing to/from Shoreham, will tend to pass through the dredge areas to the west, leading to an increase in the frequency of encounters for vessels engaged in dredging operations within this area. However, given the relatively low numbers of vessels on the displaced routes, the in-combination impact is considered minor.
- 14.9.48 Given the deviations required for marine aggregates dredgers to avoid the wind farm site and the collision risk will be present for the duration of the operational phase, the magnitude of the impact is considered to be **medium**.
- 14.9.49 Therefore, the residual effects are considered to be of **moderate** significance.

Impact on Fishing Vessels

- 14.9.50 The Offshore Project site is in an area of relatively high commercial fishing vessel activity, demonstrated by the sightings and satellite data, in addition to the AIS and radar surveys of the area. The potentially impacted fleet includes UK-registered vessels as well as vessels from France and Belgium. The sensitivity of the receptor is therefore considered to be **medium**.
- 14.9.51 The worst case fishing vessel to wind farm structure collision risk has been identified as one every 7 years. However, in terms of consequences of these collisions it is expected that the majority will be relatively minor during fishing itself and there will be low levels of risk to crew and of pollution.

- 14.9.52 An increase in vessel-to-vessel collision risk for fishing vessels in the vicinity of the wind farm is likely, due to the reduction in sea room within the ITZ, and the displacement of other vessels into areas used by fishing vessels (and vice versa).
- 14.9.53 Given the spacing between WTGs there is good prospect for fishing vessels to navigate between the WTGs, and therefore the impact on fishing vessel navigation is considered minor.
- 14.9.54 It was concluded through qualitative and quantitative risk assessment, that the magnitude of the impact on fishing vessels will be **medium**.
- 14.9.55 Therefore the residual effects are considered to be of **moderate** significance.

Impact on Recreational Craft

- 14.9.56 Given the heavy and medium use recreational routes intersecting the Offshore Project wind farm site, and the relatively high level of recreational craft activity recorded during the maritime survey in July 2011, the receptor sensitivity is considered to be **high**.
- 14.9.57 Recreational craft should be able to pass through the wind farm in suitable conditions. The majority of recreational craft recorded passing through the site were routeing East/West, and should these vessels choose to avoid the site, they can pass inshore or offshore of the wind farm with a relatively small increase in transit length. Hence, a minor change in recreational craft routeing is expected.
- 14.9.58 The risk of recreational craft colliding with wind farm structures can be mitigated through industry standard mitigation measures, including a minimum 22m rotor blade tip clearance over MHWS in order to minimise the risk of interaction between rotor blades and yacht masts. An increase in vessel-to-vessel collision risk for recreational craft is likely for craft in the vicinity of the wind farm boundary, due to reduction in sea room within the ITZ and the displacement of shipping into these areas.
- 14.9.59 Given the expected change in recreational craft routeing and collision risk, which will be present for the duration of the operational phase of the wind farm, the magnitude of the impact is considered to be **medium**.
- 14.9.60 Therefore, the residual effects are considered to be of **major/moderate** significance.

Impact on Search and Rescue

- 14.9.61 The physical presence of the Offshore Wind Farm may lead to an increased number of SAR incidents in the area, and diminish the capability of SAR operations to respond to emergency situations. The overall sensitivity is considered **medium**.

14.9.62 The wind farm site will be designed to satisfy the following specific requirements to allow safe helicopter operations within wind farms and close to, or over, WTGs:

- The WTGs shall have high contrast markings (dots or stripes) placed at 10m intervals on both sides of the blades to provide helicopter pilots with a hover-reference point;
- All SAR helicopter bases will be supplied with an accurate chart of all the Project's structures and their GPS positions;
- If winching is to take place to/from a WTG (this evacuation method is considered a last resort), the blades will be feathered and the rotor brakes applied (where feasible blades should be pinned);
- The nacelle should be rotated so that the blades are at 90 degrees off the wind with the wind blowing on to the left side of the nacelle;
- In poor visibility or at night, any lighting on WTGs may be required to be switched on or off – at the discretion of the helicopter pilot; and
- It is crucial that the WTGs are detectable to airborne radars (at a safe range) and that the aircraft crew using radar, can discriminate between individual WTGs.

14.9.63 Due to the proximity of the nearest RNLI stations to the proposed Offshore Project, it is likely that ALBs from Shoreham and Newhaven would carry out search and rescue within the site, in the event of an emergency.

14.9.64 Giving account to the design features associated with the wind farm, and commitments to meet the MCA MGN 371 guidance, including the development of an Emergency Response Co-operation Plan (ERCoP) pre-construction, it is considered that SAR issues can be well managed. In addition, there will be wind farm vessels working in the area, and response equipment on maintenance vessels could provide increased SAR facilities. This would need to be coordinated with the coastguard.

14.9.65 Therefore, the magnitude of the impact is considered **medium**.

14.9.66 The residual effects are considered to be of **moderate** significance.

Impact on Pollution and Salvage Response

14.9.67 The physical presence of the structures associated with the Offshore Project may reduce the response capabilities of pollution and salvagers operating in the area, by preventing equipment used to respond from accessing the site; for example an oil spill within the array will be more difficult to clean up. Due to the national and regional implications of this the sensitivity is considered **medium**; the

implications are considered permanent through the lifetime of the wind farm and therefore have a **medium** magnitude.

14.9.68 Offshore Project Offshore Wind Farm, as per MGN 371, will meet the requirements of MGN 371 which requires comprehensive planning for emergency response (ASMS and SAR ECoP) and will also include both response to and practicing of oil spill clean-up and salvage incidents.

14.9.69 The residual effects are considered to be of **moderate** significance.

Impact on Marine Radar Systems

14.9.70 Due to Offshore Project site location partially within an IMO adopted routeing measure (the ITZ) the overall sensitivity is considered **high**.

14.9.71 Potential radar interference is mainly a problem during periods of bad visibility when mariners may not be able to visually confirm the presence of other vessels, such as those without AIS installed. It is expected that following the construction of the Offshore Wind Farm, fishing vessels and recreational craft activity will continue within and in close proximity to the site, and a proportion of these vessels will not be equipped with AIS. Therefore, the radar interference due to the WTGs may reduce detection of these vessels by other vessels in and around the wind farm.

14.9.72 However, given the sea room available on all sides of the site, vessels can increase their passing distance from the WTGs, should they consider it necessary. Therefore, the magnitude of the impact is considered to be **medium**.

14.9.73 Residual risks for this effect are expected to be of **major/moderate** significance. In order to mitigate this risk additional consultation will be carried out with MCA and THLS upon selection of the final WTG layout.

Impact of Wind Farm on Port Access

14.9.74 There is the potential for the Offshore Wind Farm to result in reduced access to local ports. Routes displaced by the physical presence of the wind farm structures will no longer be able to use preferred port approaches and potentially aids to navigation. Given the proximity of the site to Shoreham and Newhaven ports, the sensitivity is considered **medium**.

14.9.75 In terms of aids to navigation, the Offshore Project site is aligned with the leading lights of Shoreham Port. Due to the distance between the site and Shoreham, vessels on approach to Shoreham will still be able to obtain a leading transit using the lights. In addition, it is likely that the proposed wind farm will form a significant aid to navigation which will be highly visible to shipping due to the lighting and marking.

14.9.76 Given that the impact will be present for the duration of the operational phase of the wind farm the magnitude of the impact is considered to be **large**.

14.9.77 Residual effects are therefore considered to be of **major/moderate** significance.

Impact of Cable Route on Commercial Shipping (Including Dredgers)

14.9.78 As noted above, there is a charted anchorage to the east of the export cable corridor. Given that this denotes an area of good holding ground with no charted limits, and commercial vessel anchoring activity was recorded in the area during the shipping traffic survey, the overall sensitivity is considered **medium**.

14.9.79 As previously noted, the export cable route corridor was revised giving consideration to the anchorage off Shoreham, in order to minimise the displacement of anchoring activity and the risk of anchor interaction.

14.9.80 The risk of anchor interaction with the subsea cables associated with the development can be further mitigated through the protection and burial of the cables, adequate monitoring and maintenance to ensure cables do not become exposed and the promulgation and charting of the cable locations.

14.9.81 Given the proposed mitigation measures and the limited change in anchoring practice expected due to the presence of the cables, the magnitude of this impact is considered to be **small**.

14.9.82 Following the implementation of the mitigation measures identified above, residual effects are expected to be of **minor** significance.

Impact of Cable Route on Fishing Vessels

14.9.83 The export cable corridor is in an area of relatively high commercial fishing vessel activity, demonstrated by the sightings and satellite data, in addition to the AIS and radar surveys of the area. The sensitivity of the receptor is therefore considered to be **medium**.

14.9.84 Cables will be buried where seabed conditions allow, with a burial target depth of 1-2m (for the export cable), or will be protected by suitable methods such as rock dumping or mattresses, reducing the risk of fishing gear snagging. Periodic inspections of subsea cable routes will ensure that the cables remain buried/protected.

14.9.85 Assuming cable protection and liaison with the fishing industry, it is considered that the magnitude of this impact will be **small**.

14.9.86 Therefore, the residual significance of the presence of subsea cables and the risk of fishing gear interaction is considered to be of **minor** significance.

Impact of Cable Route on Recreational Craft

14.9.87 Given the recreational craft routes crossing the export cable corridor in the RYA data, including heavy use routes, and the recreational craft activity observed

during the AIS and radar surveying of the area, the receptor sensitivity is considered **medium**.

14.9.88 Cable burial/protection should mitigate the impact on recreational craft navigational equipment as any generated electromagnetic fields will be very weak. Periodic inspection of the cable routes will ensure that cables remain buried. Therefore the magnitude of this impact is considered to be **negligible**.

14.9.89 The residual effects of the subsea cables on recreational craft navigation equipment, following the implementation of the mitigation measures above, are therefore **not significant**.

During Decommissioning

14.9.90 As noted above, the potential impacts associated with the decommissioning of the Offshore Wind Farm and subsea cables are likely to be similar to those for the construction phase of the project, and the mitigation measures are anticipated to be similar.

14.9.91 Therefore, residual effects associated with the decommissioning phase are considered to be of similar significance to those during construction.

14.10 Cumulative Impacts

14.10.1 The West Isle of Wight Zone (Zone 7) is approximately 40nm to the west of the Offshore Project site. The proposed Navitus Bay wind farm lies within the northern part of the zone and is over 50m from the Offshore Project site, as shown in Figure 14.33.

14.10.2 In addition, a number of offshore wind farms off the coast of northern France (Le Tréport, Fécamp & Courseulles-Sur-Mer) are in the planning process.

14.10.3 Other future developments which are considered to have the potential to result in cumulative impacts on shipping and navigation are the aggregate extraction areas in the vicinity of the Offshore Wind Farm. Owers Bank Areas 453 and 488 are approximately 5nm to the northwest of the Offshore Project site and are at the application stage, and a pre-application area (Area 499) is partly within the southwest corner of the site (see Figure 14.4).

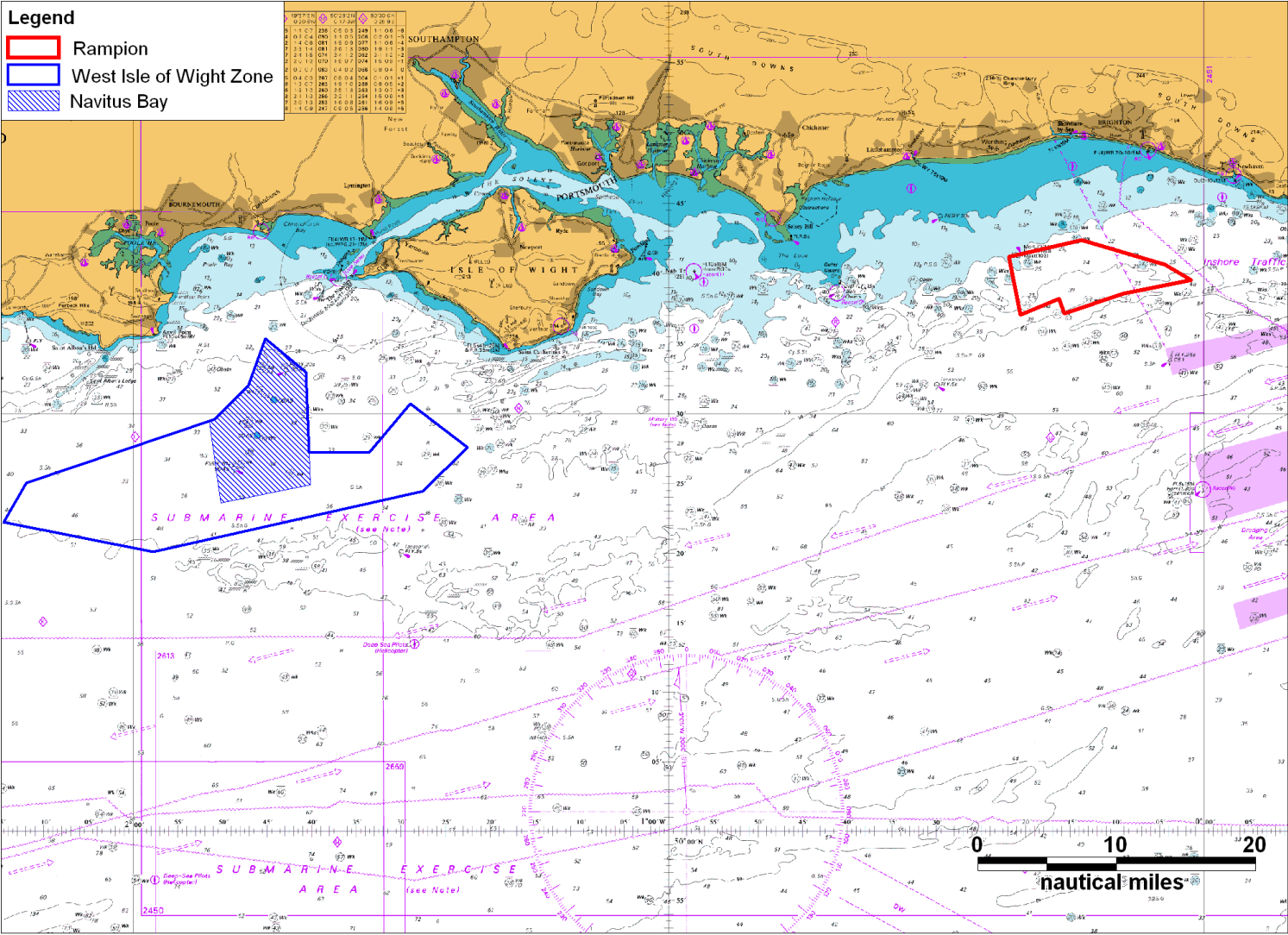


Figure 14.33: Navitus Bay and Offshore Project Wind Farm Sites

During Construction

Impact due to Increased Vessel Activity

- 14.10.4 Given the anticipated construction programmes for the Offshore Project and for the other proposed wind farm developments in the area, it is likely that there will be periods of overlapping construction activities at the different projects within the region. There will be an increased level of vessel activity in the vicinity of the projects under construction and the presence of the construction vessels is likely to increase encounters and therefore create additional navigational safety risk.
- 14.10.5 However, construction activities are generally of short duration and limited extent. Given the distance between the Offshore Wind Farm and other proposed wind farm developments in the area, the cumulative impact of overlapping wind farm construction phases on collision risk is not considered to be significant.
- 14.10.6 Also, there is the potential for an increase in dredging movements in the vicinity of the Offshore Project site if licenses are issued for the application aggregates extraction areas to the northwest and the pre-application area intersecting the site. The vessel activity associated with the construction phase of the Offshore Project together with an increased level of dredging activity has the potential to result in increased encounters and hence vessel to vessel collision risk.
- 14.10.7 Given the available sea room around the Offshore Project, and the short duration and limited extent of construction activities, the cumulative impact is considered to be of **minor significance**.

During Operation

Impact on Vessel Routeing

- 14.10.8 Of the routes identified from the maritime traffic survey that will be required to deviate from the Offshore Project site, the traffic routeing through the ITZ and passing east/west through the Offshore Project site is the route for which there are potential cumulative impacts due to Navitus Bay. As noted above (Section 14.9.3) this route includes vessels associated with the Solent (which will not be impacted by Navitus Bay) and vessels passing south of the Isle of Wight which could be cumulatively impacted.
- 14.10.9 Figure 14.34 below presents seven days of vessel track data (AIS only) from August 2011 for the Offshore Project area and the Navitus Bay area.
- 14.10.10 It can be seen that a relatively low level of traffic will be cumulatively impacted by the two proposed wind farm sites.
- 14.10.11 A proportion of vessels routeing east/west along the coast are recreational craft. The recreational cruising routes in the area, based on the RYA data are presented in Figure 14.35.

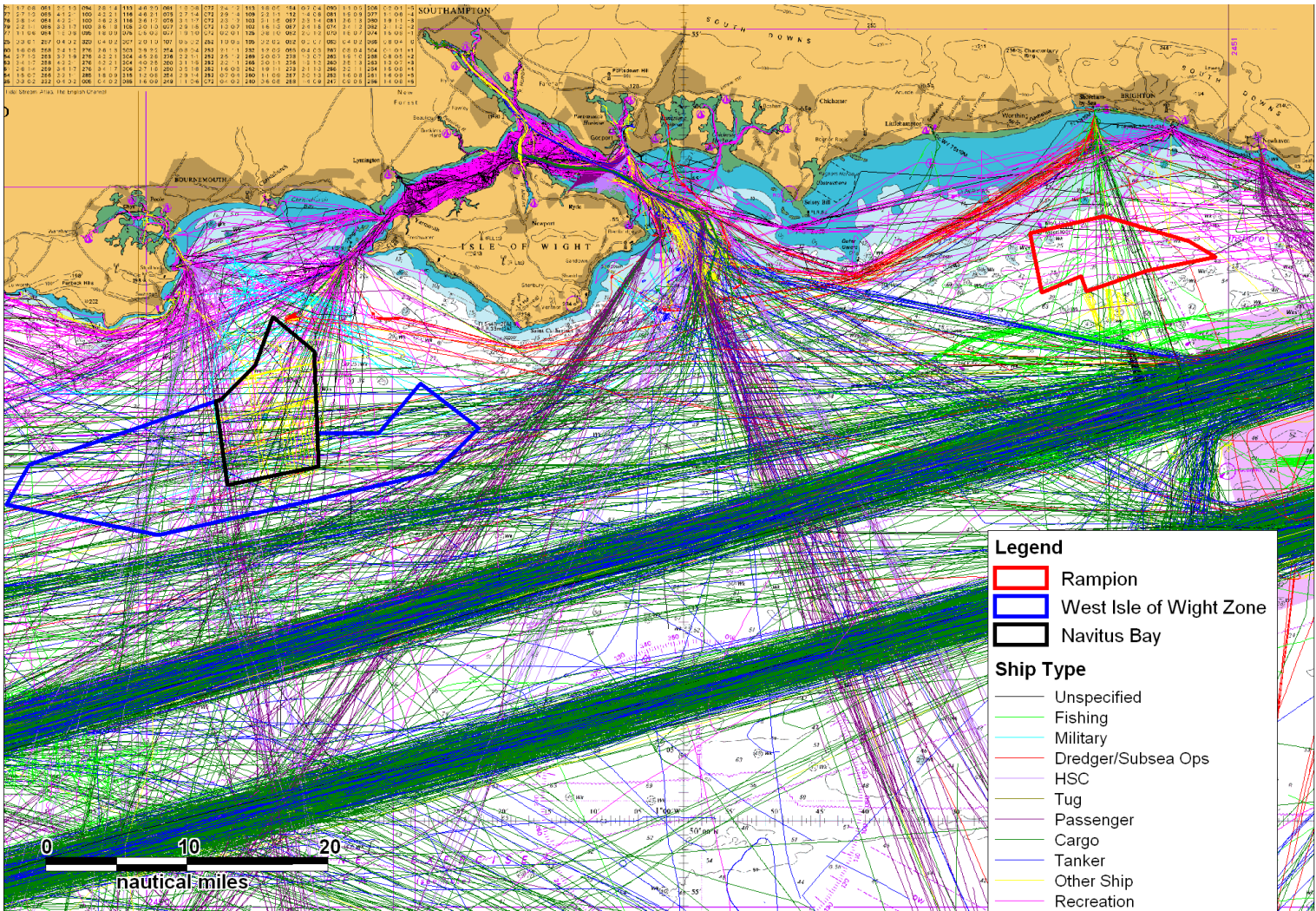


Figure 14.34: AIS Data (7 days – August 2011) relative to Offshore Project and Navitus Bay Projects

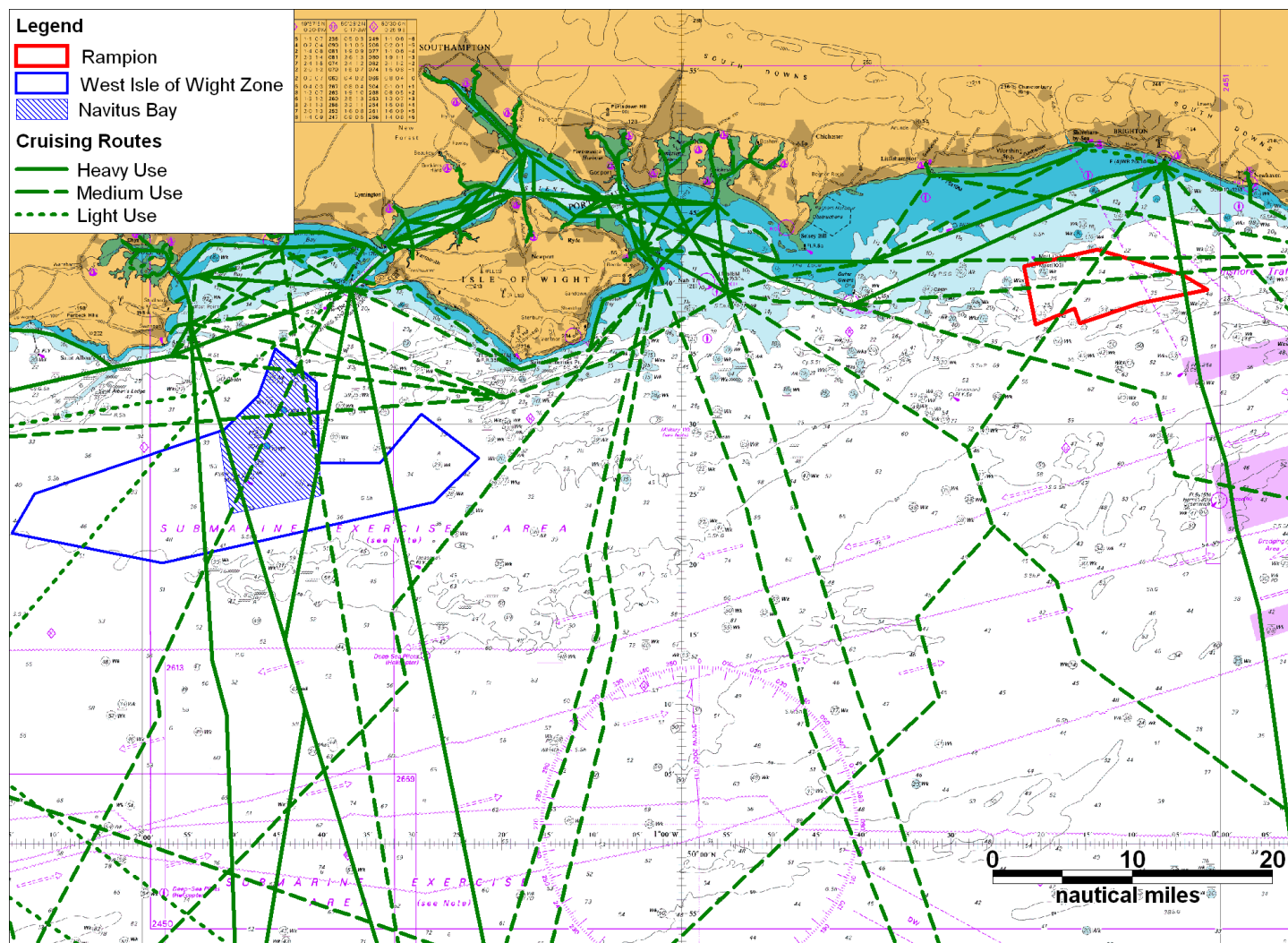


Figure 14.35: RYA Cruising Routes relative to Offshore Project and Navitus Bay

- 14.10.12 An average track routeing of Beachy Head, within the ITZ, and passing south of the Isle of Wight, will be displaced by both wind farm sites. However, assuming ships will be able to pre-plan their revised passage in advance of encountering the wind farm developments, it is considered that vessels can route either inshore or offshore of the proposed developments with only a small increase in route length.
- 14.10.13 Recreational craft routes passing east/west through the Offshore Project and passing south of the Isle of Wight could also be cumulatively impacted. As with commercial vessels, recreational craft are likely to be able to route around both sites with only small increases in route lengths. Since recreational craft are likely to be able to navigate between the WTGs within the wind farms, cumulative effects on recreational activities are not considered to be significant.
- 14.10.14 There is also the potential for cumulative impacts on vessel routeing arising from the Offshore Project and the proposed offshore wind farms off the coast of northern France. In terms of commercial vessel routeing, a small proportion of vessels associated with Shoreham routeing north/south through the Offshore Wind Farm (Figure 14.28) are headed to/from ports in northern France, e.g., Rouen, Fécamp and Le Tréport. There will be additional deviations for vessels routeing between Shoreham and Fécamp or Le Tréport, due to the proposed wind farms off the French coast. However, these are not frequently used routes.
- 14.10.15 The Offshore Project and the Fécamp wind farm will also result in cumulative impacts on recreational craft routeing. In particular, cross channel races from Shoreham and Brighton to Fécamp would be displaced by both sites, as it is considered unlikely that any races would pass through the wind farms (based on consultation and the Hazard Review Workshop). It was noted at the workshop that routeing around the sites could result in deviations for races and potentially lengthen the course, leading to races not being completed within the hours of daylight.
- 14.10.16 Overall, given the low levels of traffic that will be cumulatively impacted, cumulative effects on vessel routeing during the operation phase are therefore considered to be of **minor significance**.

During Decommissioning

- 14.10.17 The cumulative impacts of decommissioning are unknown at this stage, and will be dependent on the activities taking place on other projects at the same time as the decommissioning of the Offshore Wind Farm. These cumulative impacts will be considered as part of the decommissioning process.

Table 14.8: Summary of Residual Effects and Mitigation Measures

Aspect	Effect	Proposed Mitigation Measures	Sensitivity	Magnitude	Residual Effect
Construction Phase					
Wind Farm Construction	Construction of the wind farm leading to loss in navigable sea room and deviations for commercial vessels.	• SAR ERCoP • Compliance with MGN 371 • Promulgation of information on construction works • Application for and Use of Safety Zones	Medium	Medium	Moderate
Wind Farm Construction	Construction of the wind farm leading to loss in navigable sea room and deviations for fishing vessels.	• SAR ERCoP • Compliance with MGN 371 • Promulgation of information on construction works/Fisheries liaison • Application for and Use of Safety Zones Guard vessels	Medium	Medium	Moderate
Wind Farm Construction	Construction of the wind farm leading to loss in navigable sea room and deviations for recreational craft.	• SAR ERCoP • Promulgation of information on construction works • Application for and Use of Safety Zones Guard vessels	High	Small	Moderate
Cable Installation	Increase in collision risk, change in routeing and anchor snagging risk for commercial vessels due to cable installation works.	• SAR ERCoP • Application for and Use of Safety Zones Promulgation of information • Guard Vessels • Use of vessels that are 'fit for purpose'	Medium	Small	Minor

Aspect	Effect	Proposed Mitigation Measures	Sensitivity	Magnitude	Residual Effect
Cable Installation	Increase in collision risk, change in routeing and gear snagging risk for commercial fishing vessels due to cable installation works.	• SAR ERCoP • Application for and Use of Safety Zones • Promulgation of information • Use of vessels that are 'fit for purpose'	Medium	Medium	Moderate
Cable Installation	Increase in collision risk and change in routeing for recreational craft due to cable installation works.	• SAR ERCoP • Application for and Use of Safety Zones • Promulgation of information • Use of vessels that are 'fit for purpose'	High	Small	Moderate
Cable Installation	Installation of export cable could restrict vessel access to Shoreham port from the west.	• Promulgation of information • Effective works vessel management	Medium	Small	Minor
Operational Phase					
Wind Farm	The physical presence of wind farm structures results in deviations for commercial vessels.	• Promulgation of information (Notices to Mariners, marking on charts)	High	Medium	Major/Moderate
Wind Farm	The physical presence of wind farm structures may lead to an increase in commercial vessel collision risk.	• SAR ERCoP • Marking and Lighting • Promulgation of Information (including marking on charts) • Marine Coordination Centres	High	Small	Moderate
Wind Farm	The physical presence of wind farm structures leading to deviations and an increase in collision risk for marine aggregates dredgers.	• SAR ERCoP • Marking and Lighting • Consideration of fenders/bollards on structures.	Medium	Medium	Moderate

Aspect	Effect	Proposed Mitigation Measures	Sensitivity	Magnitude	Residual Effect
Wind Farm	The physical presence of wind farm structures leading to a loss in navigable sea room, deviations and an increase in collision risk for fishing vessels.	• SAR ERCoP • Marking and Lighting • Promulgation of Information (including marking on charts) • Marine Coordination Centres	Medium	Medium	Moderate
Wind Farm	The physical presence of wind farm structures leading to a loss in navigable sea room, deviations and an increase in collision risk for recreational craft.	• SAR ERCoP • Marking and Lighting • Promulgation of Information (including marking on charts) • WTG Blade/mast air draft • Marine Coordination Centres	High	Medium	Major/Moderate
Wind Farm	The physical presence of wind farm structures may lead to an increased number of SAR incidents and reduce SAR access within the site.	• SAR ERCoP • MGN 371 requirements to allow safe helicopter operations within the wind farm	Medium	Medium	Moderate
Wind Farm	The physical presence of wind farm structures may reduce pollution and salvage response capabilities.	• SAR ERCoP	Medium	Medium	Moderate
Wind Farm	The physical presence of wind farm structures in close proximity to shipping traffic may cause radar interference.	• Consultation with MCA and THLS upon selection of final layout.	High	Medium	Major/Moderate
Wind Farm	The physical presence of the wind farm structures may reduce access to local ports.	• Marking and Lighting • Promulgation of information	Medium	Large	Major/Moderate

Aspect	Effect	Proposed Mitigation Measures	Sensitivity	Magnitude	Residual Effect
Subsea Cables	The physical presence of subsea cables resulting in a risk of hostile anchor interaction.	• Cable burial / protection • Promulgation of cable locations • Periodic cable burial inspection	Medium	Small	Minor
Subsea Cables	The physical presence of subsea cables resulting in a risk of fishing gear interaction.	• Cable burial / protection • Promulgation of cable locations • Periodic cable burial inspection	Medium	Small	Minor
Subsea Cables	Possible electromagnetic interference on recreational craft navigation equipment.	• Cable burial / protection • Periodic cable burial inspection	Medium	Negligible	Not Significant
Decommissioning Phase					
Considered to be similar to the construction phase, therefore will require similar mitigations that will be agreed at the point of decommissioning.					

14.11 References

BWEA (British Wind Energy Association (now RUK))(2007) Investigation of Technical and Operational Effects on Marine Radar Close to Kentish Flats Offshore Wind Farm.

DECC (Department of Energy and Climate Change (formerly BERR))(2005) Methodology for Assessing the Marine Navigational Safety Risk of Offshore Wind Farms.

IALA (International Association of Lighthouse Authorities)(2008) Recommendation O-139. The Marking of Man-Made Offshore Structures.

MCA (Maritime and Coastguard Agency)(2008) Marine Guidance Note (MGN) 371. Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues.

MCA (2010) Protecting our Seas and Shores in the 21st Century, Consultation on Proposals for Modernising the Coastguard.

MCA (2011) Protecting our Seas and Shores in the 21st Century, Consultation on Proposals for Modernising the Coastguard.

OCIMF (Oil Companies International Marine Forum)(1993) Disabled Tankers – Reports of Studies on Ship Drift and Towage.

QinetiQ (2004) Results of the EM Investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle Wind Farm.

RYA (Royal Yachting Association)(2009) UK Coastal Atlas of Recreational Boating; Recreational Cruising Routes, Sailing and Racing Areas around the UK Coast.

UKHO (UK Hydrographic Office) (2005) Admiralty Sailing Directions – Dover Strait Pilot, NP 28, 7th Edition.