PROPOSED NAVITUS BAY WIND PARK

PRELIMINARY ENVIRONMENTAL INFORMATION 3

CHAPTER 16
SHIPPING AND NAVIGATION

SEPTEMBER 2013

NAVITUSBAY

VERSION HISTORY			
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02/09/2013	A	Final	Issue to S42 consultees

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16. SHIPPING AND NAVIGATION

16.1. Introduction

16.1. This chapter summarises the Navigational Risk Assessment ('NRA'), which details baseline vessel activity and navigational features in proximity to the proposed Navitus Bay Wind Park ('the Project'). In addition, it summarises the assessment of the navigational risk predicted following development.

16.2. For the purpose of this assessment, the Offshore Development Area comprises the following project elements; the Turbine Area and an Offshore Export Cable Corridor. For details of the Project Description used within this assessment refer to Chapter 2, Navitus Bay Wind Park Project.

16.3. The shipping and navigation chapter considers all vessels navigating the waters in the area of the Offshore Development Area, including recreational craft, ferries and other commercial traffic, commercial fishing vessels, aggregate vessels, military vessel transits and emergency response activities.

16.2. Legislation, Policy and Guidance

16.4. This section outlines the legislation, policy and guidance relevant to the assessment of potential impacts on shipping and navigation.

16.2.1. International

16.5. In the UK, national procedures comply as a minimum with international standards and recommended practices namely:

- International Regulations for Preventing Collisions at Sea 1972 ('COLREGs'), as implemented in the UK through Marine Shipping Notices;
- International Association of Marine Aids to Navigation and Lighthouse Authorities ('IALA') – 0139 the Marking of Man-Made Offshore Structures, Edition 1 (IALA, 2008).

16.2.2. National

16.6. The overarching National Policy Statement ('NPS') for Energy ('EN-1'), in-conjunction with the NPS for Renewable Energy Infrastructure ('EN-3'), provide the primary policy framework within which the Project will be assessed. In particular, EN-3 considers the requirements for an assessment of renewable energy projects on shipping and navigation. A summary of this policy and how it is addressed in this PEI chapter is given in Table 16.1.

16.2.3. Guidance

16.7. The guidance documents used during the assessment are:

- Maritime and Coastguard Agency ('MCA') Marine Guidance Notice 371 (MGN 371 Merchant + Fishing) Offshore Renewable Energy Installations (OREIs) Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2008a);
- Department of Energy 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 (DECC, 2005);
- Guidelines for Formal Safety Assessment ('FSA') – MSC/Circ. 1023 (International Maritime Organisation ('IMO') 2002);
- MGN 371 highlights issues to be taken into consideration when assessing the effect on navigational safety from offshore renewable energy developments, proposed within United Kingdom internal waters, territorial sea or Renewable Energy Zones ('REZ');
- MCA Marine Guidance Notice 372 (MGN 372 M+F) Offshore Renewable Energy Installations ('OREIs') Guidance to Mariners Operating in the Vicinity of UK OREIs (MCA, 2008b);
- Royal Yachting Association ('RYA') – The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2012).

Table 16.1 Compliance with National Policy statements	
NPS EN-3: Part 2	Consideration in PEI
Paragraph 2.6.153: *"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."*	Stakeholders have been identified through the assessment process, and this is described in the Consultation section.
Paragraph 2.6.154: *"Assessment should be underpinned by consultation with the 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."*	Consultation with these organisations has been undertaken and this is described in the Consultation section.
Paragraph 2.6.155: *"Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database."*	Data sources used in the assessment are described in the Assessment Methodology section.
Paragraph 2.6.156: *"Applicants should undertake a NRA in accordance with relevant Government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above."*	The guidance used in this assessment is described in the Legislation, Policy and Guidance section.
Paragraph 2.6.157: *"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."*	The methodology for the navigation risk assessment is described in the Assessment Methodology section. The potential for cumulative and in-combination effects will be addressed with the ES to be submitted in support of the application for development consent.
Paragraph 2.6.158: *"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."*	Safety zones are discussed in the Embedded Mitigation section.
Paragraph 2.6.159: *"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."*	Safety zones are discussed in Embedded Mitigation section.
Paragraph 2.6.160: *"The potential effect on recreational craft, such as yachts, should be considered in any assessment."*	The assessment of effects on recreational craft is detailed in the Impact Assessment section.

16.8. Best practice guidance includes:

- RYA & Cruising Association ('CA') (2004). Sharing the Wind - Identification of recreational boating interests in the Thames Estuary, Greater Wash and North West (Liverpool Bay);
- Department for Transport ('DfT') (2004). Results of the electromagnetic investigations;
- British Wind Energy Association ('BWEA') (2008). Guidelines for Health & Safety in the Wind Energy Industry;
- MCA (2005). Offshore Wind Farm Helicopter Search and Rescue – Trials Undertaken at the North Hoyle Wind Farm Report of helicopter Search and Rescue ('SAR') trials undertaken with Royal Air Force Valley 'C' Flight 22 Squadron on March 22nd 2005;
- Nautical and Offshore Renewable Energy Liaison Group ('NOREL'). A Report compiled by the Port of London Authority based on experience of the Kentish Flats Wind Farm Development;
- The Crown Estate (2012). Strategic assessment of impacts on navigation of shipping and related effects on other marine activities arising from the development of Offshore Wind Farms in the UK REZ.

16.3. Assessment Methodology

16.9. The MCA require that the DECC methodology is used as a template for preparing an NRA. It is centred on risk management and requires a submission that shows that sufficient controls are, or would be, in place for the assessed risk (base case and future case).

16.3.1. Study area

16.10. The study area is based on a 10 NM buffer around the Offshore Development Area (Figure 16.1). This distance has been used as it presents a sufficient area to capture the relevant issues for the wind farm in terms of vessel movements and historical marine accident data. However, the study area has been extended to greater than the 10 NM buffer where required, for example when presenting main routes or navigational features.

16.11. For the Offshore Export Cable Corridor, the study area has been defined as a 2 NM buffer around the corridor.

16.3.2. Consultation

Stakeholder consultation

16.12. Key marine and navigational stakeholders were consulted during the Zone Appraisal and Planning ('ZAP') and scoping phases of the Project, and subsequently as part of the NRA and Environmental Impact Assessment ('EIA') processes.

16.13. Table 16.2 provides a summary of the consultation relevant to shipping and navigation. Consultation was also undertaken during a hazard workshop held in September 2012. The majority of the consultations were undertaken prior to a change in the boundary of the Project which is described in Chapter 2.

Regular operators Consultation

16.14. Regular operator consultation was undertaken based on over 100 days of AIS data from October 2011 and January to April 2012. A total of 22 regular operators were identified and consulted via electronic or hardcopy mail. The email/letter gave an overview of the work to date and an opportunity to request further information if required. Separate consultation meetings were held with ferry operators, and with a dredging operator.

16.15. One regular operator written response was received, which comprised of comments from JR Ship Management B.V. This response provided detail on the operator's experience in the study area. In particular, the response noted differences between AIS data and actual experiences of approaches to the western entrance to the Solent, and the adverse current and weather experienced by the operator. This has been considered in the modelling exercise where appropriate (see further detail below).

16.16. The key points from consultation meetings held with ferry and dredging operators are summarised in Table 16.3.

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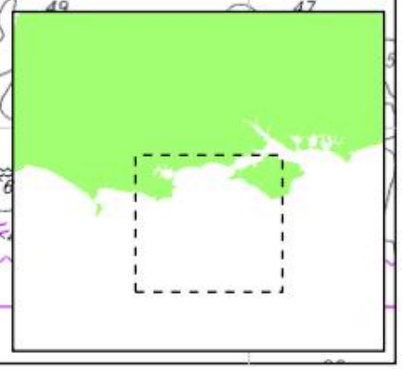
5620000 5610000 5600000 5590000 5580000 5570000

BOURNEMOUTH
Poole
POOLE HR
Wareham
Poole Bay
Christchurch Bay
Christchurch
Hurst Point
Yarmouth
Freshwater
ISLE OF W
Newport
Studland
Handfast Point
Purbeck Hills
Swanage
Anvil Point
Fl.10s45m9M
Saint Alban's Hd
Saint Alban's Ledge
Obstn
ODAS
Fl(5)Y.20s
Fl(4)WR.13-11M
Iso.WRG.21-17M
VQ(9)
Racon(T)
The Needles
Oc(2)WRG.20s24m17-13M
Horn(2)30s
Shingles
(see Note)
Fl.5s41m26M
& F.R.35m13M
Lt Hd (disused)
Stenbury
Saint Ca
Deep-Sea Pilots (Helicopter)
2613
SUBMARINE EXERCISE ARE
(see Note)
(seasonal)
Fl.Y.5s



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Study Area Shipping and Navigation

Legend

- Turbine Ares
- Offshore Export Cable Corridor
- 10 nm Buffer

Fig. No.: Figure 17.1		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone, PMSS, TCE
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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Table 16.2 Consultation Responses		
Organisation and date	Summary of response	Where addressed in PEI
MCA (17/02/2010)	Discussed the guidance to be followed for the NRA.	This is set out in the Assessment Methodology section.
National Federation of Fisherman's Organisations ('NFFO') (06/04/2010)	Provided information and advice on further sources of information to be gathered for the assessment	This is set out in the Assessment Methodology section.
RYA (04/05/2010)	Discussed the preliminary design of the wind farm and risks to recreational sailing.	This is set out in the Potential Impacts of Turbine Area on Recreational Craft (2.5 to 24 m)
Trinity House Lighthouse Services ('THLS') (19/05/2010)	Discussed the preliminary design of the wind farm and navigational safety. Provided advice on guidance to be followed for the NRA.	This is set out in the section on Guidance on Assessment of Navigation Risks and in the Limitations and Embedded Mitigation
Associated British Ports Southampton (ABP) (20/05/2010)	Discussed the preliminary design for the wind farm, and provided information on routes used by vessels.	Information gathered would be detailed in the ES that will form part of the application for Development Consent. This is also set out in the Baseline Environment section.
Poole Harbour Commissioners ('PHC') (20/05/2010)	Provided information on the ferry operators and main routes, and discussed potential impacts on commercial operations.	This is set out in the section on Commercial Ferries
Lymington Harbour Commissioners (LHC) (13/07/2010)	Discussed potential impacts on recreational craft using the harbour.	This is set out in the section on Potential Impacts of Turbine Area on Recreational Craft (2.5 to 24m)
Cowes Harbour Commissioners ('CHC') (13/07/2010)	Provided information on the fishing and commercial vessels using the harbour, and on commercial vessel routes. No impacts were foreseen by CHC.	Information gathered would be detailed in the ES that will form part of the application for Development Consent. This is also set out in the Baseline Environment section.
MCA and DfT (27/10/2010)	Discussed potential risks associated with re-routing due to the presence of wind turbines. Discussed design of cable burial.	This is set out in the following sections: ➢ Commercial Ferries ➢ Potential Impacts of Turbine Area on Commercial Passenger Vessels (Safe Operations) ➢ Limitations and Embedded Mitigation ➢ Congestion with Other Offshore Users
RYA (27/04/2011)	Discussed the location of the wind farm and the application of safety zones during operation.	This is set out in Limitations and Embedded Mitigation sections

Table 16.2 Consultation Responses		
THLS (16/06/2011)	Discussed impacts on the Hurst Point leading light and other lighting and aids to navigation measures.	This is set out in the following sections Limitations and Embedded Mitigation and Potential Mitigation.
Sailing and Yacht Club Representatives and Royal Yacht Squadron ('RYS') (30/09/2011)	Provided information on recreational vessels carrying AIS and discussed potential risks to recreational vessels.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment and Impact Assessment sections where appropriate
Chamber of Shipping ('CoS') (14/11/2011)	Discussed risks to adverse weather routes and the design of the cable route.	This is set out in Potential Impacts of Turbine Area on Commercial (Passenger) Adverse Weather Routeing
LHC (05/12/2011)	As the option of the cable route through the Solent was no longer being considered, the direct impacts on Lymington Harbour were insignificant.	Noted
PHC (05/12/2011)	➢ The potential issues regarding high speed craft (HSC) operating out of Poole were discussed. ➢ Discussion was also held on safety zones, potential hazards to vessels adrift, and commercial vessels, to be taken into account in the NRA.	This is set out in the following sections Limitations and Embedded Mitigation Commercial Ferries Potential Impacts of Turbine Area on Commercial Passenger Vessels (Safe Operations) Regular Operator Identification
Royal National Lifeboat Institution ('RNLI') (08/12/2011)	➢ RNLI stated that they were already in discussion with The Crown Estate and were trying to anticipate the information required by developers around the UK in general. ➢ They noted that each site will need to be looked at individually to determine their requirements.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
YHC and CHC (09/12/2011)	The potential impact on safety of vessels to get into difficulties was discussed.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Impact Assessment section.
RYS (23/04/2012)	Question and answer session discussing search and rescue, sailing through wind farms, water depth implications from rock protection on cables, risks arising from the wind farm, emergency response procedure for a vessel colliding with a turbine and wake effects of turbines.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
Sailing and Yacht Club Representatives (01/05/2012)	Question and answer session discussing recreational users, data collection for the NRA, charting of the wind farm and turbines following installation, search and rescue, effect on VHF and fog creation.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.

Table 16.2 Consultation Responses		
Chichester Yacht Club and Chichester Cruising Racing Club (25/05/2012)	Question and answer session discussing consultation process, AIS and Radar data collection, incidents in the area that the RNLI responded to, rotor clearance, turbine numbers, foundation selection and the consent process.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
THLS (26/07/2012)	A discussion was held on the summer traffic survey and further discussion on the Hurst Point leading light.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
CoS (06/09/2012)	Discussed the principle of a "buffer zone" of 2 km from the Turbine Area boundary for commercial ferries, and further discussed bad weather routing, and routing to the north of the Turbine Area.	This is set out in Potential Impacts of Turbine Area on Commercial (Passenger) Adverse Weather Routeing
THLS (06/09/2012)	Discussions on the Hurst Point leading light, and the potential for congestion. THLS would wish to be consulted on the final design.	This is set out in Congestion with Other Offshore Users section.
MCA (13/09/2012)	The navigational safety issue of rock protection on cables was discussed and potential new routes.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
RYA (13/09/2012)	Agree the distinction between recreational craft between 2.5 and 24 m and other types of small crafts. Discussed the potential layouts for the wind farm, the potential for re-routing of commercial vessels impacting on recreational vessels, and provided further information on regular transit routes.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
MCA and THLS (04/10/2012)	Post meeting agreement that the boundary of the Navitus Bay Offshore Development Area would change so as not to impact the Hurst Point leading light. Turbines will be positioned to ensure that no part of the blade encroaches the green sector of the leading light.	This is set out in Limitations and Embedded Mitigation section.
Cruising Association ('CA') (28/02/2013)	Discussed potential layouts of the wind farm and differences in risk, and the new Site boundary.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent.
MCA and THLS (01/03/2013)	Discussed and agreed the principles of a lighting layout for the Turbine Area, to be agreed on the final design layout.	This is set out in Limitations and Embedded Mitigation section.

Table 16.3 Regular Operator Consultation Meetings		
Organisation and date	Response	Where addressed in PEI
Hanson Aggregates Marine Ltd and Tarmac Marine Dredging Ltd 29/03/2010	Meeting: ➢ Discussed the location and layout of the Offshore Development Area. ➢ Hanson and Tarmac have two existing production licenses, and provided details of their operations.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
Brittany Ferries (Poole) 30/06/2010	Meeting ➢ Discussed safety routeing in bad weather and cable routing. ➢ Brittany issued route information, post meeting for consideration within the project design process.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set considered in Chapter 2.
Condor Ferries 30/06/2010	Meeting discussed safety routeing in bad weather and cable routing.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
Brittany Ferries (Portsmouth) 28/10/2010	Meeting discussed the Ferry routes to Spain and good weather routes. Discussed commercial concerns and Passenger comfort routes.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Baseline Environment section.
Hanson Aggregates Marine Ltd and CEMEX UK Marine Ltd 13/01/2011	Meeting discussed appropriate buffer distances with the Turbine Area.	This is set out in the Limitations and Embedded Mitigation section.
Tarmac Marine Dredging Ltd 13/01/2011	Meeting: ➢ Discussed appropriate buffer distances with the Turbine Area and Offshore Export Cable Corridor. ➢ Provided information on normal dredging operations.	This is set out in the Limitations and Embedded Mitigation
Brittany Ferries and Condor Ferries 09/06/2011	Meeting: ➢ Brittany Ferries provided more data on routes and seasonal variations in operations. Provided information on the wash generated by vessels and discussed potential risks. ➢ Discussed suitable separation distances between standard routes and the Turbine Area. ➢ Potential risks on vessel radar was discussed and potential aids to navigation for the wind farm.	This is set out in the following sections: ➢ Baseline Data Gathering Methodology ➢ Potential Impacts of Turbine Area on Commercial Passenger Vessels (Safe Operations) ➢ Potential Impacts of Turbine Area on Commercial (Passenger) Adverse Weather Routeing ➢ Limitations and Embedded Mitigation

Table 16.3 Regular Operator Consultation Meetings		
Jubilee Sailing Trust ('JST') 07/07/2011	Meeting discussed the possibility and risk associated with sailing through the wind farm, and potential risks of night-time and adverse weather.	Information gathered has been used in Technical Appendices to be provided in the ES submitted as part of the Application for Development Consent. This is also set out in the Impact Assessment.
Brittany and Condor Ferries 04/10/2012	Meeting: ➢ Discussed commercial concerns regarding re-routing. Further discussion on buffer zones, radar, and adverse weather routes. ➢ Condor Ferries provided further information on return journey routes.	This is set out in the Potential Impacts of Turbine Area on Commercial (Passenger) Adverse Weather Routeing

16.3.3. Scope of the assessment

16.17. The NRA is a different process from EIA, although the approaches are very similar and the result is an assessment of the risk of the proposed Project on navigation, and the mitigation required to minimise those risks. As such, the approach does not follow the assessment methodology laid out in Chapter 3, EIA Methodology. This approach was agreed in consultation with the MCA (see Table 16.2).

16.18. The NRA has a baseline data gathering phase broadly similar to EIA, which included marine traffic surveys, desk-based research and consultation to allow the identification of higher risk areas. This phase is followed by a Formal Safety Assessment ('FSA') in line with the IMO FSA Process (IMO, 2002) and DECC guidance (DECC, 2005). The FSA process is illustrated in Figure 16.2.

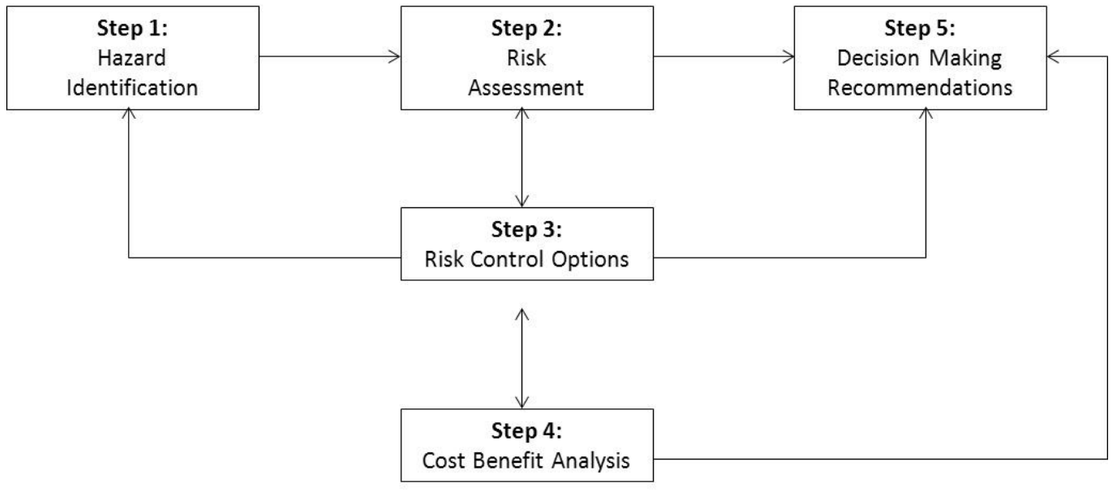

Figure 16.2 Formal Safety Assessment Process

16.19. The impact assessment in this chapter summarises the following sections of the NRA:

- Hazard log and risk ranking (see 'Hazard Workshop' section below);
- Quantified NRA for selected hazards;
- Base case and future case risk levels assessed for selected hazards;
- Emergency response review;
- Assessment of mitigation measures.

16.20. The main impact assessment covers the potential impacts to commercial vessels, fishing vessels and recreational vessels from the construction/installation, operation and maintenance ('O&M') and decommissioning phases of the Offshore Development Area.

16.3.4. Issues scoped out

16.21. Following completion of the NRA, impacts that have a clear pathway of effect on receptors have been considered as part of the FSA process and are therefore detailed within this chapter. Impacts which have not met this criterion have been scoped out at this stage.

16.22. Issues which were not identified from these sources were scoped out of the assessment. Issues scoped out included communications and position fixing (VHF Direction, AIS, NAVTEX and Global Positioning Systems) and impacts associated with noise and Sonar. All other receptors and navigation based equipment have been considered as part of the environmental impact

16.3.5. Impact assessment methodology

Hazard workshop

16.23. A hazard workshop was held in September 2012 to identify the navigational hazards associated with the Offshore Development Area. This workshop was attended by maritime stakeholders. As part of the hazard workshop, key maritime hazards associated with structures within the Turbine Area and the Offshore Export Cable Corridor were identified. Where appropriate, vessel types were considered separately to ensure the risk levels were assessed for each and the control options could be identified on a type-specific basis, e.g. risk control measures for fishing vessels differ to those for commercial ships. Other general hazards associated with the construction, O&M and decommissioning phases, such as dropped objects, man overboard, pollution incidents and search and rescue operations, were also identified.

16.24. A total of 27 potential risks were identified through the workshop were ranked and risk reduction measures identified. For the most likely outcome, 18 of the risks were broadly acceptable and nine were in the tolerable region. When the worst case consequences were assessed, three risks were broadly acceptable and 24 were tolerable. No risks were assessed as being unacceptable.

Assessment methodology

16.25. The shipping and navigation receptors have been assessed using the formal safety assessment method, as required by the Methodology for Assessing Marine Navigational Risk (DECC, 2005).

16.26. A shipping and navigation receptor can only be sensitive if there is a pathway through which an impact can be transmitted between the source and the receptor. When a receptor is exposed to an impact, the overall 'severity of consequence' to the receptor is determined and the process incorporates a degree of subjectivity. Consequence assessments for shipping and navigation receptors used the following criteria, in line with baseline data and expert opinion, to assess:

- Outputs of the hazard workshop;
- Level of stakeholder concern;
- Time and/or distance of deviation;
- Number of transits of specific vessel and/or vessel type;
- Lessons learnt from existing developments.

16.27. Rankings for 'severity of consequences' are shown in Table 16.4.

Table 16.4 Severity of Consequences

Rank	Description
Catastrophic	➢ Total loss of a vessel/recreational craft crew. ➢ Extensive environmental damage.
Major	➢ Loss of a vessel/recreational craft crew member. ➢ Major environmental damage. ➢ Major damage to infrastructure or vessel. ➢ Major national business, operation or reputation impacts.
Moderate	➢ Serious injury to vessel/recreational craft crew member. ➢ Moderate environmental damage. ➢ Notable damage to infrastructure/vessel. ➢ Considerable business, operation or reputation impacts.
Minor	➢ Minor injury to vessel/recreational craft crew member. ➢ Minor environmental damage. ➢ Minor damage to infrastructure/vessel. ➢ Minor business, operation or reputation impacts.
Negligible	No significant harm to people or environment.

16.28. Consequence has then been assessed against frequency to identify overall tolerability ranking for the impact. Rankings for frequency are shown in Table 16.5.

Table 16.5 Frequency of Occurrence	
Rank	Description
Extremely Unlikely	Only likely to happen in exceptional circumstances.
Unlikely	Unlikely to happen but not exceptional throughout all phases of the Project.
Reasonably Probable	Likely to happen throughout the all phases of the Project.
Likely	Likely to happen regularly through the all phases of the Project.
Extremely likely	Will occur on a regular occurrence through the all phases of the Project.

16.29. Table 16.6 and Table 16.7 present the risk matrix for the tolerability of the impacts according to the severity of the consequences and frequency of occurrence.

Table 16.6 Risk Matrix

Severity of Consequence						
	Catastrophic					
	Major					
	Moderate					
	Minor					
	Negligible					
		Extremely Unlikely	Unlikely	Reasonably Probable	Likely	Extremely Likely
		Frequency of Occurrence				

16.30. Following the assessment and risk ranking, further risk control measures (beyond those which are embedded mitigations as described in paragraph 16.34) may be required to mitigate the impact and bring it within ALARP (As Low As Reasonably Practicable) regions.

Table 16.7 Risk Rankings	
Rank	Description
Unacceptable	Risk Mitigation or Design Modification Required.
Tolerable	Risk Acceptable but may require suitable and sufficient mitigation measures and monitoring in place.
Broadly Acceptable	Risk Acceptable with no additional mitigations or monitoring required above industry standard risk reduction measures.

16.31. Risks ranked as 'Unacceptable' or 'Tolerable' will require additional mitigation to reduce the level of risk identified, and these mitigations are detailed in Section 16.6, Potential Mitigation.

16.3.6. Limitations and embedded mitigation

Limitations

16.32. The shipping and navigation impact assessment has been carried out based on the information available and responses received at the time of preparation. It is assumed that any notable changes will be re-assessed and re-modelled if required.

16.33. The assumptions used in the modelling of collision risk will be provided with the ES that will form part of the application for development consent.

Embedded mitigation

16.34. The following embedded mitigation measures have been incorporated into the design of the Project and are assumed to take place during the construction, O&M and decommissioning of the Project. In some instances

embedded mitigation is sufficient to prevent any significant impacts occurring. Embedded mitigation with respect to shipping and navigation includes the following industry standard mitigation measures:

- During the construction and decommissioning phases of the turbines and other offshore structures, a 500 m 'rolling' safety zone around the locations in which construction/decommissioning activity is taking place is proposed. Any application(s) for safety zones will be made to DECC under Section 95 and Schedule 16 of the Energy Act 2004, and the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007. Safety zones for the construction and eventual decommissioning would be established on a 'rolling' basis, covering only those areas of the total Turbine Area in which such activities are actually taking place at a given time in order to reduce the amount of time that mariners and other users of the sea would be required to deviate around the safety zones. Once the activity has been completed in that specific location, the safety zone would then 'roll on' to cover the next specific location within the Turbine Area in which activity is taking place.
- Additionally a 50 m safety zone may also be applied for around the structures where construction works have been completed but prior to the wind farm being commissioned.
- During operation, a 500 m safety zone is proposed to be employed where exceptional, major maintenance is underway on a structure during the operational phase.
- With regard to "standard" 50 m operational safety zones around each of the wind farm structures, at this stage of the consent process it is not currently the intention to apply for these;. However the requirement for 50 m operational safety zones to be included in an application to DECC may need to be reviewed once the Project design has been finalised and in recognition of any changes to the nature of the marine traffic in and around the Project area at the point of application, as well as the avoidance of any damage to the underwater infrastructure such as subsea cables entering the foundations.
- Turbines would be constructed to ensure that the minimum rotor blade clearance is at least 22 m above mean high water springs ('MHWS').
- Cables would be trenched and buried where seabed conditions allow or protected with suitable methods to ensure the risk of snagging or anchor interaction is mitigated. Due to the different seabed conditions, it is assumed that 50% of the cable route (the northern section) would be installed using ploughing and jetting whilst the 50% in the southern sector would be installed using trenching techniques without jetting. If cables are fixed to the seabed, they would be protected by rock placement, concrete mattresses or ducting which lies clear of the surrounding seabed. The impact of these protection methods on navigation and the requirement for appropriate risk mitigation measures would be assessed by NBDL as part of the ongoing cable works programme. However it is noted that any method chosen would not increase risk to navigation by creating hazards such as a reduction in water depth.
- Structures within the wind farm would be marked and lit in accordance with International Association of Lighthouse Authorities ('IALA') Recommendation O-139 on the Marking of Man-Made Offshore Structures (IALA, 2008) but may also include the use of other visual and sounds aids to navigation.
- Scour protection used for turbine foundations would be designed with consideration to navigation risk. There are a number of different scour protection materials that may be used such as loose rock, rough gravel, concrete mattresses and frond mats. Scour and scour protection are not expected to have any impacts on surface navigation, but could present a snagging risk. The method of protection therefore selected, especially in shallow water depths, should give consideration to the potential hazards posed to vessels anchoring, include hose that are required to anchor in an emergency.

16.35. In addition a number of industry standard mitigation measures are assumed to all be in place during the construction, O&M and decommissioning phases:

- Wind turbines will be designed in accordance with MGN 371 (MCA, 2008a) and procedures put in place for generator shut down and other operational requirements in emergency situations. Any amendments to MGN 371 that are made post-consent may be considered retrospectively.

- Following consultation with marine aggregate dredging companies it was noted that due to tidal direction, buffers would be installed 0.5 NM (approx. 926 metres) from structures and 0.25 NM (approx. 500 m) from cables. These buffers are subject to ongoing discussions as part of the consultation process.
- An Emergency Response and Cooperation Plan ('ERCoP') will be developed and implemented for the construction, operation/maintenance and decommissioning phases of a renewable energy development. This should include cooperation with UK National Contingency Plan. ERCoPs are initially discussed with the MCA Search and Rescue and Navigational Safety Branches and then completed in consultation with the relevant Maritime Rescue Coordination Centre ('MRCC') for the area. As an example, the ERCoP should include company details and contact details (for routine and emergency situations), cooperation arrangements between company and MRCC, details on how information would be passed on during emergency situations, shut down and turbine control requirements, details of what is to be built, information about vessels and activities on-site (updated regularly), contact details for the MRCC, information about nearby SAR facilities including surface craft rescue resources and airborne rescue resources and planned response to pollution events;
- The ERCoP would be linked directly to the Navitus Bay Development Limited ('NBDL') Safety Management System to ensure that the information is part of a documented review process and updated as required.
- Compliance with International Maritime Organisation ('IMO') Conventions including COLREGs and Safety of Life at Sea ('SOLAS') is assumed to ensure that standard levels of navigation and vessel safety continue to be adhered to by all receptors during all phases.
- The Turbine Area would be marked on relevant United Kingdom Hydrographic Office ('UKHO') admiralty charts. These areas have generally been marked as 'submarine power cable area' as well as with the wind farm symbol to advise mariners of the issues when passage planning. The Offshore Export Cable Corridor would also be charted, although whether the Inter-array cables are shown would depend on the scale of the chart.
- Guard vessels would be used during construction, decommissioning and significant maintenance to both protect the installations and workers on the turbines, particularly in areas in proximity to main traffic routes. Their role would be to both alert vessels to the development activity and provide support in the event of an emergency situation.
- An assessment of the level of risk of the ongoing activities would be assessed by NBDL while vessels are deployed for wind farm activities. It is noted that during the construction and decommissioning phases, a number of guard vessels would be under contract to NBDL.
- The subsea cables would be subject to periodic inspection to ensure they remain buried and do not become a hazard to marine navigation. This would include ad hoc inspections after potential anchor interactions.
- Standard marine quality, health, safety and environment ('QHSE') documentation to ensure safe operation on a daily basis, including work vessel operations would be included within the Safety Management Systems ('SMS');
- All personnel would be conversant with the SMS and emergency response procedures and would wear the correct Personal Protective Equipment ('PPE') at all times, as defined by the relevant QHSE documentation. This would include consideration for the use of Personal Locator Beacons.
- Dissemination of information and warnings through Notices to Mariners and other appropriate media, (e.g., Admiralty Charts, local notice to mariners and fishermen's awareness charts) would enable vessels to effectively and safely passage plan around the Turbine Area and the Export Cable Corridor.
- The wind farm would continue to have either shore based or structure based AIS monitoring that can be reviewed when required by regulators.

16.4. Baseline Environment

16.4.1. Baseline data gathering methodology

16.36. The following section details the baseline data gathering methodology for the assessment and data sources used.

Data sources

16.37. The main data sources used in this assessment are listed below:

- Automatic Identification System (AIS) and Radar survey data (February and March 2012, and August 2012);
- Long term AIS data recorded from Swanage (October 2011 onwards);
- Fishing Surveillance Satellite Data (2009) and Observation Data (2005-09) shown as density grids;
- Maritime Incident Data from the Marine Accident Investigation Branch ('MAIB') (2002-2011) and RNLI (2001-2010);
- Marine aggregates dredging data (licence areas and active areas) and transit routes from The Crown Estate and British Marine Aggregates and Producers Association ('BMAPA');
- Oil and gas platforms (UK Deal);
- Admiralty Sailing Directions – Channel Pilot, NP 27 (UKHO, 2011);
- UK Admiralty Charts 2045, 2615, 2450 and 2454;
- UK Coastal Atlas of Recreational Boating, 2009 and 2010 GIS Shape Files (RYA, 2010).

Numerical modelling

16.38. Numerical collision and allision risk modelling has been undertaken to assess the consequence of incidents in terms of people and the environment and related to the development. The modelling considers vessel types and powered/unpowered status.

Survey methodology

16.39. Marine traffic surveys were under taken in line with MGN 371, including consideration for other users, by MaricoMarine in 2012.

16.40. Baseline shipping activity was assessed using AIS and Radar track data. The period of data collection encompassed seasonal fluctuations in shipping activity (winter and summer), and also accounted for a range of tidal conditions. During the winter survey (February/March 2012), data were gathered from a shore based survey at Durlston Head. However, during the summer survey (August 2012), data from the shore based station were supplemented by a dedicated survey vessel to ensure a comprehensive survey across the Offshore Development Area by providing additional coverage in the vicinity of the western Solent approaches for the summer period (MaricoMarine, 2012).

16.4.2. Turbine area

Marine traffic survey

16.41. A plot of the AIS and Radar tracks recorded during 22 days in August 2012, colour coded by vessel type, is presented in Figure 16.3. However, due to the fact that the summer is busier and more relevant, these data are used in the subsequent analysis rather than those collected during the winter survey. A number of tracks recorded during the survey were classified as temporary (non-routine), such as the tracks of the survey vessel and traffic associated with other surveys and work of a temporary nature. These tracks have therefore been excluded from this figure and from further analysis.

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AIS and Radar Data
22 Days
August 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Vessel Type

- Unspecified
- Fishing
- Military
- Dredger / Subsea Ops
- HSC
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreation

Fig. No.: Figure 16.3		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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16.42. During the survey, averages of 31 unique vessels per day were recorded within the study area. Figure 16.4 shows the daily number of unique vessels per day during the survey period.

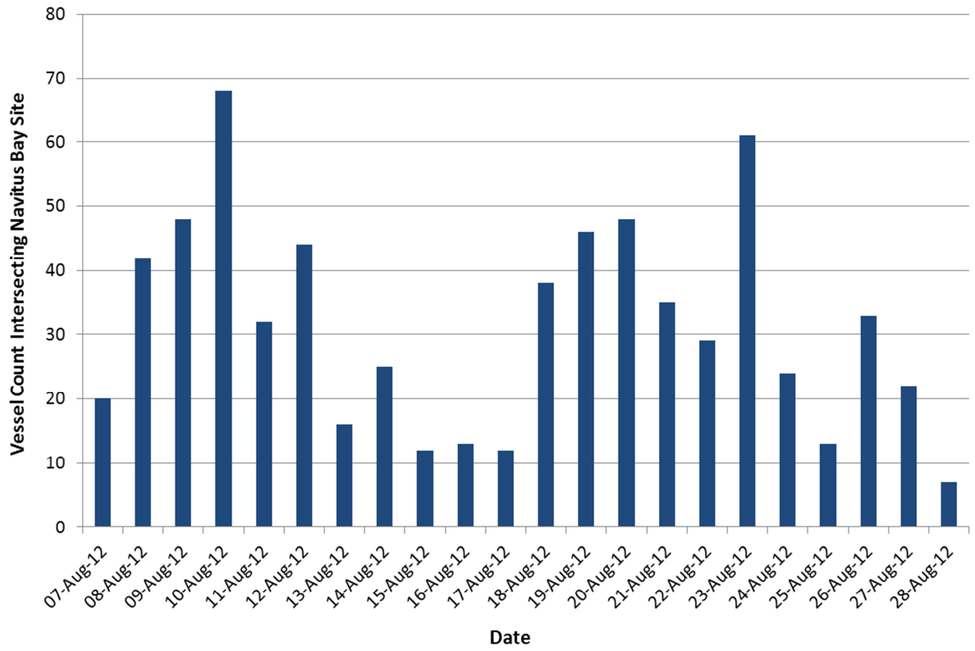

Figure 16.4 Daily Number of Unique Vessels

16.43. The busiest day during the survey period was 10th August 2012, when 68 unique vessels were recorded intersecting the Turbine Area. A plot of the vessel tracks recorded on the busiest day is presented in Figure 16.5.

16.44. The majority of tracks were recreational vessels (66%) with cargo vessels and passenger vessels making up 14% and 6% respectively. Fishing vessels made up 5% of traffic and tankers 3%. Further plots will be made available in the ES to be submitted as part of the application for development consent, and these will show vessels broken down by type.

Navigational Features

16.45. An overview of the navigational features in proximity to the Turbine Area and Offshore Export Cable Corridor is presented in Figure 16.6.

16.46. There are no spoil grounds or explosives dumping grounds within the Turbine Area. The closest spoil ground is located approximately 5.5 NM to the north east of the site.

16.47. The Hurst Point leading light is located to the north of the Turbine Area. It provides a directional light to guide vessels entering or leaving the Solent via the Needles Channel. A narrow 'white' sector (040.75° - 041.75°) leads through the channel, and 'red' and 'green' sectors to either side of the white sector inform vessels that they are west or east of the approach line and potentially heading off course.

16.48. The closest port to the Turbine Area is Poole (approximately 13.3 NM to the west). In addition to the main ports, there are also a number of smaller harbours and recreational marinas located along the south coast.

16.49. There are 10 charted anchorages in proximity to the Turbine Area, mostly used by small craft but occasionally used by larger vessels in particular within Poole or Freshwater Bay.

Aids to Navigation and IMO Routeing Measures

16.50. A plot of the main navigational aids and IMO routeing measures relevant to the study area is presented in Figure 16.7. The unlit buoys marked by blue circles are temporary between April and October and are yellow special marks used by the recreational community.

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AIS and Radar Data
Busiest Day
10 August 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Vessel Type

- Unspecified
- Fishing
- Passenger
- Cargo
- Tanker
- Other
- Recreation

Fig. No.: Figure 16.5		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

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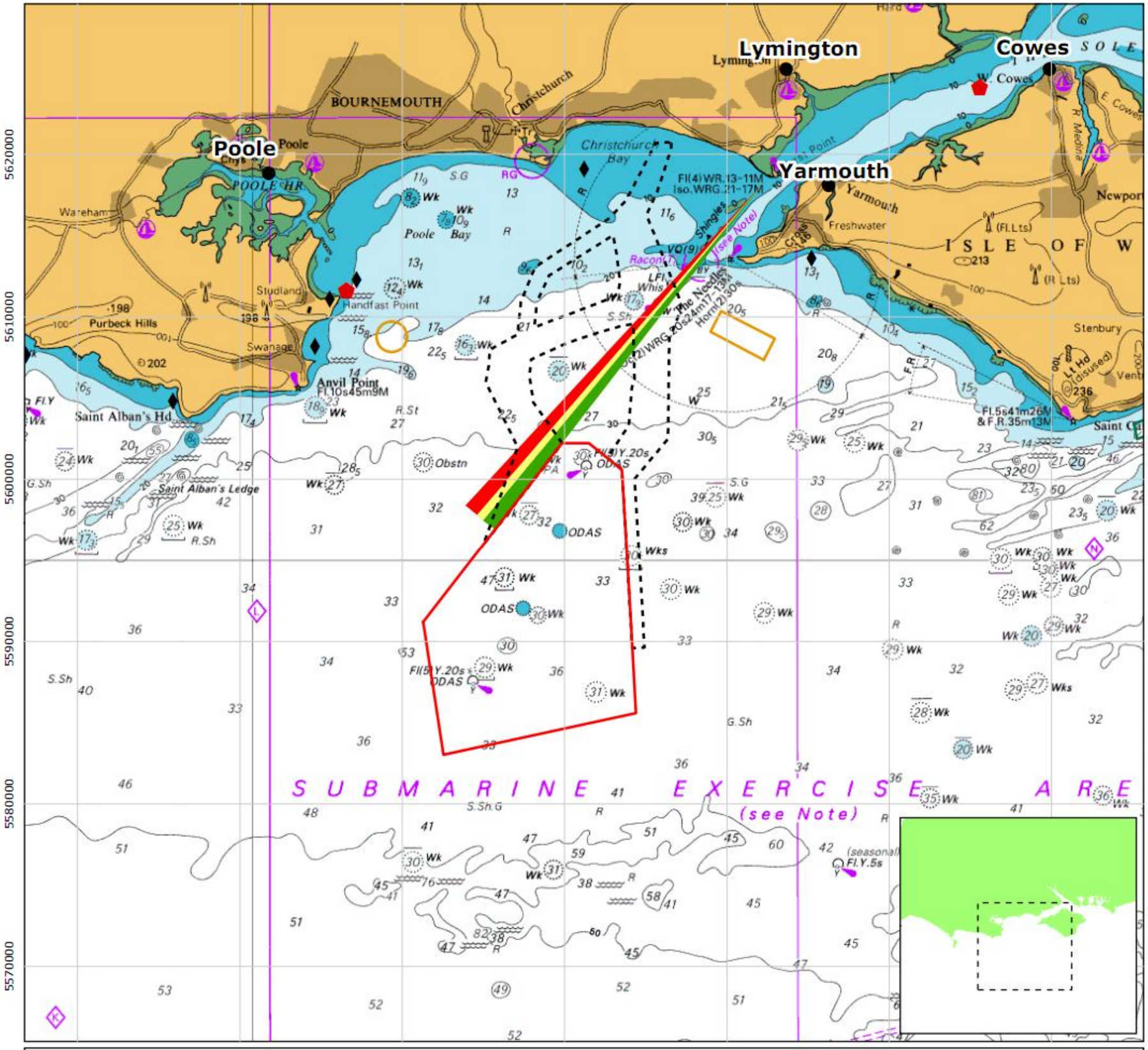
Navigational Features and Main Ports



Legend

- Turbine Area
- Offshore Export Cable Corridor

Navigational Features

- Pilot Boarding Station
- Port
- Anchorage
- Spoil Ground
- Explosives Dumping Ground

Hurst Point Leading Light

- Green Sector
- White Sector
- Red Sector

Fig. No.: Figure 16.6		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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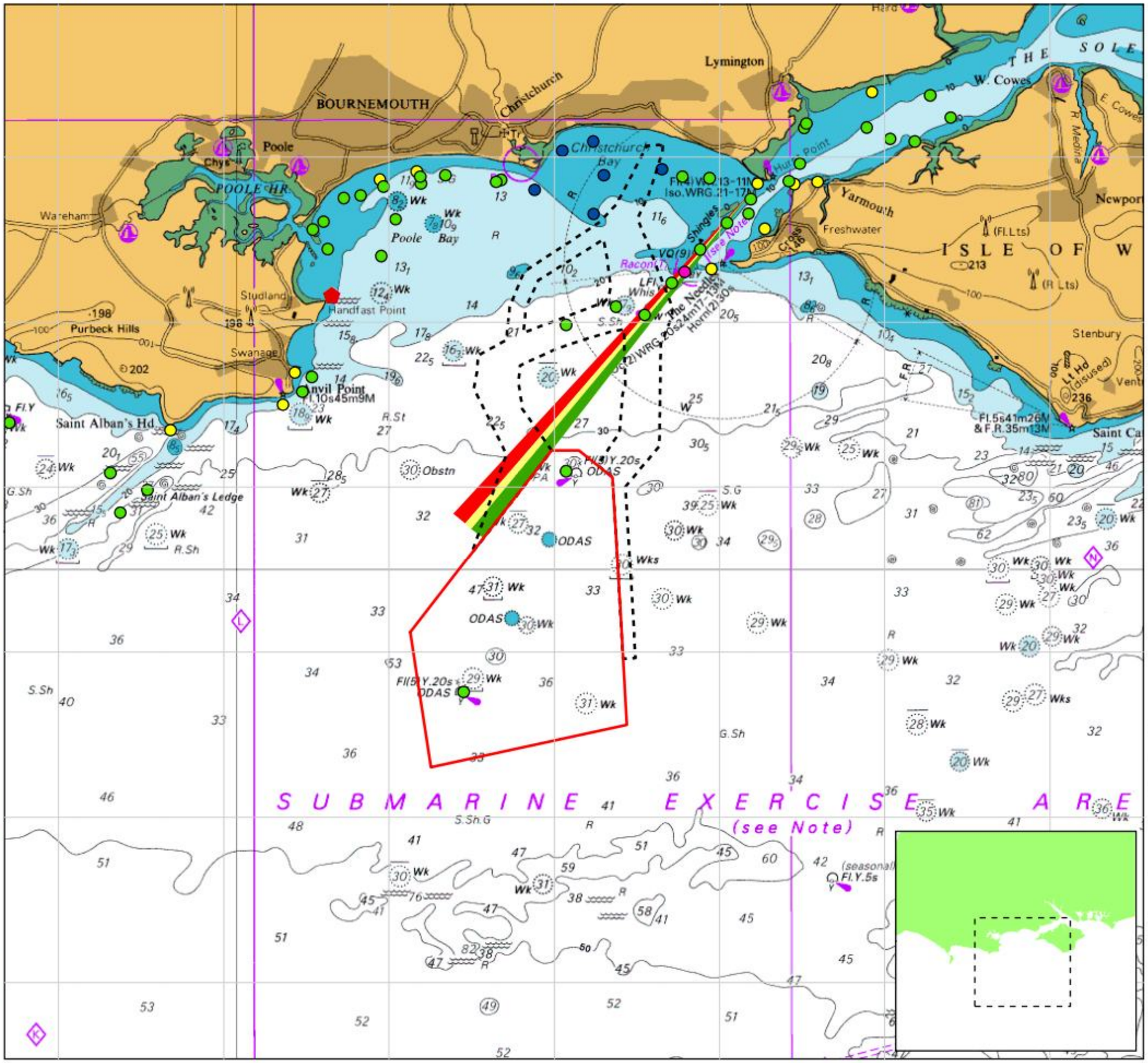
5620000 5610000 5600000 5590000 5580000 5570000



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Aids to Navigation

Legend

- Turbine Area
- Offshore Export Cable Corridor

Aids to Navigation

- Light
- Racon
- Buoy
- Unlit Buoy
- Pilot Boarding Station

Hurst Point Leading Light

- Green Sector
- White Sector
- Red Sector

Fig. No.: Figure 16.7		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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Commercial shipping

16.51. Main route identification was undertaken for the study area. Fifteen main commercial vessel routes have been identified as transiting in proximity to the site. A plot of the main routes is presented in Figure 16.8.

16.52. A description of the main routes is given in Table 16.8.

Table 16.8 Description of Main Routes

Route number	Destination	Vessel type	Number of vessels
1	Poole to Guernsey	Passenger	Just over 1 per day
2	Southampton to Eastern UK and European Ports	Various	3 per day
3A	Poole to Cherbourg (Northbound)	Passenger	1 per day
3B	Poole to Cherbourg (Southbound)	Passenger	1 per day
4	Southampton to Channel Islands	Majority are cargo vessels (87%)	1 per day
5	West Coast UK and Ireland to East Coast UK and Mainland Europe	Majority are cargo vessels (85%)	6 per day
6	To/from Traffic Separation Schemes ('TSS')	Cargo (68%) and tankers (28%)	56 per day
7	Southampton to European Ports	Passenger	1 every 4 days
8	Eastern Ports to Shoreham	Cargo and Dredgers/Subsea Ops	1 every 2 days
9A	Southampton to Liverpool (to Southampton)	Cargo	1 every 10 days
9B	Southampton to Liverpool (from Southampton)	Cargo	1 every 10 days
10	UK South/West Coast	Tankers	1 every 3 days
11	Poole to The Solent	Tankers	1 every 6 days
12A	Poole to Cherbourg	Cargo/Passenger	1 per day
12B	Poole to Santander	Cargo/Passenger	1 every 4 days
13	Portsmouth to Channel Islands	Passenger	Just over 3 per day
14A	Portsmouth to Santander	Passenger	1 every 2 days
14B	Portsmouth to St Malo	Passenger	Just under 1 per day
15	Portsmouth to Bilbao/Santander	Passenger	1 every 2 days

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Main Routes
14 NM

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 14 NM Buffer

Route

- Main Route

Fig. No.: Figure 16.8			**Date:** 15/08/2013
Author: JS	**Checked:** JB		**Approved:** SW
Scale@A3: 1:300,000			**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N			**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809		

0 3.75 7.5 NM

0 5 10 km

N

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Recreational craft (2.5-24 metres)

16.53. Recreational vessel activity was recorded during the winter and summer surveys on AIS and Radar, as presented in Figure 16.9 and Figure 16.10. These vessels are all between 2.5 m and 24 m in length. It can be seen that recreational vessels were recorded transiting through the Turbine Area, with the densest area of activity to the north of the Turbine Area.

16.54. It is noted that the summer survey included an extreme high in recreational craft traffic including the sailing at Weymouth as part of the London 2012 Olympics, traffic to/from the Cowes Week Regatta, the Cowes Classic Powerboat Race (Cowes to Torquay 26th August 2012) and the August Bank holiday weekend (22-27th August 2012). The data indicated that 66% of vessels within 10 NM of the study area were recreational (2.5-24 metres), with the other 34% being made up largely of cargo, passenger (ferries) and military vessels.

16.55. From analysis of the AIS and Radar data, it has been calculated that approximately 38% of the recreational vessels recorded had AIS.

16.56. Recreational routes were defined by a study undertaken by the RYA and CA. They are not designated courses but are general indications of known recreational routes between specific destinations popular with recreational craft.

16.57. Following consultation with key recreational stakeholders, hazard workshop feedback and knowledge from current developments it is anticipated that a large number of recreational craft would continue to transit through the Offshore Development Area post construction. However, it is noted that navigation through a wind farm is somewhat an unknown navigational transit for recreational users and some may choose to alter their routes to avoid passing through the area. Following the boundary change, the navigable area to the north of the Turbine Area has been significantly increased preventing squeeze, congestion or displacement of commercial vessels into recreational areas (or vice versa). It is also noted that the current east – west routes, following consultation with operators and ports, will most likely be displaced to the south of the Turbine Area. Following consultation with local operators and ABP Southampton, it is considered unlikely that vessels travelling west – east would choose to use the western Solent unless bound for Cowes or Southampton ports (western Solent is not recommended for laden tankers over 10,000 gross tonnage ('GT') and destinations).

16.58. It is noted both from consultation, surveys results and local knowledge that a number of races pass in close proximity to the Offshore Development Area. This includes long distance races such as the Fastnet Challenge Cup (biannual offshore yacht race), Cowes Classic (powerboat race from Cowes to Torquay) as well as local races along the south coast and to/from France. These races are planned and organised in advance including extensive dissemination of information. Moreover, these routes may vary from year to year, and are dependent on wind, current and tidal conditions at the time of the event. There are, therefore, not expected to be any additional effects on these races or the competitors associated with the project.

Commercial fishing

16.59. This section is intended to give an overview of navigational fishing activity in the area and further information on commercial activities is provided in Chapter 17, Commercial Fisheries. Fishing vessel activity was recorded on AIS and Radar during the survey, as presented in Figure 16.11. It can be seen that a low number of fishing vessels were recorded intersecting the site over the survey period, with the densest fishing activity to the north east of the site.

16.60. Satellite data cover fishing vessels of 15 m length and over. The latest satellite dataset analysed is from 2009 and the data include both UK and foreign vessels. Plots of vessel positions (received a minimum of every two hours) have been converted to a 1 NM by 1 NM density grid and are presented in Figure 16.12.

16.61. From analysis of the satellite data it has been identified that the majority of fishing vessels were registered in France (80%) or the United Kingdom (13%). Vessels from Belgium, The Netherlands and Ireland were also recorded.

16.62. The main gear types recorded using sightings data in the vicinity of the study area were potters/whelkers, beam trawlers and pair trawlers.

16.63. However, as described in Chapter 17, Commercial Fisheries, the data presented here is known to represent a small proportion of the total

commercial fishing fleet. Most vessels operating in the area are of 10 m length or under, and most of those do not carry AIS.

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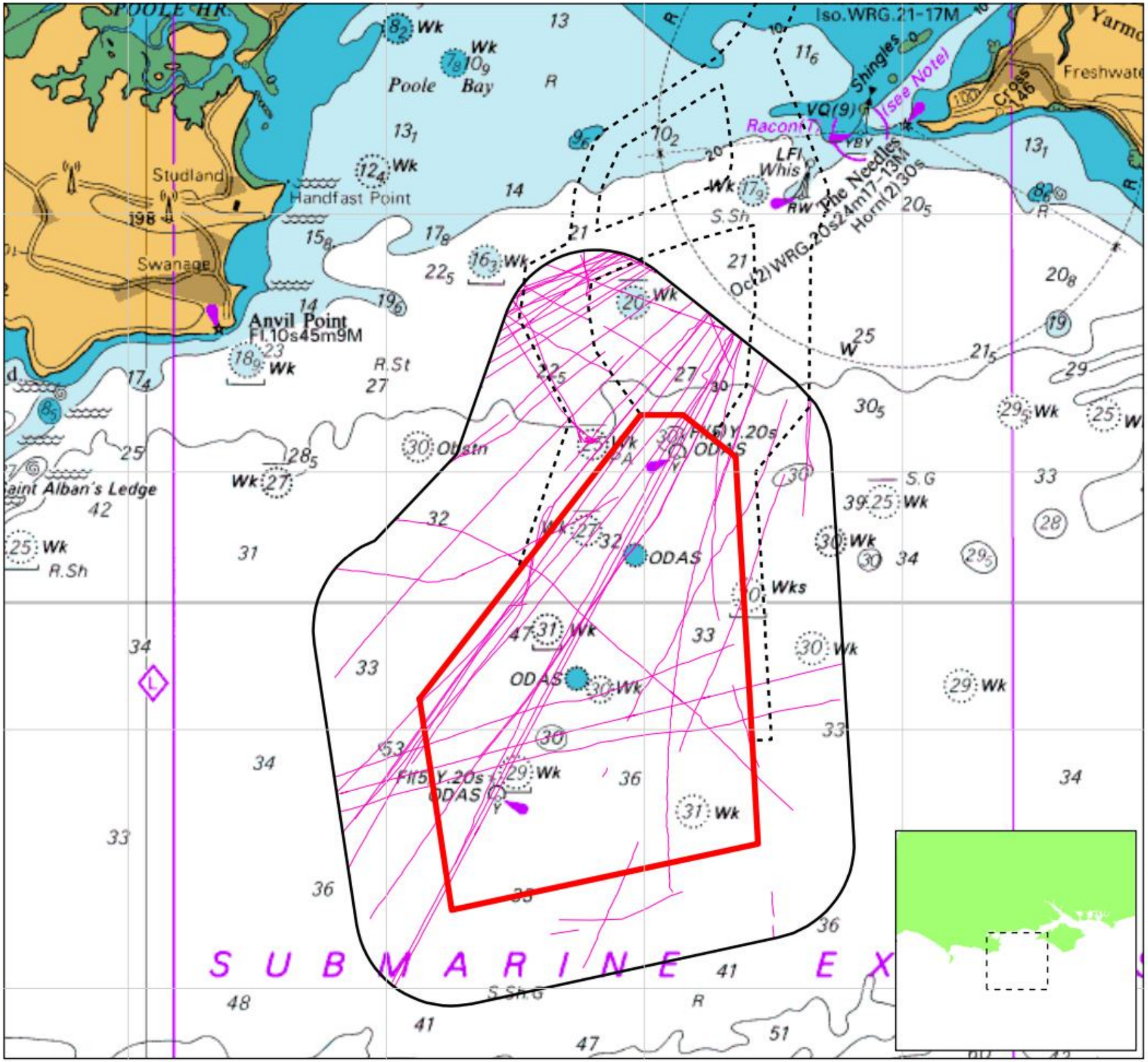
5610000 5600000 5590000 5580000



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Recreational Vessels AIS and Radar Data 17 Days February / March 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 2 NM Buffer of Original Site Boundary

Vessel Type

- Recreation

Fig. No.: Figure 16.9		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:160,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 2 4 NM

0 5 10 km

N

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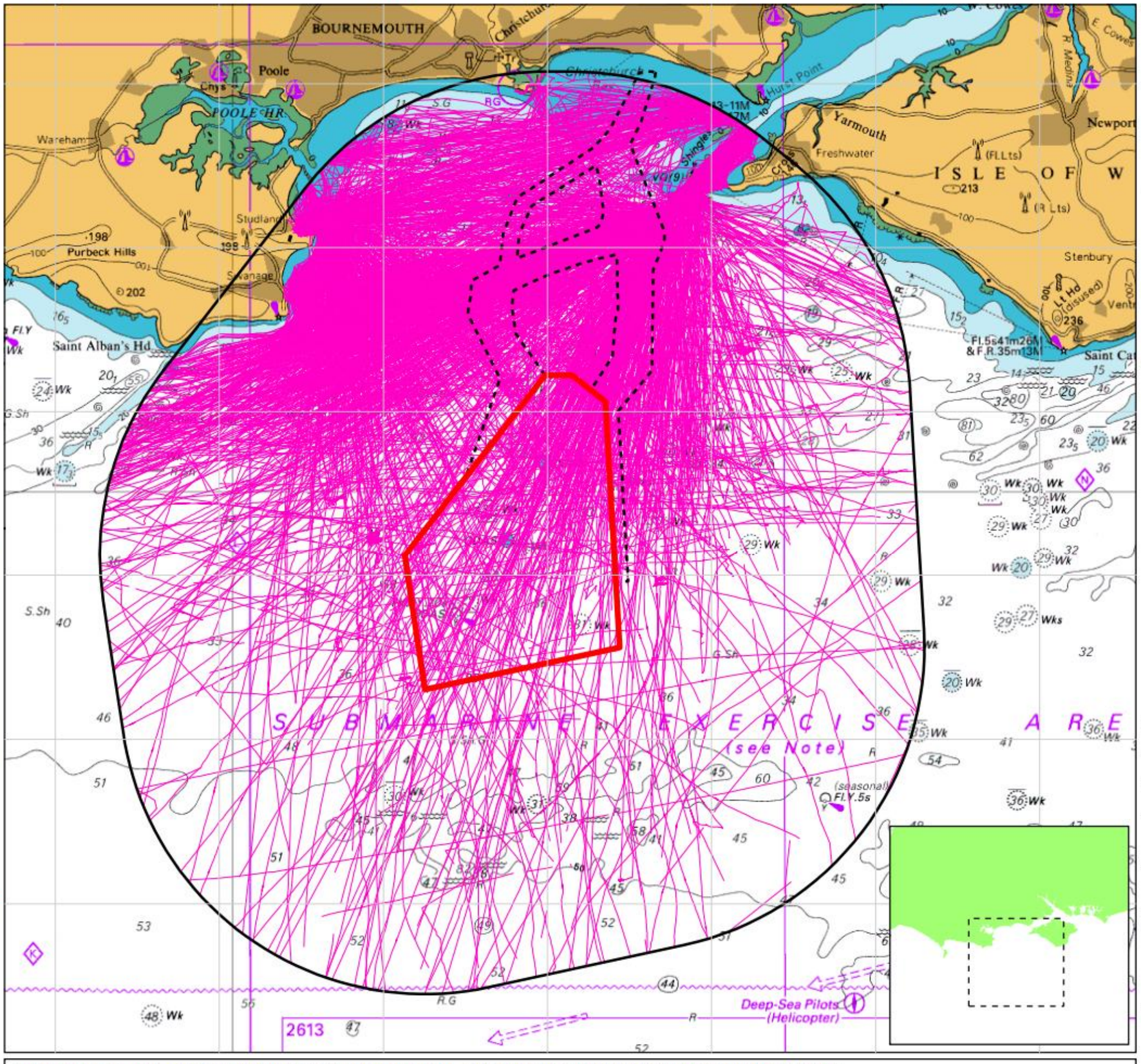

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Recreational Vessels AIS and Radar Data 22 Days August 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Vessel Type

- Recreation

Fig. No.: Figure 16.10		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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Fishing Vessels
AIS and Radar Data
22 Days
August 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Vessel Type

- Fishing

Fig. No.: Figure 16.11		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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560000 570000 580000 590000 600000 610000 620000

5620000 5610000 5600000 5590000 5580000 5570000

BOURNEMOUTH
Poole
Wareham
Purbeck Hills
Anvil Point
Fl.10s45m9M
Saint Alban's Ledge
Poole Bay
Christchurch Bay
Hurst Point
Newport
Freshwater
Stenbury
Ventnor
Saint Catherines
Needles
Fl(4)WR.13-11M
LFl.WRG.20s
Fl.5Y.20s
ODAS
Deep-Sea Pilots (Helicopter)

S U B M A R I N E E X E R C I S E A R E A

Navitus Bay Development Ltd

Fishing Vessel Satellite Data 2009

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Satellite Density of Fishing Vessel Counts

- High
- Low

Fig. No.: Figure 16.12		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MMO, Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

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Commercial ferries

16.64. The high speed ferries Condor Vitesse, Condor Rapide and Condor Express were recorded operating on regular ferry routes from Poole to the Channel Islands during the time period analysed. This route is considered a 'lifeline route' which means it provides an essential service to an island community. The tracks of these vessels are shown in Figure 16.13.

16.65. Brittany Ferries currently operate two ferries between Poole, UK and Cherbourg, France. The Cotentin, a freight ferry, currently operates on the route with the Barfleur, a cruise ferry, returning to the route in March 2013 to allow extra passenger capacity and a day-return sailing service. Tracks of the Cotentin and other Brittany Ferries vessels which operate out of Portsmouth are presented in Figure 16.14.

Marine aggregate dredging

16.66. Figure 16.15 presents the licensed and proposed aggregates dredging areas in proximity to the study area and tracks of dredgers recorded during the summer survey.

16.67. There is a licensed marine aggregate dredging area (Area 127) approximately 0.5 NM to the northeast of the Turbine Area. Area 127 lies between two of the Offshore Export Cable Corridor options, with a 400 m separation at the nearest point. Area 137/313 lies further to the east approximately 3.8 NM from the site and 2 NM from the Export Cable Corridor. There are also a number of application areas to the east of the Turbine Area, including Area 465/1 which intersects the Export Cable Corridor.

16.68. Tracks of dredgers recorded on AIS and Radar during the summer survey show that the study area is not heavily trafficked by transiting dredgers.

Military vessels and submarine exercise areas

16.69. The study area is intersected by two submarine exercise areas. These are both surfaced and dived and the chart notes that a good lookout should be kept for them when passing through these waters. A number of military vessels were recorded on AIS and Radar during the summer survey. The survey showed a number of 'Archer' class vessels using the western Solent, and limited movements through the Turbine Area. It is noted that military vessels can turn off their AIS, however it is not usual for them to do this around the UK coast unless for the purposes of military exercise.

Emergency response

16.70. As well as current resources provided by emergency responders such as the MCA (HM Coastguard) and the RNLI, the requirement under national and international law will mean that their existing emergency response requirements will directly contribute to Emergency Response in the area including:

- Search and Rescue as defined in the SAR Convention of 1979 and in subsequent amendments – encourages cooperation with neighbouring states including polling of facilities, common procedures, training and liaison visits;
- The rendering of assistance to vessels in distress as detailed in SOLAS (as amended) – this treaty and covers both the construction of, equipment for and special measures to ensure the safety of vessels including obligations to assist;
- First response as described in the Salvage Convention of 1989 – Article 10 defines a Masters duty to render assistance, without risk to vessel, to any person at sea;
- First response in respect of the National Contingency Plan for Marine Pollution from Shipping & Offshore Installations (2006) - sets out the arrangements for dealing with pollution, or the threat of pollution, spilled from ships and offshore installations into the marine environment.

16.71. Although at this stage it is too early to define exactly what requirements would be available, NBDL will work with the MCA, local ports and other emergency responders to identify both current and additional requirements that may be needed as the Project develops. As part of the consent process, an emergency response plan will be developed.

Marine accidents and incidents

16.72. Figure 16.16 and Figure 16.17 show MAIB and RNLI incidents over a period of 10 years within 10 NM of the wind farm.

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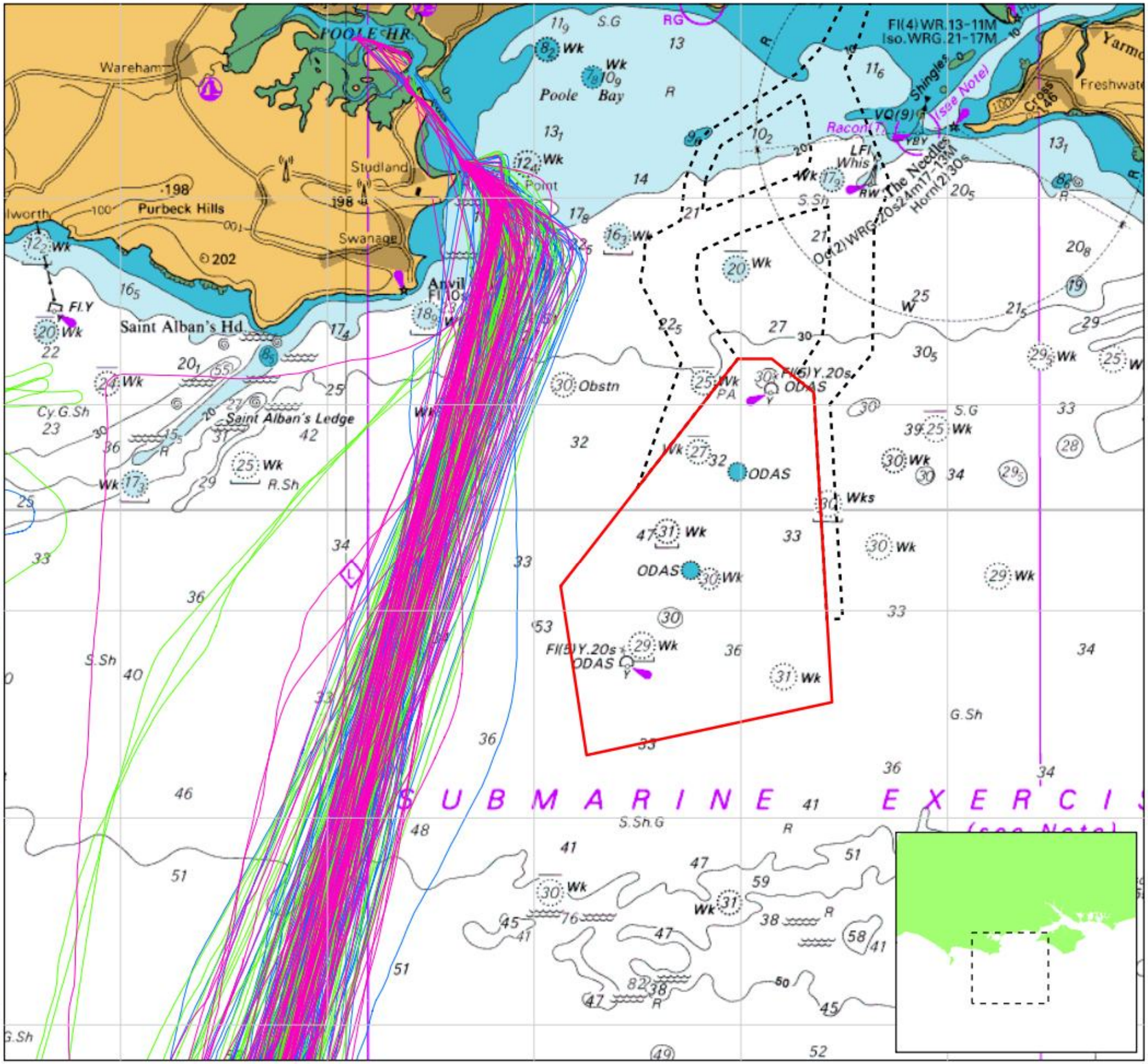

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Tracks of Condor Vessels to Channel Islands

Legend

- Turbine Area
- Offshore Export Cable Corridor

Vessel Track

- Condor Express
- Condor Rapide
- Condor Vitesse

Fig. No.: Figure 16.13		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:200,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 2.5 5 NM

0 5 10 km

N

NAVITUSBAY

Navitus Bay Development Ltd

Tracks of Brittany Ferries Vessels

Legend

- Turbine Area
- Offshore Export Cable Corridor

Vessel Track

- Bretagne
- Cap Finistere
- Cotentin
- Pont Aven

Fig. No.: Figure 16.14		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

NAVITUSBAY

Navitus Bay Development Ltd

Aggregates Dredging Areas and Dredger Tracks

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Vessel Type

- Dredger

Aggregate Area

- Area of Active Dredging
- Licensed Area
- New Application Area

Fig. No.: Figure 16.15		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

NAVITUSBAY

Navitus Bay Development Ltd

MAIB Incident Locations by Type

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

MAIB Incident Type (2002-2011)

- Machinery Failure
- Accident to Person
- Fire / Explosion
- Grounding
- Collision
- Flooding / Foundering
- Hazardous Incident
- Contact
- Heavy Weather Damage

Fig. No.: Figure 16.16		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MAIB, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

NAVITUSBAY

Navitus Bay Development Ltd

RNLI Incident Locations by Type

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

RNLI Casualty Type (2001 to 2010)

- Unspecified / Other
- Person
- Personal Craft
- Yacht
- Power Boat
- Other Sail
- Fishing Vessel
- Merchant Vessel
- Other Vessel

Fig. No.: Figure 16.17		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:250,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** RNLI, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 3.25 6.5 NM

0 5 10 km

N

NAVITUSBAY

16.4.3. Offshore Export Cable Corridor

16.73. This section summarises the key findings of the NRA for the Offshore Export Cable Corridor.

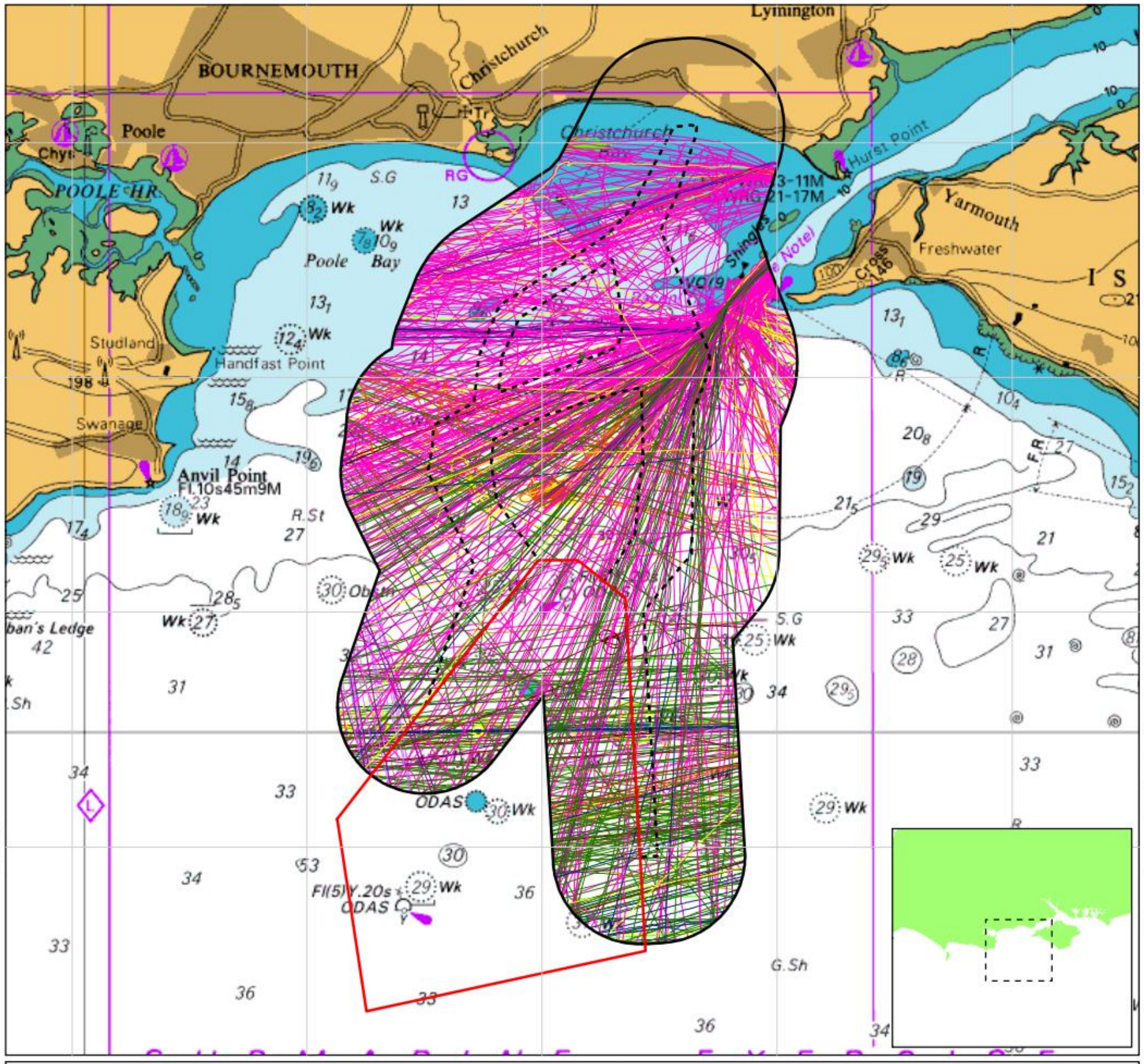
Data analysis

16.74. Figure 16.18 presents a plot of 28 days AIS data colour-coded by vessel type within 2 NM of the Offshore Export Cable Corridor. The main vessel types recorded were recreational (56%) and cargo vessels (21%) with an average of 30 unique vessels per day.

16.75. Analysis of anchored vessels has identified that no vessels were at anchor within the Turbine Area boundary or Offshore Export Cable Corridor during the summer survey period (22 days in August 2012). A plot of anchorage areas and vessels recorded at anchor in proximity to the Offshore Export Cable during the survey period is presented in Figure 16.19. It can be seen that vessels mainly anchored towards the coast, with a number of recreational vessels being recorded in the charted anchorage in Studland Bay.

Marine accidents and incidents

16.76. Figure 16.20 and Figure 16.21 show MAIB and RNLI incidents over a period of 10 years within 2 NM of the Offshore Export Cable Corridor.



Navitus Bay Development Ltd

AIS and Radar Data Export Cable 28 Days August/October 2012

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 2 NM Buffer

Vessel Type

- Unspecified
- Fishing
- Military
- Dredger / Subsea Ops
- HSC
- Tug
- Passenger
- Cargo
- Tanker
- Other
- Recreation

Fig. No.: Figure 16.18		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:175,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 2.25 4.5 NM

0 5 10 km

N

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Navitus Bay Development Ltd

Anchored Vessels AIS and Radar Data 22 Days August 2012 Anchorage Areas

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 10 NM Buffer

Anchoring

- Anchorage

Vessel Type

- Recreation
- Unspecified
- Cargo
- Dredger / Subsea Ops

Fig. No.: Figure 16.19		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:175,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Anatec, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 2.25 4.5 NM

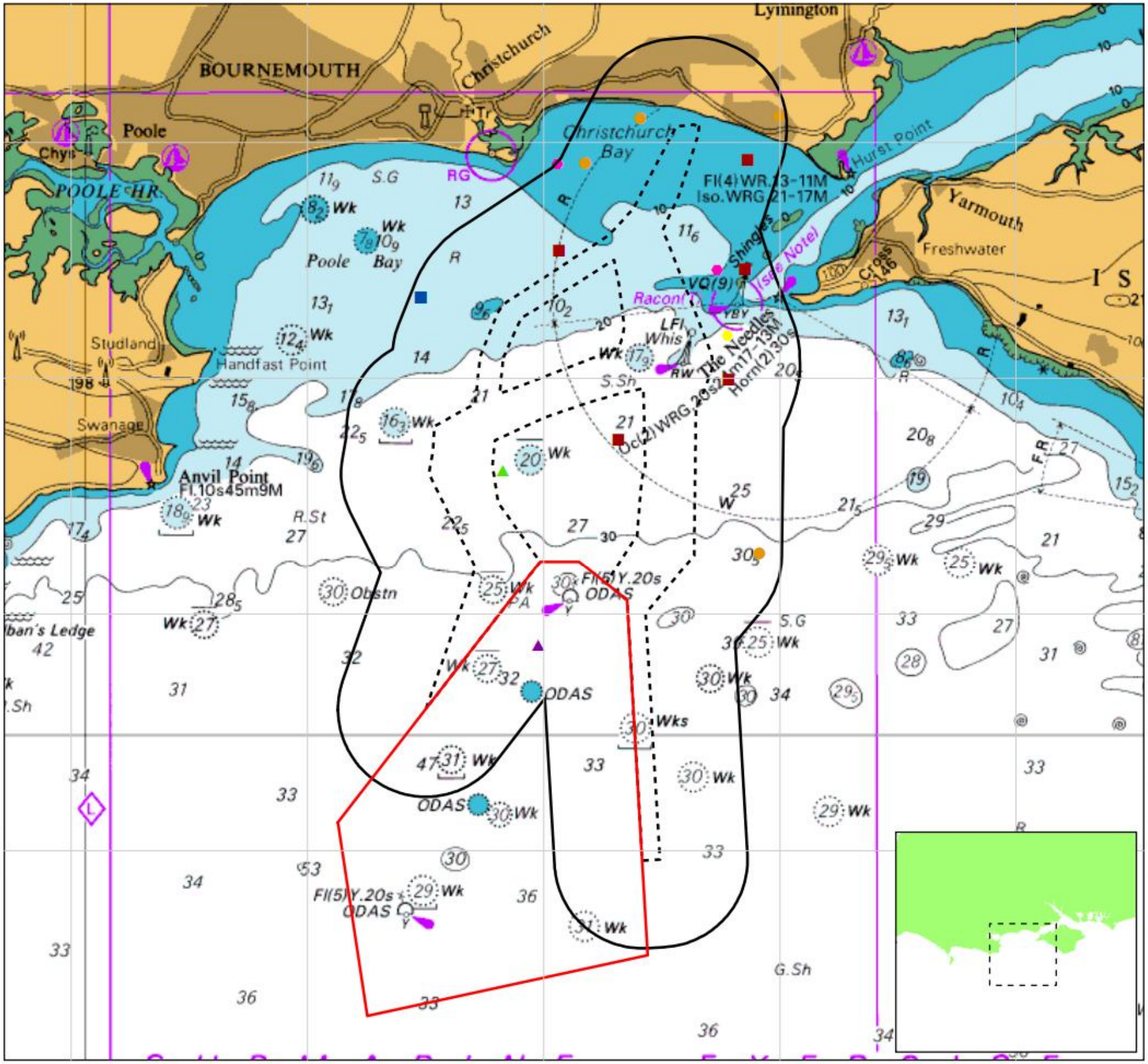
0 5 10 km

N

NAVITUSBAY

570000 580000 590000 600000 610000

5620000 5610000 5600000 5590000



Navitus Bay Development Ltd

MAIB Incident Locations by Type Export Cable

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 2 NM Buffer

MAIB Incident Type (2002-2011)

- Machinery Failure
- Accident to Person
- Fire / Explosion
- Grounding
- Collision
- Hazardous Incident
- Contact

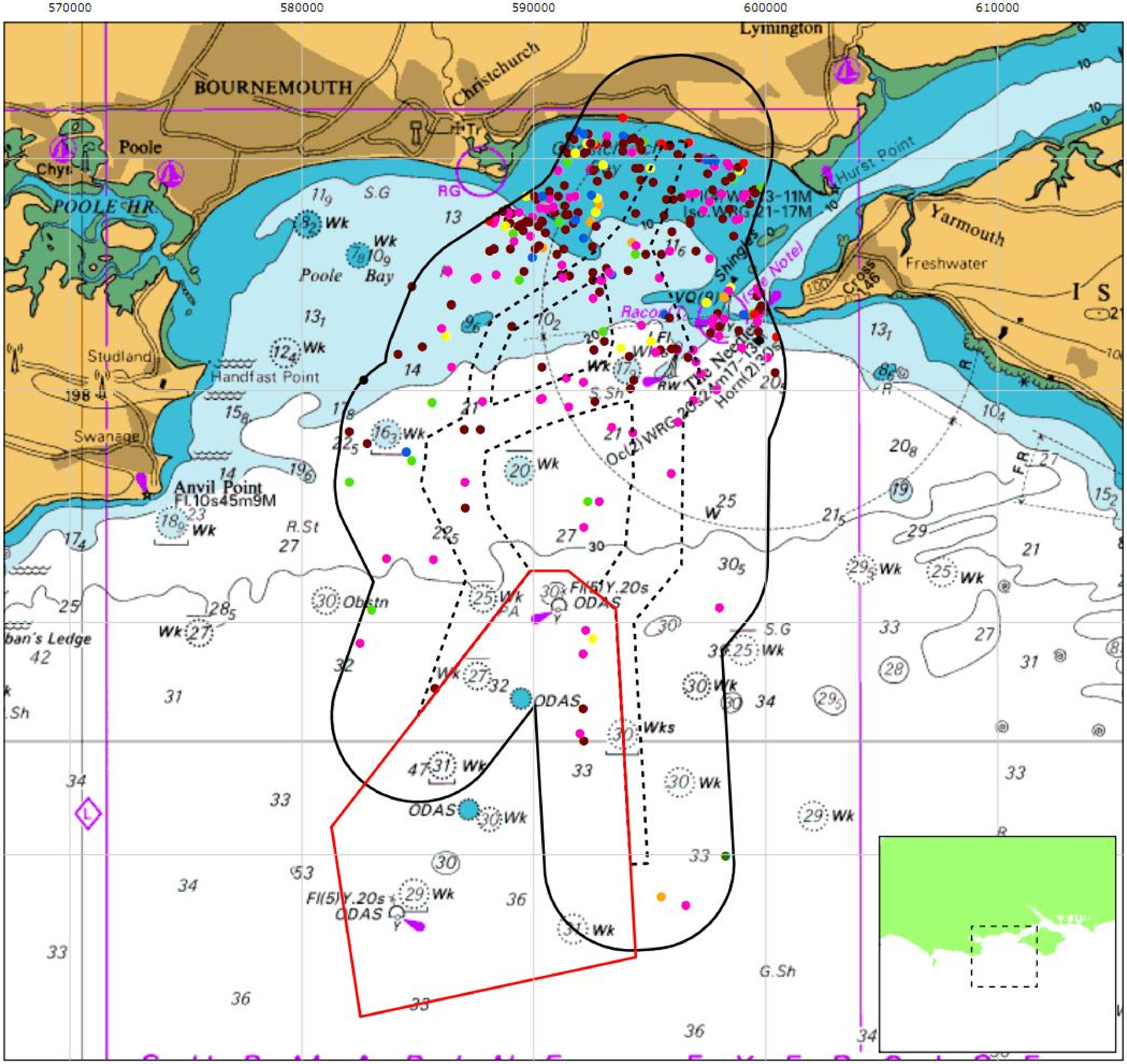
Fig. No.: Figure 16.20		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:175,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MAIB, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

0 2.25 4.5 NM

0 5 10 km

N

NAVITUSBAY



Navitus Bay Development Ltd

RNLI Incident Locations by Type Export Cable

Legend

- Turbine Area
- Offshore Export Cable Corridor
- 2 NM Buffer

RNLI Casualty Type (2001 to 2010)

- Unspecified / Other
- Person
- Personal Craft
- Yacht
- Power Boat
- Other Sail
- Fishing Vessel
- Merchant Vessel
- Other Vessel

Fig. No.: Figure 16.21		**Date:** 15/08/2013
Author: JS	**Checked:** JB	**Approved:** SW
Scale@A3: 1:175,000		**Revision No.:** 03
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** RNLI, SeaZone
Datum: WGS 1984	**Ref. No.:** Anatec_SN_130809	

Scale bar: 0, 2.25, 4.5 NM; 0, 5, 10 km. N

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16.5. Impact Assessment

16.5.1. Realistic Worst Case Scenario

16.77. Table 16.9 presents the Realistic Worst Case Scenarios ('RWCS') used in this assessment.

16.78. The worst case has been selected based on geometric factors, where the higher number of 5 MW turbines (smallest size turbine) presents the greatest surface area and density of structures and thus the largest allision risk.

16.79. However it is noted that, for impacts on vessels transiting through the array (i.e. recreational craft, a mixed layout, due to its irregular pattern), presents the worst case as it reduces the vessels ability to visually navigate and therefore this is assessed accordingly.

16.80. For the collision risk modelling, a worst case assessment of the largest foundation type has been assumed. The worst case foundation for shipping and navigation is a space frame design due to the larger dimensions compared to the others being considered for the Offshore Development Area. For this assessment it is assumed as a worst case, that the entire Turbine Area is worked on at once with 500 m construction safety zone applied. This increases the risk of collision as vessels are displaced a greater distance due to a large area of the Offshore Development Area being constructed at one time.

Table 16.9 Rochdale Envelope Parameters Relevant to the Offshore Shipping and Navigation Impact Assessment		
Potential effect	Realistic Worst Case Scenario	Rationale
Construction		
Vessel allision with partially constructed turbines/structure	Construction strategy where all foundations in a single phase are installed first, then the remainder of the turbine is installed. Maximum length of construction period (4.5 years). Presence of Space Frame Foundations.	If construction is phased so that all foundations are installed first rather that the entire turbine/structure being installed then they may not be visible to vessels, therefore creating an allision risk. This risk is increased with a longer construction period.
Increased vessel to vessel collision risk	Entire Turbine Area being worked on at once with 500 m construction safety zones. Maximum number of construction vessel movements (253 to 380 heavy vessel movements each year and 1400 to 2100 light vessel movements each year).	Vessel to vessel collision risk would be increased when vessels are displaced a greater distance due to a large area of the Offshore Development Area being constructed at one time. Entire Turbine Area worked at once is assumed as RWCS, as limited information is currently available as to the stages of the development. The vessel to vessel collision risk with construction vessels would be greatest when there are the most construction vessels working in and around, and transiting to/from the Offshore Development Area. These vessels may be restricted in their ability to manoeuvre when working in the Turbine Area.
NUC vessels drifting into partially constructed turbines/structure or construction activities	Maximum number of turbines (218), substations (3), met masts (1) and construction vessels working on-site that a drifting vessel could allide or collide with. Space Frame Foundations used.	There is a greater risk of a drifting vessel alliding with a structure or colliding with a vessel when there are more present.
Displacement from regular routes due to construction activities	Maximum length of construction period (4.5 years). Entire Turbine Area being worked on at once with 500 m construction safety zones.	Vessels would be displaced from their regular routes for the longest period of time when the maximum construction period is used. Displacements would be greatest when a larger area of the Turbine Area is being constructed at one time.

Table 16.9 Rochdale Envelope Parameters Relevant to the Offshore Shipping and Navigation Impact Assessment		
Potential effect	Realistic Worst Case Scenario	Rationale
Loss of recreational cruising/racing routes due to construction activities	Maximum length of construction period (4.5 years). Entire Turbine Area being worked on at once with 500 m construction safety zones.	Recreational vessels would be displaced from their cruising routes for the longest period of time when the maximum construction period is used. Displacements would be greatest when a larger area of the Turbine Area is being constructed at one time.
Vessel to vessel collision with cable installation vessel which may be restricted in its ability to manoeuvre	Maximum length and maximum number of Offshore Export Cable (6 x 35 km) being installed over longest time period. Maximum number of Offshore Export Cable laying vessel movements (18).	The risk of vessels colliding with cable installation vessels will be increased when they are working on-site for the longest period of time and when the position of the cable installation vessel is in a busy traffic area.
Operation and maintenance		
Vessel allision with structure	Maximum number of turbines (218), substations (3) and met masts (1) in Turbine Area and extreme peripheral placement of turbines and structures. Turbines would be constructed to ensure that the minimum rotor blade clearance is at least 22 m above MHWS. Space Frame Foundations used.	The risk of a vessel alliding with a turbine or structure is increased as the numbers present increases. Extreme peripheral turbines and structures on the boundary or corners of the Turbine Area pose the greatest risk for allisions.
Increased vessel to vessel collision risk	Maximum number of turbines (218), substations (3) and met masts (1) in wind farm. Maximum number of operation and maintenance vessel movements (1000 workboat vessel movements).	Vessel to vessel collision risk would be increased when vessels are displaced a greater distance due to the entire wind farm being avoided because of the presence of turbines and structures. The vessel to vessel collision risk with operation and maintenance vessels would be greatest when there are the most vessels working in and around the Turbine Area and transiting to/from the Turbine Area. These vessels may be restricted in their ability to manoeuvre when working in the Turbine Area during times of major maintenance.
Not Under Command ('NUC') vessels drifting into structures and/or O&M activities	Maximum number of turbines (218), substations (3), met masts (1) and O&M vessels working on-site that a drifting vessel could allide or collide with. Space Frame Foundations used.	There is a greater risk of a drifting vessel alliding with a structure or colliding with a vessel the greater the number of structures present.

Table 16.9 Rochdale Envelope Parameters Relevant to the Offshore Shipping and Navigation Impact Assessment		
Potential effect	Realistic Worst Case Scenario	Rationale
Displacement from regular routes due to presence of wind farm	Maximum number of turbines (218), substations (3) and met masts (1) in Turbine Area.	Vessel displacements from regular routes would be greatest when the entire Turbine Area needs to be avoided due to the presence of turbines.
Loss of adverse weather routes	Maximum number of turbines (218), substations (3) and met masts (1) in Turbine Area.	The impact to adverse weather routes would be greatest when the entire Turbine Area is filled with turbines and the maximum sea room is lost.
Loss of recreational cruising/racing routes due to presence of wind farm	Maximum number of turbines (218), substations (3) and met masts (1) in Turbine Area.	Vessel displacements from recreational cruising routes would be greatest when the entire Turbine Area needs to be avoided due to the presence of turbines.
Decommissioning		
The shipping and navigation worst case parameters associated with the decommissioning of the Offshore Development Area are considered to be similar or of a reduced magnitude to those described above for the construction phase. A full Decommissioning Plan would be agreed with the relevant government department prior to the commencement of decommissioning activities. At present, decommissioning assumes removal of all structures above the seabed, while cables are anticipated to remain in-situ.		

16.81. The impact assessment has been divided into sections dealing with the impact on the different receptors. The following receptors have been identified as potentially being impacted by the construction and/or operation activities associated with the Turbine Area:

- Commercial Vessels (Safe Operations)
- Commercial Passenger Vessels (Safe Operations)
- Commercial Vessel Routeing
- Commercial (Passenger) Vessel Adverse Weather Routeing
- Marine Aggregate Dredgers
- Commercial Fishing Vessels
- Recreational Craft (2.5-24 metres)
- Recreational Charter Vessels (Fishing and Diving) Engaged in Navigation
- Military Vessels Safe Navigation
- Wind Farm Craft
- Emergency Response
- Port Activities

16.82. The following receptors have been identified as potentially being impacted by the construction and/or operation activities associated with the Offshore Export Cable Corridor:

- Commercial Vessels
- Commercial Fishing Vessels
- Recreational Craft (2.5-24 metres)
- Marine Aggregate Dredgers

16.83. These are dealt with in turn in the sections below, including potential decommissioning considerations.

16.5.2. Potential Impacts of Turbine Area

Collision risk modelling results

16.84. Due to the unusual traffic patterns and non-formalised routeing noted in the vicinity of the study area, vessel to vessel collisions have been assessed separately for commercial vessel collisions and collisions involving commercial vessels and other receptors.

16.85. The baseline collision risk for commercial vessels is 1 major collision in 61 years and post development this is shown to increase to 1 major collision every 51 years, which the change in collision frequency due to the Turbine Area being estimated at 2.95 x 10-3 per year (1 every 339 years). Other receptor collisions may increase in the high density areas noted to the north or south west of the Turbine Area. Despite this difference, increases are expected to be negligible and it is proposed are mitigated with continuous compliance with COLREGs including conduct of vessel in restricted visibility, following safe speed principles and compliance for the 'give way' rules including crossing, head on and vessel type.

16.86. Based on modelling of the revised routeing following the construction of the Offshore Development Area and local metocean data, the frequency of a passing powered vessel allision was estimated to be 9.53E-04 (allision return period of 1 in 1,049 years). The allision return period is higher than the historical average of 5.3E-04 (1 in 1,900 years) per installation-year for offshore installations on the UK Continental Shelf (HSE, 2010). The majority of this risk was noted on the southern boundary; however in reality it is likely that vessels would increase their passing distance due to the available sea room.

16.87. Following assessment, it was noted that the majority of the Not Under Command ('NUC') vessel allision frequency is associated with structures on the western boundary of the Turbine Area during the easterly tide. The collision and allision risk modelling consequences have been assessed, which applies the site-specific collision and allision frequency results presented above with estimated outcomes in terms of fatalities on-board and oil pollution from the vessel. This is based on research into historical collision incidents (MAIB, International Tanker Owners Pollution Federation Limited). Results showed the incremental increases in risk to both people and the environment caused by the Offshore Development Area to be low.

16.88. Various encounter models were run, due to the variations in safe encounter distances considered acceptable by commercial and recreational vessels. Encounter distances of 0.25 NM and 1 NM were considered, both showing that the majority of encounters would include recreational to recreational vessels that are considered willing to pass close to each other without any

increased risk to the safety of themselves or the vessels. The model has shown that the majority of encounters would occur to the north of the Turbine Area or within the approaches to Poole or the Western Solent, again where it would be considered normal for vessels to pass in close proximity.

16.89. Analysis of passing distances within 1 NM indicated no passing distance preference for recreation to recreation or recreation to commercial vessels, but that the majority of commercial vessels to commercial vessels (over 50%) preferred to pass over 0.6 NM apart with percentages increasing as the distance increased. It is also noted that recreational vessels often transit in groups and maintain a similar distance apart for some time. The encounters model (at 0.25 NM) showed that the majority of instances would occur outside the Turbine Area boundary. Traffic will become more formalised to the north of the Turbine Area as seen in other examples of offshore wind projects in UK waters. Increases in traffic may occur but expert opinion indicates that these would not adversely increase risk because compliance with COLREGS would ensure that vessel encounters are carried out in a safe manner. Also, traffic levels on these new routes would still be expected to be moderate compared to other areas.

16.90. An assessment was also made of the pollution risk due to the proposed wind farm, which considered that some vessels (i.e. tankers) are likely to be carrying larger quantities of potential pollutants when compared to others. The overall increase in pollution estimated due to Navitus Bay is very low compared to the historical average pollution quantities from marine accidents in UK waters (approximately 0.00395%).

Commercial vessels (Safe operations)

16.91. As previously noted in paragraph 16.54, summer survey data were recorded during a peak recreational period which included the London 2012 Olympics, traffic to/from the Cowes Week Regatta, the Cowes Classic Powerboat Race and the August Bank Holiday weekend.

16.92. Traffic currently transiting the area is relatively unrestricted due to the lack of navigational features that often define the routes vessels take including comparatively unrestricted water depths. Recreational craft are noted transiting on a variety of routes within the area including between local ports and cross channel, passenger vessels generally transit from Poole and cargo vessels transit in an east west direction or on routes bound to/from the Western Solent or Poole.

16.93. Fifteen main routes, as defined by MGN 371, have been identified throughout the Turbine Area (see Table 16.9). These are generally low use routes ranging from 1 vessel every 10 days on route 9 to 6 vessels per day on route 5 which is used by mostly by cargo vessels transiting in an east west direction between West Coast UK/Ireland and East Coast UK/Mainland Europe. Route 6 includes up to 56 vessels per day and is recorded at the very edge of the 14 NM buffer around the Turbine Area. However it is noted that the extreme edge of this route, which is used by traffic transiting the Channel between the TSSs, is located approximately 9 NM from the southern boundary of the Turbine Area, leaving sea room available for any vessels displaced to the south of the Turbine Area post development. Those routes which are transiting in an east west direction (Routes 8 and 10) are used by 1 vessel every day and 1 vessel every 3 days respectively. These are the only routes to transit through the Turbine Area in this direction and would potentially increase traffic on routes 5 or 7 by less than one vessel per day.

16.94. Routes running in an east – west direction may also consider routeing to the north of the Turbine Area. However it is noted that maintaining the northern boundary at its current extent would help to discourage this and prevent cumulative issues, such as increased encounters for recreational craft that were raised by stakeholders.

16.95. Vessels may still route north of the Turbine Area, particularly in adverse weather, when smaller volumes of recreational craft are likely to be at sea. Commercial rerouting scenarios have been considered by Anatec (2013). Eight out of the 15 identified main routes would be deviated, with a maximum increase of 2 NM (representing approximately 12 minutes) on route 4. This assumes the vessels maintain a minimum 1 NM distance from the peripheral turbines.

16.96. The Project has been designed with consideration for the Poole bound traffic and, following consultation with key stakeholders and regulators, the north west boundary was redesigned to give consideration to the Hurst Point leading light including agreement with THLS for this buffer to be designed along the edge of the green light sector.

16.97. MAIB and RNLI statistics indicate a number of incidents within the Offshore Development Area with the majority involving power boats, yachts and

personal water craft and occurring within shallower waters to the north of the Turbine Area (Figures 16.20 and 16.21).

Construction

16.98. During construction, there are expected to be an average of 1400 to 2100 small vessel and 253 to 380 large vessel movements each year (based on construction period of 3 to 4.5 years) associated with the development of the area which has the potential to lead to increased vessel encounters and therefore increased allision or collision risk. No specific ports have been identified for use as a construction or operations & maintenance base however construction vessels would be in contact with local vessel traffic services to aid traffic management on the approaches to port.

16.99. Impacts identified as part of the assessment include:

- Vessel allision with partially constructed turbines/structure;
- Increased vessel to vessel collision risk;
- NUC vessels drifting into partially constructed turbines/structure or construction activities.

16.100. The overall severity of consequences for construction activities is considered to be **moderate** due to the potential for notable damage to infrastructure/ vessels and interruption to construction and thus business impacts. The frequency of occurrence is considered **unlikely** due to the presence of rolling safety zones and the use of guard vessels, giving an overall risk ranking of **Tolerable**.

Operation and Maintenance

16.101. During the operation and maintenance phase, there are expected to be around 1000 vessel movements per year (2.7 vessels per day). This excludes periods of significant maintenance where there may again be construction vessels such as jack up barges on-site.

16.102. Potential impacts identified as part of the assessment include:

- Vessel allision with structures;
- Vessel to vessel collision (including associated wind farm vessels);
- NUC vessels drifting into structures and/or O&M activities.

16.103. The overall severity of consequences for operation and maintenance activities is considered to be **moderate** due to the potential for notable damage to infrastructure/vessels and interruption to construction and thus business impacts. The frequency of occurrence is considered **reasonably probable** as the impacts are likely to occur through the life of the wind farm, giving an overall risk ranking of **Tolerable**.

Commercial passenger vessels (Safe operations)

16.104. Marine traffic survey data indicated that 8% of vessels within 2 NM during the winter survey and 6% within 10 NM during the summer survey were commercial passenger vessels. The majority of these were passenger ferries operating out of Poole bound to France, Spain and the Channel Islands with the rest being made up of Portsmouth based ferries and cruise vessels.

16.105. Ferry traffic currently transiting the area is relatively unrestricted due to the lack of routeing measures and relatively unrestricted water depths. Limits on routeing are required on the High Speed Ferries due to written agreements with the MCA that require wash on local beaches to be kept to a minimum. This requirement has been considered within the re-routes drawn as well as the 2 NM passing distance requested by the operators during consultation.

16.106. Three main routes operating out of Poole have been identified including the conventional ferry to Cherbourg and Standard and High Speed routes to Cherbourg and the Channel Islands and equate to approximately four return trips per day within summer season. Portsmouth ferries generally pass to the south of the Turbine Area apart from minimal adverse weather route trips where vessels take coastal route crossing the channel further to the west.

16.107. As noted in paragraph 16.85, post development modelling has shown vessel to vessel collision risk to increase to 1 major collision every 51 years, which the change in collision frequency due to the wind farm development being estimated at 1 every 339 years.

16.108. From the detailed results of the collision frequency modelling, which includes consideration for vessel type and persons on board, the distribution of the predicted change in collision frequency by vessel type due to the presence of the Turbine Area is presented in Figure 16.22. The figure shows

that the fatality risk is dominated by fishing vessels, which historically have a higher fatality probability per incident than other commercial vessels.

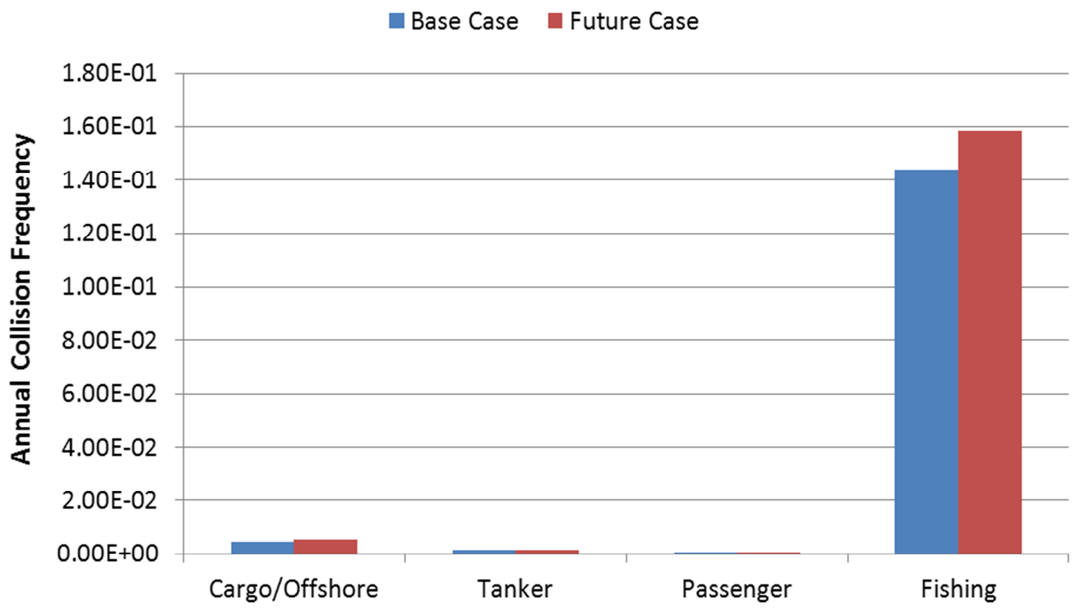

Figure 16.22 Change in Collision by Vessel Type Estimated for Navitus Bay Wind Park

16.109. Based on modelling of the revised routeing following the construction of the Turbine Area and local metocean data, the frequency of a passing powered vessel allision was estimated to be 9.53E-04 (allision return period of 1 in 1,049 years), 13% of which is attributable to passenger vessels.

16.110. Commercial ferries present an increased hazard level associated with the number of people on board, and this Potential Loss of Life ('PLL') value is an output of modelling. The overall increase in PLL was found to be 5.00 x 10^{-3} per year (base case), equating to one additional fatality in 200 years. In terms of individual risk to people, the increase for commercial vessels was very low and in the region of 10^{-8}. These values were derived noting a different number of persons on board for passenger ferries, cargo vessels, tankers and fishing vessels.

16.111. For the purposes of estimating deviations and additional voyage distances /times, a 2 NM clearance was assumed following consultation with the ferry operators. This clearance was also assumed as the mean minimum passing distance of the ferries from the nearest turbine, although the collision modelling also took into account that ferries may pass closer or further away on occasion, due to influencing factors such as weather and sea state. This range of passing distances has been noticed by regular ships passing other UK wind farms. As is standard practice, the ferry operators have indicated they would revise their passage plans (as necessary) following installation of the wind farm, in consultation with their Masters, to ensure a safe passing distance is planned before commencing each voyage.

Construction

16.112. As identified above there would be an increased number of vessel movement associated with construction, which potentially would operate out of ports currently used by the commercial passenger vessels. No specific ports have been identified for use as a construction or operations and maintenance base, however construction traffic would coordinate with local port Vessel Traffic Services ('VTS') to ensure that traffic movements are effectively managed.

16.113. Potential impacts identified as part of the assessment include:

- Commercial Passenger Vessel allision with partially constructed turbines/structures;
- Increased passenger vessel to passenger vessel collision risk;
- Increased passenger vessel to other vessel collision risk;
- NUC vessels drifting into partially constructed turbines/structure or construction activities.

16.114. The overall severity of consequences for construction activities is considered to be **moderate** due to the potential for notable damage to infrastructure/vessels and interruption to construction and thus business impacts as well as the risk associated with the large numbers of persons on board. The frequency of occurrence is considered **unlikely** due to the presence of rolling safety zones, dissemination of information and the use of guard vessels, giving an overall potential risk ranking of **Tolerable**.

Operations and Maintenance

16.115. During the operations and maintenance phase, the number of wind farm associated craft will decrease, however O&M support may still be based in ports used by local ferry traffic. Industry standard mitigations will be in place including Aids to Navigation, compliance with IMO conventions, adherence with MGN 371 and dissemination of information (including significant maintenance phases) to mitigate the risk to commercial passenger vessels.

16.116. Potential impacts identified as part of the assessment include:

- Passenger vessel allision with structures including turbines;
- Passenger vessel to passenger vessel collision risk;
- Passenger vessel to other vessel collision (including associated wind farm vessels);
- NUC passenger vessels drifting into structures and/or O&M activities.

16.117. The overall severity of consequences for operation and maintenance activities is considered to be **moderate** due to the potential for notable damage to infrastructure/vessels, and thus business impacts as well as consideration with the large number of persons on board. The frequency of occurrence is considered **reasonably probable** as the impacts are likely to occur through the life of the wind farm, giving an overall risk ranking of **Tolerable**.

16.118. It is noted that commercial vessels, in particular regular operators may have their own mitigations such as amendments to their standing orders. These mitigations have not been considered within this assessment.

Commercial vessel routeing

16.119. Aside from the impacts on the safe operation of vessels, consultation feedback has also indicated concerns over the commercial impacts on regular operator routeing. In particular, both Condor and Brittany ferries have raised concerns over increased transit distances and impacts of new legislation on the financial viability of their companies such as ballast water management and MARPOL low sulphur requirements. It is also noted that due to the dissolving of joint ventures and issues with berths at Weymouth, there are likely to be changes to timetables over the coming years including the introduction of a new vessel on the Poole – Cherbourg route. Commercial deviations can have a number of impacts associated with increases in operational cost including fuel and manning as well as inability to meet schedules.

16.120. No impacts have yet been identified on main routes used by Portsmouth ferries, which would continue to be able to pass south of the Turbine Area following construction. Routes 3B and 12A, which are both used by an average of 1 vessel per day, would be displaced by the offshore elements of the project. Route 3B is the Condor Ferries route used by north bound vessels only. Southbound vessels use 3A and this split is associated with the MCA requirements to keep wash off local beaches. Route 12A is used by Brittany Ferries between Poole and Cherbourg and during consultation it was noted that there was flexibility for them to adjust their heading without significant penalty. Deviations for these routes were calculated and include ensuring a passing distance of 2 NM from peripheral turbines.

16.121. The results in Table 16.10 were concluded based on the mean position of the route. Again it is noted that the number of crossings may increase.

Table 16.10 Commercial Route Deviations

Route Number	Existing Length within 14 NM Buffer (NM)	Deviated Length within 14 NM Buffer (NM)	Change (NM)	Time change based on average vessel speed	Number of Crossings Per Day
3B – Condor South Bound Only	61.60	62.42	+0.82	+ 2m 17s	1
12A – Brittany	35.32	35.80	+0.48	+ 2m 02s	2

16.122. As mentioned in the previous potential impact, the largest deviation was noted as a 2 NM increase in distance. This route is not used by a specific regular operator but by general cargo vessels bound from Southampton to the Channel Islands and used by an average of 1 vessel per day. This deviation is based on the vessel passing to the north west of the Turbine Area when in fact it could also go to the east.

16.123. Routes 8 and 10, which are low use, would require minor deviations in order to pass clear to the south of the Turbine Area due to their ability to make early course alterations.

Construction

16.124. During construction, deviations may vary in conjunction with the 500 metre rolling safety zones in place and would increase as the development grows. However, continued communication and dissemination of information would ensure that all operators, including regular operators, are kept informed of the progress of the development and current construction activities.

16.125. The potential impact identified as part of the assessment is:

- Displacement from regular routes due to construction activities.

16.126. The overall severity of consequences for construction activities is considered to be **minor** due to the varying and temporary duration of impacts. The frequency of occurrence is considered **likely** due to the presence of rolling safety zones and general construction activities, giving an overall potential risk ranking of **Tolerable**.

Operation and Maintenance

16.127. Apart from during periods of significant maintenance on the boundary of the Turbine Area, deviations would remain constant once the turbines are operational. The severity of consequences is considered to be **minor**, noting that this is considering commercial impacts only, due to the minor impact on business operations indicated. Frequency is considered **extremely likely** as displacement would be a regular occurrence, giving an overall risk ranking of **Tolerable**.

Commercial (passenger) vessel adverse weather routeing

16.128. This potential impact has been considered separately from the main route deviations due to the important implications on safety rather than commercial viability. As an overview, the most significant effects of adverse weather on passenger vessels could include:

- Reduced safety and comfort of passengers on board including motion sickness or difficulty moving around the vessel;
- Risk of vessel damage such as damage through slamming, longitudinal or torsional stresses, special effects of waves in shallow water or current, risk of collision and/or stranding.

16.129. In order to counteract the effects of adverse weather, vessels can, for example, adjust heading to position themselves 45 degrees to the wind, reduce speed and/or potentially cancel sailings. These impacts are considered more significant for passenger vessels due to the large number of third party people on board. AIS data indicated that the most likely route to be affected is the Brittany Ferries route to the east of the Turbine Area; however, data shows that this route is not regularly used. Similar headings can also be achieved around the development albeit with an increased journey time to ensure that this route maintains the headings indicated by the vessels as the most comfortable for passengers.

Operation and Maintenance

16.130. This impact has only been considered for the operations and maintenance phase where impacts will be permanent throughout the operational life of the Project.

16.131. The potential impact identified as part of the assessment is:

- Loss of adverse weather route.

16.132. The overall severity of consequences is considered to be **moderate** due to the potential for major injury. The frequency of occurrence is considered to be **extremely unlikely** due to the vessels ability to mitigate and the low number of transits/days this would apply to. This gives an overall risk ranking of **Broadly Acceptable.**

Marine aggregate dredgers

16.133. There are a number of marine aggregate extraction areas located in proximity to the Offshore Development Area. These are both active and application areas, and AIS data indicate that they are frequently used. The closest active area is located 0.53 NM to the north of the Turbine Area, there is also an application area located 0.51 NM (closest point) to the east of the Turbine Area. Following consultation and the outcomes of the hazard workshop, the dredging operators requested a 'buffer' around the structures and other snagging risks associated with the dredge gear of 0.5 NM from any dredging areas, however in most cases this exceeded. Following

consultation, NBDL have also identified 500 metre buffers from the majority of Offshore Export Cable Corridor routes, however where there is overlap mitigations would include cable burial or appropriate protection method as agreed with the relevant stakeholders.

Construction

16.134. Impacts are expected to be mitigated by the ongoing consultation and dissemination of information direct to the marine aggregate companies. This would include liaison and vessel movement planning in conjunction with the operators of the licensed dredging area to identify when construction activities would occur in the area close to those areas to ensure that activities can be pre-planned to ensure they do not overlap.

16.135. The potential impacts identified as part of the assessment are:

- Vessel allision with partially constructed or deconstructed structure during dredging activities; and
- Marine Aggregate vessel collision with wind farm construction vessels.

16.136. The overall severity of consequences for construction activities is considered to be **minor** due to the potential for minor damage to infrastructure/vessels due to vessels ability to deploy anchors and the likely low speed and therefore low energy. The frequency of occurrence is considered **extremely unlikely** due to the planning and consultation that would occur. This gives an overall risk ranking of **Broadly Acceptable**.

Operation and Maintenance

16.137. Ongoing consultation and dissemination of information direct to the marine aggregate companies would mitigate the risk. However, it is noted that buffers between dredging areas and the extreme peripheral turbines are 0.5 NM from the closest point on the eastern boundary of the Turbine Area. The distance between turbines and dredging areas is at least 1 NM at all other points.

16.138. The impact identified as part of the assessment is:

- Marine aggregate vessel allision with structures during dredging activities;
- Marine Aggregate vessel collision with wind farm O&M vessel.

16.139. The overall severity of consequences for O&M activities is considered to be **minor** due to the potential for minor damage to infrastructure/vessels (likely low speed and therefore low energy).The frequency of occurrence is considered **unlikely** throughout the operational phase of the wind farm. This gives an overall risk ranking of **Broadly Acceptable**.

Commercial fishing vessels

16.140. Low numbers of fishing vessels were recorded intersecting the Turbine Area over the survey period, with the densest fishing activity to the north east of the Turbine Area. From analysis of the fishing vessel sightings data, it has been noted that the majority of vessels were registered in the UK (82%) or France (15%). From the data analysed, the majority of fishing vessels within the study area were engaged in fishing, some were steaming (transiting to/from fishing grounds) and a minority were laid stationary (vessels at anchor or pair trawlers whose partner vessel is taking the catch whilst the other stands by). It is noted that this value differs from the values seen in the satellite data, due to the size of vessels each method records.

Construction

16.141. Impacts identified as part of the assessment include:

- Vessel allision with partially constructed turbines/structure whilst navigating to fishing grounds;
- Vessel to vessel collision (including associated wind farm vessels).

16.142. The overall severity of consequences for construction activities is considered to be **minor** due to the potential for limited/minor damage to infrastructure/vessels and interruption to construction and thus business impacts. The frequency of occurrence is considered **extremely unlikely** due to the presence of rolling safety zones, the use of guard vessels and limited fishing activity within the construction areas. This gives an overall risk ranking of **Broadly Acceptable**.

16.143. Note that this assessment has not considered the potential allision risk for fishing vessels while undertaking fishing activities.

Operation and Maintenance

16.144. Industry standard mitigations will mitigate risks to commercial fishing vessels. There is potential that fishing activity, including transits, may increase within the Turbine Area during operation due to the potential for fish aggregation around the structures. However at this stage this effect is not yet certain or quantifiable.

16.145. Impacts identified as part of the assessment include:

- Vessel allision with structure whilst navigating to fishing grounds.
- Vessel to vessel collision (including associated wind farm vessels).

16.146. The overall severity of consequences for operation and maintenance activities is considered to be **moderate** due to the potential for notable damage to infrastructure/vessels and the potential for serious injury to personnel. The frequency of occurrence is considered to be **reasonably probable** because the impacts are likely to occur throughout the life of the Project. This gives an overall risk ranking of **Tolerable**.

16.147. Note that this assessment has not considered the potential allision risk for fishing vessels while undertaking fishing activities.

Recreational craft (2.5-24 metres)

16.148. Several models were run using survey data. The variety of recreational craft in proximity to the Turbine Area is extensive, and in busy periods when all vessels and watercraft comply with COLREGS and practice good seamanship, an environment is created where all receptors safely co-exist. Results of the base case assessment (deviated routes and densities), consultation on boundary developments and lessons learnt indicate that post development the area would continue to provide a safe area for all receptors to co-exist, as commercial vessel movements, and therefore congestion, are not expected to increase significantly. It is noted however, that some recreational vessels would choose to not transit through the array.

16.149. The RYA considers that the largest risk to recreational craft from offshore wind developments is the risk of rotor blade allision and underwater impact associated with scour which reduces the under keel clearance. An allision between a turbine blade and the mast of a yacht or damage to the keel could result in structural failure of a yacht. In order to mitigate this risk, the design of the wind farm will adhere to the RYA's standard mitigation of a minimum rotor height clearance above MHWS of 22 m; and a minimum underwater clearance of 4 m below chart datum. These measures mean that whilst the allision risk cannot be completely eliminated, it would be reduced to ALARP. In terms of consequences, most allisions with the turbines should be relatively low speed and hence low energy.

16.150. It is noted that there are factors that would influence a mariner's decision (including recreational sailors) to navigate through, around or avoid a wind farm and that the choice is influenced by a number of factors including the vessels characteristics, the weather and sea condition. The MCA (2008b) concluded that "Although offshore renewable energy installations present new challenges to safe navigation around the UK coast, proper voyage planning, taking into account all relevant information, should ensure a safe passage and the safety of life and the vessel should not be compromised". Therefore, the recreational sailor shall continue to take due consideration for the weather conditions and passage plan accordingly to ensure safe passage.

Construction

16.151. During construction, there are expected to be an average of 1400 to 2100 small vessel and 253 to 380 large vessel movements each year (based on construction period of 3 to 4.5 years) associated with the construction activities which has the potential to lead to increased vessel encounters and therefore increased allision or collision risk.

16.152. Potential impacts identified as part of the assessment include:

- Powered recreational vessel allision (horizontal and vertical) with partially constructed structures;
- Unpowered recreational vessel allision (horizontal and vertical) with partially constructed structures;
- Powered recreational vessel to non-recreational vessel collision (including associated wind farm vessels);
- Unpowered recreational vessel to non-recreational vessel collision (including associated wind farm vessels);
- Recreational vessel to recreational vessel collision;
- Loss of cruising/racing routes due to construction activities.

16.153. The overall severity of consequences for construction activities is considered to be **minor** due to the potential minor injury to person, minor damage to vessel (most likely low energy) and limited environmental impacts**.** The frequency of occurrence is considered **reasonably probable** including the industry standard mitigations to be employed, due to the number of recreational craft, giving an overall risk ranking of **Tolerable**.

Operation and Maintenance

16.154. During the operation and maintenance phase, there are expected to be around 1000 vessel movements per year (2.7 vessels per day), a movement meaning a two way journey. This excludes periods of significant maintenance where there may again be construction vessels such as jack up barges on-site.

16.155. Industry standard mitigations would be in place. However, it is noted that layouts where turbines are misaligned could affect both a vessels ability to visually navigate within a wind farm and for other vessels to identify small craft within them.

16.156. Potential impacts identified as part of the assessment include:

- Powered recreational vessel allision with structures;
- Unpowered recreational vessel allision with structures;
- Powered recreational vessel to non-recreational vessel collision (including associated wind farm vessels);
- Unpowered recreational vessel to non-recreational vessel collision (including associated wind farm vessels);
- Loss of cruising/racing routes due to presence of wind farm;
- Impacts on visual navigation associated with the misalignment of structures (such as the mixed array layout).

16.157. The overall severity of consequences for operation and maintenance activities is considered to be **minor** due to the potential for minor injury and minor damage to infrastructure/vessels. The frequency of occurrence is considered **likely** as the impacts are likely to happen regularly with minor consequence, throughout the life of the wind farm. This gives an overall risk ranking of **Tolerable**.

Recreational charter vessels (fishing and diving) engaged in navigation

16.158. Although included within the recreational impacts, there are noted chartered navigational based activities that occur within the vicinity of the Project. It is noted that these vessels are likely to both transit (as identified in the previous impact) and also remain within the wind farm boundary to undertake diving or other non-transit based recreational activities. COLREGS already deals with the interaction between vessels engaged in these types of recreational activities and includes day/night marks, such as the alpha code flag, to ensure that they are easily identified by passing traffic.

16.159. The structures within the wind farm would be spaced at a minimum of 756 metres (crosswind) and 1008 metres (downwind) allowing room for manoeuvring. Internal structures would also be lit using low level lighting, retro reflective markings and day markings to ensure they are visible to mariners transiting through. However current levels of traffic and seabed knowledge indicate that the levels of sea angling or recreational diving are likely to be low levels. This would be monitored post installation to identify if the levels of activity increase.

Construction

16.160. This period presents the higher risk to recreational divers and impacts associated with health and safety impacts will be addressed in the Recreation Assessment section that will support the application for development consent. For navigational safety impacts industry standard mitigations including the application and use of rolling safety zones of up to 500 metres during construction, the use of guard vessels to protect sensitive areas and issuing regular warnings/updates to recreational charter vessel operators users as well as ensuring compliance with international regulations would all mitigate the risk to commercial vessels.

16.161. Potential impacts identified specifically for recreational charter vessels include:

- Powered recreational charter vessel allision (horizontal and vertical) with partially constructed structures; and
- Unpowered recreational charter vessel allision (horizontal and vertical) with partially constructed structures.

16.162. The overall severity of consequences for construction activities is considered to be **minor** due to the potential minor injury to person, minor damage to vessel (most likely low energy) and limited environmental impacts. The frequency of occurrence is considered **unlikely** due to the number of recreational charter vessels active within the site and the presence of guard vessels and safety zones, giving an overall risk ranking of **Broadly Acceptable**.

Operation and Maintenance

16.163. Industry standard mitigations would be in place. However, it is noted that layouts where turbines are misaligned could affect both a charter vessels ability to visually navigate and hold position within a wind farm and for other vessels to identify small craft within them.

16.164. Potential impacts identified specifically for recreational charter vessels include:

- Powered recreational charter vessel allision with structures;
- Un powered recreational charter vessel allision with structures; and
- Impacts on visual navigation associated with the misalignment of structures.

16.165. The overall severity of consequences for operation and maintenance activities is considered to be **minor** due to the potential for minor injury and minor damage to infrastructure/vessels. The frequency of occurrence is considered to be **likely**. Although there are low levels of recreational charter vessels within the Turbine Area they would spend increased time within compared to other recreational. This gives an overall risk ranking of **Tolerable**.

Military vessels safe navigation

16.166. Baseline data shows military vessels recorded during the summer survey period on AIS and/or Radar including a number of 'Archer' class vessels using the western Solent, and limited movements through the study area. There are not expected to be any additional impacts to military vessels not already covered under the commercial vessel impacts section.

Construction

16.167. As was the case for commercial vessels, industry standard mitigations including the application and use of rolling safety zones of up to 500 metres during construction, the use of guard vessels to protect sensitive areas, issuing regular warnings/updates and compliance with international regulations would all mitigate the risk to military vessels.

16.168. Potential impacts identified as part of the assessment include:

- Vessel allision with partially constructed structures; and
- Vessel to vessel collision (including associated wind farm vessels).

16.169. The overall severity of consequences for construction activities is considered to be **minor** due to the potential for limited damage to infrastructure/vessels and interruption to construction and thus business impacts. The frequency of occurrence is considered to be **extremely unlikely** due to the limited military use, presence of rolling safety zones and the use of guard vessels. This gives an overall risk ranking of **Broadly Acceptable**.

Operation and Maintenance

16.170. Potential impacts identified as part of the assessment include:

- Vessel allision with structures;
- Vessel to vessel collision (including associated wind farm vessels).

16.171. The overall severity of consequences for operation and maintenance activities is considered to be **minor** due to the limited potential for notable damage to infrastructure/vessels. As noted with commercial vessel impacts, industry standard mitigations would be place. The frequency of occurrence is considered **unlikely**, giving an overall risk ranking of **Broadly Acceptable**.

Wind farm craft

16.172. The maximum construction period for the wind farm would be 4.5 years. During this phase and the decommissioning phase there would be an increased level of vessel activity within the Turbine Area and along the Offshore Export Cable Corridor.

16.173. The presence of construction vessels within the area is likely to pose an additional navigational risk, although such vessels can also provide on-site response and mitigation.

16.174. It is noted that, to a large extent, the hazards would depend on the vessels and procedures which are to be used for these operations. This would not be known in detail until the structures, construction methods and vessels/contractors have been selected. It is therefore planned that hazard/risk assessments would be carried out as part of the project-planning process once this information is known.

Construction

16.175. During construction, a number of different types of vessel would be on-site at any one time, however standard industry practices would be in place to ensure vessels do not become a hazard to themselves or other receptors.

16.176. Potential impacts identified as part of the assessment include:

- Vessel allision with structures;
- Wind farm O&M vessel to other vessel collision.

16.177. As it has not yet been confirmed that works vessel coordination would be in place, the frequency of this impact has been record as **reasonably probable** with the severity of consequences being **moderate** due to the potential moderate damage to vessel or structures. This gives an overall risk of **Tolerable**.

Operation and Maintenance

16.178. Levels of small craft movements are expected to be 1000 per year during operations and maintenance, excluding periods of larger maintenance.

16.179. Potential impacts identified as part of the assessment include:

- Vessel allision with structures;
- Wind farm O&M vessel to other vessel collision.

16.180. As it has not yet been confirmed that work vessel coordination will be in place the frequency of this impact has been record as **likely** due to the number and continuous movement of vessels on a daily basis, with a severity of consequence of **minor** with potential minor damage to vessels or structures, giving an overall risk of **Tolerable**.

Port activities

16.181. The closest port to the Turbine Area is Poole. In addition, to the main commercial ports such as Southampton, Portsmouth, Weymouth and Cowes there are also a number of smaller harbours and recreational marinas located along the south coast. Consultation feedback from port operators and authorities have not expressed significant concerns over the development, including impacts such as congestion or increased encounters or on functions of the port such as anchoring or pilotage.

16.182. It is noted that construction, decommissioning and maintenance activities would increase the levels of marine traffic in the vicinity of the Turbine Area. This could include daily operation of wind farm support vessels to the use of jack up barges located on-site for several weeks or months. The proposed Navitus Bay Wind Parks construction vessels and other vessels associated with the development would also liaise and disseminate information to VTS operations in the area to ensure that they coordinate with vessel movements in the area, therefore assisting with the mitigation of impacts on ports in the vicinity of the development.

Construction and Operations/Maintenance

16.183. The potential impact identified as part of the assessment is:

- Increased marine traffic due to the presence of the wind farm.

16.184. The severity of consequences is expected to be **negligible** as traffic management and monitoring are considered within the ports' current remit and any large vessel movements would be planned and coordinated in conjunction with NBDL. This is considered a normal port function, meaning that the frequency is **likely** giving a risk ranking of **Broadly Acceptable**.

Emergency response

16.185. Under national and international law, NBDL would be required to comply with existing emergency response requirements, as well as giving consideration to other response groups within the area. Due to the increased level of activity in and around the wind farm there are expected to be some increased demands on search and rescue facilities within the area. The Project would also increase traffic and therefore diminish the capability of emergency response and consideration should be given to what resources would be required to provide a level of response that would work within the development.

Construction and Operations/Maintenance

16.186. The potential impact identified as part of the assessment is:

- Reduced emergency response capability/oil spill response due to the presence of the wind farm.

Reduced emergency response capability including search and rescue is considered **likely** to happen and with a severity of consequence of **moderate** due to the potential for loss of life, moderate environmental damage, moderate damage to infrastructure/vessel and national business, operation or reputation impacts. This gives an overall risk ranking of **Tolerable** without risk mitigations in place.

16.5.3. Potential Impacts of Offshore Export Cable Corridor

Commercial vessels

16.187. There are ten anchorages located within proximity to the Offshore Development Area, generally for small craft in shallower waters but also frequented by commercial vessels awaiting tidal restrictions or seeking refuge from adverse weather conditions. This includes commercial ferries that have been noted as anchoring whilst awaiting berths. The majority of vessels seen transiting the cable route, inward of the 10 m contour are recreational craft, however following assessment of the North Channel access route into the western Solent, some small bunker barges were also noted using this route.

Construction

16.188. Specialist vessels and teams would be responsible for installing the Offshore Export Cable within the proposed buffer area. Whilst the exact location has not been confirmed yet, it is considered likely that impacts would remain the same for commercial vessels regardless of the exact location.

16.189. Potential impacts identified as part of the assessment include:

- Vessel to vessel collision with cable installation vessel which may be restricted in its ability to manoeuvre;
- Anchor interaction with partially buried/unburied cable.

16.190. Due to the high level of mitigation and control already in place for this kind of operation, it is considered **extremely unlikely** that an impact would occur. For any impact which does occur, the severity of consequences has been assessed to be **moderate** due to the potential moderate damage to the cable, vessel or injury to personnel. This gives an overall ranking of **Broadly Acceptable.**

Operation and Maintenance

16.191. An Offshore Export Cable would not pose a risk to surface vessels if it is both adequately buried/protected and maintained to ensure that it does not become a risk over time.

16.192. The potential impact identified as part of the assessment is:

- Anchor interaction with Offshore Export Cable which has not been buried or becomes exposed over time.

16.193. The severity of consequences for this impact is considered to be **minor** due to the low potential for damage to the vessel or injury to personnel with the most likely consequence being damage to the cable causing interruptions to operations. The frequency is considered to be **unlikely** due to NBDL's commitment to ensure that the cable is adequately maintained, giving an overall ranking of **Broadly Acceptable**.

Commercial fishing vessels

Construction

16.194. Specialist vessels and teams would be responsible for installing the Offshore Export Cable within the proposed buffer. Whilst the exact location has not been confirmed yet, it is considered likely that impacts would remain the same for commercial fishing vessels regardless of the exact location.

16.195. The following potential impacts have been identified:

- Vessel to vessel collision with cable installation vessel which may be restricted in its ability to manoeuvre; and
- Impacts on navigational safety associated with anchor interaction with partially buried/unburied cable.

16.196. Due to the high level of mitigation and control already in place for this kind of operation, it is considered **extremely unlikely** that an impact would occur. For any impact which does occur, the severity of consequences has

been assessed to be **major** due to the potential for loss of vessels and loss of life. This gives an overall ranking of **Tolerable**.

Operation and Maintenance

16.197. An Offshore Export Cable would not pose a risk to surface vessels if it is both adequately buried/protected and maintained to ensure that it does not become a risk over time.

16.198. The potential impact identified as part of the assessment is:

- Impacts on navigational safety associated with anchor interaction on cables which have not been buried or become exposed over time.

16.199. The severity of consequences for this impact is considered to be **moderate** due to the low potential for damage to the vessel or injury to personnel with the most likely consequence being damage to cable causing interruptions to operations. The frequency is considered **extremely unlikely** throughout the life of the Project, giving an overall ranking of **Broadly Acceptable**.

Recreational craft (2.5-24 metres)

Construction

16.200. Whilst the exact location of the Offshore Export Cable has not been confirmed yet, it is considered likely that impacts would remain the same for recreational vessels regardless of the exact location. However, it is noted that the dissemination of information would need to be targeted to ensure that the right receptors are identified including giving consideration to any racing or events that may need to be avoided.

16.201. Potential impacts identified as part of the assessment include:

- Vessel to vessel collision with cable installation vessel which may be restricted in its ability to manoeuvre;
- Anchor interaction with partially buried/unburied cable.

16.202. Due to the high level of mitigation and control already in place for this kind of operation, it is considered **unlikely** that an impact would occur. For any impact which does occur, the severity of consequences has been assessed to be **minor** due to the potential moderate damage to the cable or interruption to operations. This gives an overall ranking of **Broadly Acceptable**.

Operation and Maintenance

16.203. An Offshore Export Cable would not pose a risk to surface vessels if it is both adequately buried/protected and maintained to ensure that it does not become a risk over time.

16.204. The impact identified as part of the assessment is:

- Anchor interaction with Offshore Export Cable which has not been buried or becomes exposed over time.

16.205. The severity of consequences for this impact is considered to be **minor** due to the low potential for a recreational crafts' anchor to penetrate the seabed and interact with the cable. The frequency is considered **extremely unlikely**, giving an overall ranking of **Broadly Acceptable**.

Marine aggregate dredgers

16.206. Following consultation and the outcomes of the hazard workshop, the dredging operators requested a 'buffer' not only around the structures but also around the Offshore Export Cable. A buffer of 0.25 NM would be provided from Offshore Export Cable corridors, however where this cannot be achieved burial and/or protection would be considered in conjunction with the stakeholder.

Construction

16.207. Industry standard mitigations including the application and use of rolling safety zones of up to 500 metres during construction, the use of guard vessels to protect sensitive areas, issuing regular warnings/updates and compliance with international regulations would all mitigate the risk to marine aggregate dredgers. Consultation must be undertaken with the operators of the dredge areas to ensure that they are aware of major installation periods and vice versa of key dredging campaigns.

16.208. The potential impacts identified as part of the assessment is:

- Vessel to vessel collision with cable installation vessel which may be restricted in its ability to manoeuvre;
- Anchor or dredge gear interaction with Offshore Export Cable which has not been buried or becomes exposed over time.

16.209. The frequency is considered to be **extremely unlikely** due to the planning that would occur, with the severity of consequence being assessed as being

moderate due to the moderate damage that could be done to the installation vessel, cable and /or dredging gear. This gives an overall ranking of **Broadly Acceptable**.

Operations and Maintenance

16.210. An Offshore Export Cable would not pose a risk to surface vessels if it is both adequately buried/protected and maintained to ensure that it does not become a risk over time.

16.211. The potential impact identified as part of the assessment is:

- Anchor interaction with Offshore Export Cable which has not been buried or becomes exposed over time.

16.212. For operations and maintenance, the frequency is considered to be **extremely unlikely**, with a **moderate** severity of consequences due to potential damage to the cable or dredge gear. This gives an overall ranking of **Broadly Acceptable**.

16.5.4. Decommissioning

16.213. The shipping and navigation impacts associated with the decommissioning of the Offshore Development Area are considered to be similar to those described for the construction phase.

16.214. A Decommissioning Plan in line with standard requirements, would be developed and should consider the scenario where on decommissioning and on completion of removal operations, an obstruction attributable to the wind farm is left on-site which is considered to be a danger to navigation and which it has not proved possible to remove.

16.215. Buried cables would be left *in situ*, and would be notified to UKHO for inclusion in navigation charts.

16.6. Potential Mitigation

16.216. This section outlines the risks identified to a Tolerable level, and the additional mitigation, over and above best practice that would be applied to minimise such risks.

16.217. The receptors previously identified as having a Tolerable risk during the Turbine Area construction phase include:

- Commercial Vessels Safe Operations
- Commercial Passenger Vessel Safe Operations
- Commercial Vessel Routeing
- Recreational Craft 2.5-24 metres
- Wind Farm Craft
- Emergency Responders

16.218. The receptors identified with a Tolerable risk during Turbine Area operation and maintenance phase include:

- Commercial Vessels Safe Operations
- Commercial Passenger Vessel Safe Operations
- Commercial Vessel Routeing
- Commercial Fishing (Navigation Impacts)
- Recreational Craft 2.5-24 metres
- Recreational Charter Vessels (fishing and diving) engaged in navigation
- Wind Farm Craft
- Emergency Responders

16.219. The receptors identified with a tolerable risk during the installation of the Offshore Export Cable Corridor include:

- Commercial Fishing (Navigation Impacts)

16.220. No additional mitigation is identified during the operation phase of the Offshore Export Cable Corridor, as all risks are assessed as Broadly Acceptable.

16.6.1. Mitigation measures for Turbine Area impacts (construction phase)

16.221. The following mitigation measures are proposed during the construction phase for the Turbine Area:

- Advanced dissemination of information and warnings through VHF warnings, notices to mariners and other appropriate media such as direct dissemination of information to local clubs and marinas for recreational users. This will enable vessels to plan their passage accordingly and therefore effectively and safely navigate around the Turbine Area. At this level, information should be targeted to specific receptors that may be

affected by particular parts of the construction, operation or decommissioning activities.

- Use of temporary aids to navigation (including buoyage and lighting) to mark hazards during the construction and decommissioning phases and significant periods of maintenance. These aids to navigation would guide vessels around temporary navigational hazards such as turbines which are partially constructed and not yet adequately lit. It is noted that the development would occur in 3 phases and therefore NBDL would be required to consult with THLS on the temporary marking of those phases when they have been defined.
- Work planning to ensure that all activities are planned and coordinated with full consideration for marine safety, for example ensuring that turbines are constructed using a system that does not create navigational hazards.
- Use of route planning for wind farm associated vessels (such as construction traffic corridors) including entry and exit locations at various points around the Turbine Area. These would be defined by NBDL as part of the construction planning process.
- Continued consultation with stakeholders including regular operators, regulators, international bodies and other stakeholders.
- During consultation with recreational stakeholders, it was noted that a construction vessel could use its own fendering system to mitigate the impact of low energy impacts, and therefore NBDL can consider making this as a requirement for vessels.
- Consideration given to cooperation with local VTS services such as those located in Poole or Southampton to coordinate large vessel, multiple vessel or sensitive activities with movements to and from the ports. This could include the management of large vessel movements within channels and ports;
- The current ERCoP template was developed for smaller round one and two wind farms, and recent consultation has noted that developers now need to move beyond this requirement and develop an Advanced ERCoP that is enhanced to cover the principles of self-help and relative to the size, location and nature of the development.
- This Advanced ERCoP would be part of NBDL Safety Management System.

16.222. These measures are anticipated to minimise the potential risks to the following receptors:

- Commercial Vessels Safe Operations
- Commercial Passenger Vessel Safe Operations
- Commercial Vessel Routeing
- Recreational Craft 2.5-24 metres

16.223. The risk to the following receptors is anticipated to be reduced, however, monitoring is likely to be required through the NBDL SMS to ensure the risks do not increase during the duration of the construction period:

- Wind Farm Craft
- Emergency Responders

16.6.2. Mitigation measures for Turbine Area impacts (operation/maintenance)

16.224. The following mitigation measures are proposed during the operation and maintenance phase for the Turbine Area:

- The SMS should include processes in places to ensure that the mitigations identified as reducing risks are maintained and monitored effectively. This is likely to be done through the marine coordination centre.
- Consultation with stakeholders including regular operators, regulators, international bodies and other stakeholders would be ongoing as required.
- The Turbine Area would be designed to ensure that the overall design or peripheral turbines do not increase risk by creating high risk areas. This may include the use of buoyage to aid traffic flow around the Turbine Area particularly during construction and decommissioning. These requirements would be discussed in consultation with THLS on identification of the wind farm's final layout pre-construction.
- Advanced dissemination of information and warnings through VHF warnings, notices to mariners and other appropriate media such as direct

dissemination of information to local clubs and marinas for recreational users. This would enable vessels to plan their passage accordingly and therefore effectively and safely navigate around the Turbine Area. At this level, information should be targeted to specific receptors that may be affected by particular parts of the construction, operation or decommissioning activities.

- Further consultation with ferry operators to discuss any potential for commercial impacts.
- Consideration would be given to turbine alignment, particularly on the north west edge to ensure that the turbines are, where feasible with ground conditions, aligned so as to present a straight edge which would assist both visual and electronic navigation. Alignment would also consider SAR requirements and ensure that they are constructed and labelled to assist SAR activities both on the ground and in the air.
- The western boundary of the Turbine Area, aligning with the eastern edge of the Hurst Point leading light green sector, requires due account to be taken of the turbine blade length to ensure there is no encroachment into the green sector or outside of the Offshore Development Area boundary.
- Should mixed arrays be taken forward to the final Turbine Area layout consideration, consultation with key regulators would be undertaken to ensure both alignment within and effective navigational aids.
- Establish a works vessel coordination centre to monitor and control movement within, to and from the wind farm to both the construction and operation bases. The works vessels coordination centre would also be responsible for the cooperation with emergency response coordinators. This could include the use of entry/exit point or construction traffic corridors.
- During consultation with recreational stakeholders, it was noted that an O&M vessel could use its own fendering system to mitigate the impact of low energy impacts, and therefore NBDL can consider making this as a requirement for vessels.
- Consideration given to cooperation with local VTS services such as those located in Poole or Southampton to coordinate large vessel, multiple vessel or sensitive activities with movements to and from the ports. This could include the management of large vessel movements within channels and ports.
- Develop an advanced ERCoP that is enhanced to cover the principles of self-help and relative to the size, location and nature of the development.
- Potential for limited towage capability (such as bollards and winches) to be installed on some vessels to assist within the Turbine Area. This should also include appropriate training for personnel. This is dependent on the type of vessels and their suitability for this type of role. The ERCoP would cover this in more detail.
- Contract emergency towing vessels in addition to the Coastguard Agreement on Salvage and Towage ('CAST') agreements would be considered when drafting emergency response strategy.
- Specialist Man Over Board ('MOB') equipment on board all on-site vessels (i.e. Jason's Cradle) and additional training as required.
- Vessels available on-site having capability to deal with any major damage to structures that require a quick response to assist personnel or prevent pollution.
- Contractual assistance to deal with pollution and advanced training or personnel.
- Advanced medical training and equipment for offshore personnel.

16.225. These measures are anticipated to minimise the potential risks to the following receptors:

- Commercial Vessel Routeing

16.226. These measures are anticipated to minimise the potential risks to the following receptors, with monitoring through the NBDL Safety Management System to ensure the risks would not increase during the duration of the construction period:

- Commercial Vessels Safe Operations
- Commercial Passenger Vessel Safe Operations
- Commercial Fishing (Navigation Impacts)
- Recreational Craft 2.5-24 metres

- Recreational Charter Vessels (fishing and diving) engaged in navigation
- Wind Farm Craft
- Emergency Responders

16.6.3. Mitigation measures for Offshore Export Cable Corridor impacts (construction)

16.227. The following mitigation measures are proposed during the construction phase for the Offshore Export Cable Corridor:

- Advanced dissemination of information to specific receptors noting installation periods;
- Temporary aids to navigation; and
- Work procedures to ensure any areas that pose a specific risk to navigation are marked or are not left unattended.

16.228. With the application of mitigation, predicted impacts are anticipated to be minimised. Mitigation measures proposed will be agreed in close consultation with relevant statutory consultees.

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Glossary

TERM	DEFINITION
Allision	The act of striking or collision of a moving vessel against a stationary object.
Automatic Identification System (AIS)	Automatic Identification System. A system by which vessels automatically broadcast their identity, key statistics e.g. length, brief navigation details e.g. location, destination, speed and current status e.g. survey. Most commercial vessels and EU fishing vessels over 15 m are required to have AIS.
Collision	The act or process of colliding (crashing) between two moving objects.
Jason's Cradle	Device attached to the side of vessels and designed to retrieve people quickly and horizontally from the water.
Marine Guidance Note (MGN)	A system of guidance notes issued by the Maritime and Coastguard Agency which provide significant advice relating to the improvement of the safety of shipping and of life at sea, and to prevent or minimise pollution from shipping.
Not Under Command (NUC)	Under Part A of the International Regulations for Preventing Collisions at Sea (COLREGS), the term "vessel not under command" means a vessel which through some exceptional circumstance is unable to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.
Offshore Renewable Energy Installations (OREI)	Offshore Renewable Energy Installations (OREIs) as defined by Guidance on UK Navigational Practice, Safety and Emergency Response Issues, MGN 371. For the purpose of this report and in keeping with the consistency of the Environmental Impact Assessment, OREI can mean offshore wind turbines and the associated electrical infrastructures such as offshore collector stations, offshore converter stations and offshore reactive stations.
Radar	Radio Detection And Ranging – an object-detection system which uses radio waves to determine the range, altitude, direction, or speed of objects.
Safety Zone	A marine zone demarcated for the purposes of safety around a possibly hazardous installation or works/ construction area. It may exclude other vessels.
Traffic Separation Scheme (TSS)	A Traffic Separation Scheme (TSS) is a traffic-management route-system ruled by the International Maritime Organization. The traffic-lanes (or clearways) indicate the general direction of the ships in that zone; ships navigating within a TSS all sail in the same direction or they cross the lane in an angle as close to 90 degrees as possible.

Abbreviations

TERM	DEFINITION
ABP	Associated British Ports
AIS	Automatic Identification System
AtN	Aids to Navigation
BMAPA	British Marine Aggregates Producers Association
BWEA	British Wind Energy Association (now RenewableUK)
CA	Cruising Association
CAST	Coastguard Agreement on Salvage and Towage
CHC	Cowes Harbour Commissioners
CoS	Chamber of Shipping
CPA	Closest Point of Approach
DECC	Department of Energy and Climate Change
DfT	Department for Transport
EIA	Environmental Impact Assessment
ERCoP	Emergency Response Cooperation Plan
ES	Environmental Statement
FSA	Formal Safety Assessment
GT	Gross Tonnage
HSC	High Speed Craft
IALA	International Association of Marine Aids to Navigation and Lighthouses
IMO	International Maritime Organisation
ITOPF	International Tanker Owners Pollution Federation Limited
LHC	Lymington Harbour Commissioners
MAIB	Marine Accident Investigation Branch
MARPOL	Marine Pollution Convention (International Convention for the Prevention of Pollution from Ships, 1973, and Protocol 1978)
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Notice
MHWS	Mean high water springs

TERM	DEFINITION
MOB	Man Over Board
MRCC	Maritime Rescue Coordination Centre
MW	Megawatt
NAVTEX	Navigational Telex
NBDL	Navitus Bay Development Ltd.
NFFO	National Federation of Fishermen's Organisations
NOREL	Nautical and Offshore Renewable Energy Liaison Group
NRA	Navigation Risk Assessment
NUC	Not Under Command
O&M	Operations and Maintenance
OREI	Offshore Renewable Energy Installation
PHC	Poole Harbour Commissioners
PLL	Potential Loss of Life
PPE	Personal Protective Equipment
QHSE	Quality, Health Safety and Environment
REZ	Renewable Energy Zone
RNLI	Royal National Lifeboat Institution
RYA	Royal Yachting Association
RYS	Royal Yacht Squadron
SAR	Search and Rescue
SMS	Safety Management System
SOLAS	Safety Of Life At Sea Convention 1974
THLS	Trinity House Lighthouse Service
TSS	Traffic Separation Scheme
UKHO	United Kingdom Hydrographic Office
VTS	Vessel Traffic Services
YHC	Yarmouth Harbour Commissioners
ZOI	Zone of Influence