PROPOSED NAVITUS BAY WIND PARK

PRELIMINARY ENVIRONMENTAL INFORMATION 3

CHAPTER 17
COMMERCIAL FISHERIES

SEPTEMBER 2013

NAVITUSBAY

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17. COMMERCIAL FISHERIES

17.1. Introduction

17.1. This chapter assesses the potential impacts on the operational aspects of commercial fisheries arising from the construction, operation and maintenance ('O&M') and decommissioning phases of the offshore elements of Navitus Bay Wind Park Project ('the Project').

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

17.3. Commercial fishing is defined as the activity undertaken by both registered commercial fishing and charter angling vessels for declared taxable profit. Potential impacts on the navigational aspect of commercial fisheries are described and assessed separately within Chapter 16, Shipping and Navigation. Recreational fisheries (which include impacts on the recreational users booking charter angling trips) are described and assessed separately within the recreation assessment presented in Chapter 22, Recreation. The assessment in Chapter 21, Socio-economics and Tourism includes the conclusions of the commercial fisheries assessment for the assessment of the wider economic impacts of the Project.

17.4. This chapter is also supported by site-specific surveys undertaken in support of the Project for Fish Ecology; further information is provided in Chapter 10, Fish and Shellfish Ecology. Further information on the detailed baseline review and project surveys is provided in summary within this chapter; full details will be provided in the Environmental Statement that will form part of the application for development consent.

17.2. Legislation, Policy and Guidance

This section outlines the legislation, policy and guidance that is relevant and important to the assessment of potential impacts on the commercial fisheries associated with the construction, O&M and decommissioning phases of the Project.

17.2.1. International fisheries regulatory framework

17.5. The European Community ('EC') is the legislative institution of the European Union ('EU') and administers fisheries management in all EU waters through its Common Fisheries Policy ('CFP'), in force since 1983. The CFP applies within the respective member states' Economic Exclusive Zones ('EEZ') but outside national jurisdiction waters (beyond the 12 NM limit).

17.6. The EC sets statutory measures for a variety of species, in partnership with the International Council for the Exploration of the Sea ('ICES'). These measures include the Total Allowable Catches ('TACs') and catch quotas, supported by technical conservation measures (e.g. gear restrictions, minimum landing sizes and closed areas), as well as decommissioning schemes to reduce fishing capacity.

17.7. Each EU Member State is responsible for policing its own quota within territorial waters (12 NM limit). In the UK these may include licensing, limited entry to a fishery, individual vessel quotas and so on. Catches and landings must be recorded and regulations govern what fishing gear can be used in shared waters.

17.2.2. National fisheries regulatory framework

17.8. The quota system in England is complex, as the distribution, availability and popularity of different fish stocks over the course of the year make it difficult for licensed vessels to fully exploit the value of the quota available to each licence. Quota species of importance within the study area (see the Baseline Environmental section) include flatfish (notably sole*, Solea solea*) and skates and rays.

17.9. Non-quota species, i.e. those not subject to TACs, are increasingly important to fishermen operating in nearshore waters because they are still economically valuable. Non-quota species of notable commercial importance within the study area include bass, shellfish (notably crabs, lobsters and whelks) and cuttlefish. Bass, crabs, lobsters and whelk are subject to management control via minimum landing sizes.

17.10. In England, the Fisheries Directorate of the Department for Environment, Food and Rural Affairs ('DEFRA') is responsible for managing and enforcing sea fisheries. DEFRA is supported by the Marine Management Organisation

('MMO'), which manages monitors and enforces quota limits as defined in the Marine and Coastal Access Act 2009.

17.11. The MMO co-ordinates the enforcement programme for monitoring, control and surveillance of all sea fishing activity within British fishery limits around the coast of England and UK vessels operating outside those waters.

17.12. The MMO works closely with the Inshore Fisheries and Conservation Authorities ('IFCA'). IFCAs are funded through local authorities and their duties and powers set out in sections 153 to 158 of the Marine and Coastal Access Act 2009. IFCAs provide the regulatory framework for fishing activities within a district out to 6 NM and are granted powers under the Sea Fisheries Regulation Act 1966.

17.13. For this Project, the South Eastern Marine Area includes the waters of the Southern IFCA ('SIFCA') based in Poole. SIFCA's jurisdiction extends from the Devon border in the West to Sussex border and covers the entire Dorset, Hampshire and Isle of Wight coastline out to 6 NM.

17.14. Beyond the 6 NM limit, fisheries regulation is the responsibility of the MMO.

17.2.3. National planning policy

17.15. The Overarching National Policy Statement ('NPS') for Energy ('EN-1'), in conjunction with the NPS for Renewable Energy Infrastructure ('EN-3'), provides the primary policy framework within which the Project will be assessed (Table 17.1).

Table 17.1 Compliance with National policy statements

Summary of NPS provision	Consideration in PEI
NPS EN-3: Part 2	
Paragraph 2.6.123: *"The Infrastructure Planning Commission ('IPC') (now the Planning Inspectorate) should consider adverse or beneficial impacts on different types of commercial fishing on a case by case basis."*	Considered within the impact assessment on availability of commercially fished species during construction O&M and de-commissioning phases of the Project (refer to the Impact Assessment section).
Paragraph 2.6.124: *"Transboundary issues may be a consideration as fishermen from other countries may fish in waters within which offshore wind farms are sited."*	The assessment of the potential for transboundary issues will be detailed within the Environmental Statement, that will form part of the application for development consent.
Paragraph 2.6.125: Where an offshore wind farm could affect a *"species of fish that is of commercial interest, but is also of ecological value, the IPC should refer to paragraphs 2.6.58 to 2.6.77 of the NPS with regard to the latter."*	Considered within the impact assessment on availability of commercially fished species during construction, O&M and de-commissioning phases (refer to the Impact Assessment section).
Paragraph 2.6.127: *"Early consultation should be undertaken with statutory advisors and with representatives of the fishing industry which could include discussion of impact assessment methodologies. Where any part of a proposal involves a grid connection to shore, appropriate inshore fisheries groups should also be consulted."*	Considered in Consultation and Baseline Environment sections.
Paragraph 2.6.129: *"The assessment by the applicant should include detailed surveys of the effects on fish stocks of commercial interest and any potential reduction in such stocks, as well as any likely constraints on fishing activity within the project's boundaries. Robust baseline data should have been collected and studies conducted as part of the assessment."*	Surveys on species of commercial interest were carried out by EMUFugro in 2013 see Chapter 10, Fish and Shellfish Ecology. Impacts are considered in the impact assessment on availability of commercially fished species during Construction, O&M and decommissioning phases (refer to the Impact Assessment section).
Paragraph 2.6.130:*"Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on commercial fishing."*	Impacts are considered in the impact assessment on loss of access to traditional fishing grounds during construction, O&M and decommissioning phases (refer to the Impact Assessment section).
Paragraph 2.6.131: *"Where the precise extents of potential safety zones are*	This is considered in Realistic Worst Case Scenario ('RWCS') (refer to

Table 17.1 Compliance with National policy statements	
unknown, a realistic worst case scenario should be assessed. Applicants should consult the Maritime and Coastguard Agency ('MCA'). Exclusion of certain types of fishing may make an area more productive for other types of fishing. The assessment by the applicant should include detailed surveys of the effects on fish stocks of commercial interest and the potential reduction or increase in such stocks that will result from the presence of the wind farm development and of any safety zones."	Impact Assessment section). Impacts on fish stocks of commercial interest are considered in the impact assessment on the availability of commercially fished species during the Construction, O&M and decommissioning phases (refer to the Impact Assessment section).

17.2.4. Local

17.16. The SIFCA ensures that the local byelaws, stipulating vessel length restrictions, fishing instrument regulations and various other input controls are complied with. Examples of SIFCA byelaws include the following:

- Restriction of the use of fixed fishing gear within the 6 NM limit from 1 April to 30 September in Poole Harbour, Keyhaven, Lymington, Test and Itchen and the River Meon;
- Restriction of the use of any vessel that exceeds 12 metres length overall for fishing within the 6 NM limit (with the exception of vessels with "grandfather rights", i.e. registered before 1995);
- Minimum landing sizes for several fish species.

17.17. A complete list of byelaws is available on the SIFCA website (www.southern-ifca.gov.uk).

17.2.5. Guidance

17.18. The following guidance and best practice documents inform the impact assessment:

- Cefas (2004). Offshore Wind Farms: Guidance note for Environmental Impact Assessment in respect of FEPA and CPA requirements. Version 2;
- Seafish (2012). Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments;
- Cefas (2012). Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas report ME5403);
- International Cable Protection Committee ('ICPC') (2006). Fishing and submarine cables – working together;
- Mackinson *et al.* (2006). A Report on the Perceptions of the Fishing Industry into the Potential Socio-economic Impacts of Offshore Wind Energy Developments on their Work Patterns and Income;
- Blyth-Skyrme (2010). Options and opportunities for marine fisheries mitigation associated with wind farms.

17.3. Assessment Methodology

17.19. This section sets out the methodology used to assess the impact of the Project on commercial fisheries receptors.

17.20. The approach to assessing the impacts from offshore wind farms on commercial fisheries follows the guidance documents presented above. The categories of impact that are relevant to the Offshore Development Area are broadly similar to other wind farm developments in UK waters, but require consideration of local conditions regarding fishing operations within the study area. Detail on local operations has been obtained from the consultation process summarised in Table 17.2. Further detail on consultation will be provided within consultation reports submitted in support of the application for development consent.

17.3.1. Study area

Turbine Area

17.21. The study area includes the open sea from St. Catherine's Point on the Isle of Wight in the east to St. Alban's Head in Dorset in the west (Figure 17.1). This area includes all inshore waters and extends beyond the most southerly extent of the Turbine Area.

17.22. The study area was defined based on discussions with the NBDL Fisheries Liaison Officer ('FLO') and the SIFCA fisheries officer. It includes fishing fleet activity during 2012 and the location of harbours used by the fleet in relation to their fishing grounds. Where fishing vessels operate from distant harbours and the target species are not associated with the Project area,

they were excluded from the assessment (refer to the Impact Assessment section).

17.23. Vessels with the greatest potential exposure to adverse effects from the construction and O&M of the wind farm are those with a significant reliance on marine resources either within or adjacent to the Turbine Area and Export Cable Corridor. The significant majority of vessels that work in this area operate from (east to west): Lymington, Yarmouth, Keyhaven, Mudeford (identified in official statistics as Christchurch), Poole and Swanage.

570000 590000 610000 630000

5640000 5620000 5600000 5580000

Blandford Forum
Ringwood
Fareham
Wimborne Minster
Lymington
Cowes
Mudeford
Ryde
Poole
Bournemouth
Keyhaven
Yarmouth
Newport
Wareham
Sandown
Swanage
Ventnor

Navitus Bay Development Ltd

Commercial Fisheries Study Area

Legend

- Turbine Area
- Offshore Export Cable Corridor
- Study Area
- Interview Locations

Fig. No.: Figure 17.1		**Date:** 15/08/2013
Author: CG	**Checked:** NDU	**Approved:** SMF
Scale@A3: 1:300,000		**Revision No.:** 02
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Ordnance Survey SeaZone
Datum: WGS 1984	**Ref. No.:** 0205130619293/02	

0 4 8 NM
0 5 10 km

N

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17.3.2. Consultation

17.24. This section provides information of the consultation undertaken to date, to inform the assessment of commercial fisheries. Advice and information provided by the consultees shaped both the assessment methodology and the scope of the assessment. The organisations consulted and the subject of each contact is provided in Table 17.2.

17.25. Consultation with the fishing industry included:

- Semi-structured interviews with representatives of the commercial fishing fleet and charter angling fleet operating in the study area. Interviews were guided by a series of questions to determine views in a standardised format.
- Two workshops held in Poole and Milford-on-Sea with fishermen and vessel owners to validate information gathered during the interviews.
- A meeting with charter angling vessel operators belonging to the key charter angling association in the study area.

17.26. Where consultations later identified fishing vessels active in the study area but originating from harbours other than those in the study area, representatives were contacted and interviewed. These locations included Weymouth, Ryde, Southampton and Shoreham.

17.3.3. Confidentiality

17.27. The confidentiality of the fishing businesses needs to be respected and care given to prevent individual operators from being identified by potential competitors. Therefore, grounds of local importance are referenced only where appropriate and the report does not identify individual vessels or vessel owners.

Table 17.2 Summary of consultation

Organisation, type and date	Summary of response	Where addressed
IPC Scoping Opinion November 2011	*"11. The commercial fishery of the area has been adequately described. We support the continued consultation and communication with local fishermen, especially as the local fleet is diverse."*	Consultation with local fishermen has been undertaken and is presented in this chapter.
	"12. It is noted that many fishermen have mentioned the possibility of the site being used as an area that enhances fisheries. For example, the rock armour could be designed to have a beneficial effect on certain commercial species such as Lobster by ensuring suitable sized holes are provided, and funding made available for stock enhancement projects."	This is noted and potential mitigation measures are summarised in this chapter. Details of mitigation options are under discussion and will be provided in the ES that will form part of the application for development consent.
	"13. The data and information section ... details that MMO surveillance data and VMS data will be utilised to inform the ES. We would expect the limitations of VMS data to be recognised and detailed in the ES. As the local fishing fleet contains vessels 12 m and under ... these may not be captured, the registration of buyers and sellers (2006) may provide additional data and we would encourage close communication with the local fishermen to make sure their interests are captured."	Data limitations, Data Sources are set out with the Scope of the Assessment. See also subsequent consultation with the MMO in June 2013 below.

Table 17.2 Summary of consultation		
	"14. ... Given the large proportion of shellfisheries that operate from <10m vessels and the paucity of data covering them, it is vital that the local IFCA is involved in ascertaining local fishing practices. It may not be possible to give an accurate picture from the other official data sources mentioned."	The Southern IFCA has been contacted for information, and a meeting was held to discuss the project. See consultation below and Data Sources set out within The Scope of the Assessment section.
	"15. .... As detailed in 6.10.9 [of the Scoping Report] many of the fishing vessels of the inshore fleet are adapted to utilise a number of fishing gear types that correspond to the seasonal fisheries of the area. Therefore the constraints of the surveillance data should be recognised."	This has been noted and is defined within The Scope of the Assessment section.
	"16. We encourage the detailed fisheries activity study ... which is to be undertaken and the acquisition of data from the international bodies responsible for landings."	International fishery bodies were consulted, and information on potential transboundary issues will be detailed within the ES that will form part of the application for development consent.

Table 17.2 Summary of consultation		
	"17. The construction and operation effects ... appear to be well described. The potential positive effect on local fish numbers should be considered with regard to the habitat modification resulting from the construction of the wind park. The fish assemblage and community structure is likely to change as a result of the wind park presence."	This has been considered within the Impact Assessment (refer to Impact Assessment section).
Marine Management Organisation Scoping Response 20th October '11	*"3.66 The IPC considers that the assessment coverage should not be limited to the location of the proposed WTGs, but should also encompass the Export Cable Corridor and the alternative grounds to which fishing effort may be displaced."*	This has been considered as part of the Baseline Environment and Impact Assessment sections of this chapter.
	"3.67 The potential impacts of displacing fishing activities from the site onto a neighbouring area should be assessed. Therefore, the assessment should not be limited purely to the Offshore Development Area."	This is noted and the study area is defined (refer to Assessment Methodology section).
	"3.68 The potential for the proposed development to be used as an area to enhance fisheries should also be explored in the ES."	This is noted and potential mitigation measures are summarised in this chapter. Details of mitigation options are under discussion and will be provided in the ES that will form part of the application for development consent.

Table 17.2 Summary of consultation		
	"3.69 The ES should clearly identify any limitations of data used in the assessment, including vessel monitoring system and fisheries surveillance data."	Data limitations are set out within this chapter (refer to Assessment Methodology section).
Marine Management Organisation Appendix to Scoping Response 20th October '11	These comments are dealt with in the comments above.	The receptors for the assessment are set out within the Baseline Environment section and include shellfisheries.
Natural England (on behalf of NE and JNCC) Scoping Response 19th October '11	*"16. In line with point 12 of the MMO response above, NE and JNCC recommend consultation with the Southern Inshore Fisheries Conservation Authority."*	The Southern IFCA has been contacted for information, and a meeting was held to discuss the project. See consultation below and Data Sources set out within The Scope of the Assessment section.
	"102. JNCC advises that they have received a response from a French fishery representative to the recent public consultation on a possible SAC at Wight-Barfleur Reef. This response suggests that the area encompassing the pSAC is heavily used by French fishermen. The response to the consultation is publicly available on request."	International fishery bodies were consulted. The potential for transboundary issues will be assessed in detail within the ES.

Table 17.2 Summary of consultation		
West Dorset District Council and Weymouth and Portland Borough Council Scoping Response 17th October '11	"1. Both councils consider that due to the geographical range of the project, there is potential for environmental impacts within their jurisdictions and the corresponding marine areas beyond the coastline. Therefore, the councils would like the ES to fully consider the following potential environmental impacts on a scale that accounts for both districts and the marine areas beyond them: Offshore Components .... - Commercial Fisheries"	This is addressed by this chapter.
SIFCA Meeting 29/05/2012	Specialist fisheries consultants presented overview of approach to baseline data collection, obtained feedback on approach from SIFCA, obtained general fisheries and fisheries management regime information, and overview of fisheries active in study area	Included within the Baseline Environment section)
36 commercial fishermen and 5 charter anglers based in Lymington, Mudeford, Keyhaven, Poole, Shoreham and Swanage Interviews June–August 2012	Round 1 interviews followed a semi-structured questionnaire to obtain comparable information on fishing practices (including key target species, fishing grounds, seasonality and value chain), financial characteristics of businesses, perceptions and concerns relating to the proposed Project and identification of mechanisms to mitigate potential impacts. Information was obtained on which vessels were most likely to be affected and if any additional vessel owners should be contacted.	Refer to Baseline Environment and Impact Assessment sections.

Table 17.2 Summary of consultation		
21 commercial fishermen based in Poole and surrounding area, and SIFCA fisheries officer Workshop 15/10/2012	Workshop held to obtain feedback from representatives of commercial fishing industry on spatial information gathered during the round 1 interviews, identification of concerns about the proposed Project and suggestions for how potential negative effects on their interests could be reduced and identification of information that would assist the fishing industry to comment further as the proposal evolves.	Refer to Baseline Environment and Impact Assessment sections. Potential mitigation options are under discussion and detail will be provided within the ES.
15 commercial fishermen based in Milford and surrounding area Workshop 16/10/2012	As above	As above
Poole Charter Boats Association Meeting 22/11/2012	Meeting to obtain information about the operations of the charter angling sector in the study area and discussed concerns about construction/O&M impacts of the project in context of charter angling businesses.	Refer to Baseline Environment and Impact Assessment sections. Potential mitigation options are under discussion and detail will be provided within the ES.
Poole and District Fishermen's Association Meeting 18/12/2012	Presentation of baseline findings to representatives of PDFA to obtain feedback on accuracy and further information for refinement.	Refer to Baseline environment section

Table 17.2 Summary of consultation		
9 commercial fishermen and 2 charter anglers based in Lymington, Weymouth, Mudeford, Poole, Swanage and Keyhaven Interviews February 2013	Owners of fishing vessels most likely to be affected by the Project were contacted. Those amenable to a meeting were presented with the baseline findings to obtain feedback on accuracy and further information for refinement.	Refer to Baseline Environment Section.
MMO Letter 24/06/13	Comments received on the baseline report noting that "The report is well structured and provides a considered, comprehensive description of the commercial fishing activities in and around the site of the proposed Navitus Bay OWF."	Refer to Baseline Environment section for full details on consultation and responses will be provided within the Consultation Report submitted in support of the application for development consent.
SIFCA Email 11/06/13	SIFCA "support[s] the content that is presented" in the baseline report.	Conclusions noted.

17.3.4. Scope of the assessment

17.28. The scope of the impact assessment was determined by considering how the receptors identified are likely to be affected by the Project activities as described in Chapter 2, Navitus Bay Wind Park Project.

17.29. The baseline environment for commercial fisheries was derived through consultations and analysis of MMO data on landings, effort and distribution of fishing activity (over-15m vessels only). This included the characterisation of the local fleet and mapping of important fishing grounds.

A brief assessment of shore-based infrastructure and ancillary industries was also conducted to inform the scope of the assessment.

Commercial fisheries receptors

17.30. The assessment considers the potential impacts on each segment of the regional fishing industry including the charter angling businesses. Based on the consultations and guidance, receptors were categorised according to the key fleet segments operating in the region. Categories have been defined based on their importance in the context of commercial fisheries active in the study area, in terms of economic importance and proportion of the local fleet operating a particular gear type (Table 17.3).

Table 17.3 Receptors used in the impact assessment

Receptor	Description
Static gear	Vessels deploying gill nets and trammel nets, cuttlefish traps, and lobster and crab pots to catch target species. Some vessels specialise in one gear type or depend primarily on one gear type. Other vessels can deploy a range of gears to target a multitude of species or to respond to seasonal abundances of target species.
Whelk gear	Vessels with a primary reliance on whelks caught using baited whelk pots, which are deployed in strings. Whelk gear was disaggregated from static gear due to the local importance of this receptor category.
Towed gear	Vessels operating trawl gear, which is towed behind the vessel. Trawling in the study area is demersal, i.e. the gear contacts the seabed, and involves otter trawls, beam trawls or scallop dredges. Commercial scallop dredging is non-existent at this time, although some exploratory fishing occurs occasionally.
Other gear	Vessels deploying a range of 'other' gears, including the rod and line fishery for bass using live bait, as well as long-lining and ring-netting. Ring-netting is not common and is a skilful form of fishing, but is occasionally employed to target mullet.
Charter angling	Licensed vessels operating commercial charter angling trips. Many charter angling vessels operate on a part-time basis, but there are a number of full-time charter angling businesses active in the study area.

17.31. Many vessels from harbours in the study area operate a combination of pots, nets and cuttlefish traps, thus these gears are aggregated together. Some vessels overlap receptor categories; for example a small number of vessels operate towed and static gear at different times of year or according to returns/market conditions.

17.32. For some impacts, there are individual vessels that are more at risk of experiencing a negative impact than the fleet category as a whole, due to a particular focus of fishing activity at grounds within the Turbine Area or Offshore Export Cable Corridor. Therefore, where appropriate and where possible, specific vessel operations that are known to have a particular reliance on the Offshore Cable Corridor and Turbine Area are assessed.

17.3.5. Issues scoped out

17.33. Consultations and analysis of Vessel Monitoring System (VMS) data established that nomadic fishing vessels are not dependent on the grounds within the study area and so were screened out of the assessment. VMS data obtained from the MMO support this position, with negligible fishing by UK vessels over 15 m in length in 2010 in the study area. These larger, nomadic vessels are capable of navigating to and fishing at grounds throughout the UK.

17.3.7. Assessment of impacts methodology

17.34. The assessment broadly follows that described in Chapter 3 (EIA Methodology). Fisheries-specific definitions and approaches used to develop the assessment methodology were informed through consultation.

Cognitive mapping

17.35. The first stage in the assessment was a cognitive mapping exercise to map sources of impacts, effects and consequences, taking into account the characteristics of the local fishing fleet as described in the baseline environment section. The cognitive mapping is a visual representation of the various sources of effects, and demonstrates interlinkages. The effects were then grouped for analysis in the impact assessment. The mapping also shows the relationships between effects.

Sensitivity of a receptor

17.36. The sensitivity of a receptor is its susceptibility to an environmental change above baseline conditions. For commercial fisheries receptors, sensitivity is determined using the following variables:

- Tolerance: how susceptible a receptor's earning capacity is to impacts from an external factor;
- Recoverability: The ability of a receptor to return to a level of commercial activity as experienced prior to the change. Recoverability may include a receptor's ability to maintain earnings by diversifying to other target species or gear types or by exploiting other fishing grounds.

17.37. Importance, which would usually be included in an environmental assessment, has been intentionally avoided. During the development of the methodology, consultations with representatives of the fishing industry led to the conclusion that 'importance' is not an equitable concept to apply when assessing impacts of the Project on commercial fisheries.

17.38. Most commercial fishing businesses operate independently and individual fishing businesses within the study area are highly dependent on specific areas of ground. Therefore, an impact that influences an individual fishing business would be deemed 'important' by that business, regardless of the financial contribution a fleet segment makes to the fishing industry, or whether a fishery could be classified as being of local, regional or national importance in terms of overall economic contribution. The inclusion of importance, therefore, risks underestimating the effect of an impact on individual business owners with a legitimate right to fish in the study area.

17.39. To characterise the sensitivity of a receptor, the following criteria have been applied (Table 17.4).

Table 17.4 Categorisation for sensitivity of a receptor

Sensitivity	Definition
High	Receptor earning capacity has a low tolerance to impacts from an external factor with low recoverability from changes caused by the external factor.
Medium	Receptor earning capacity has a low tolerance to impacts from an external factor and medium recoverability from changes caused by the external factor.
Low	Receptor earning capacity has a medium tolerance to impacts from an external factor and medium recoverability from changes caused by the external factor.
Imperceptible	Receptor earning capacity has a high tolerance to impacts from an external factor and high recoverability from changes caused by the external factor.

Magnitude of effect

17.40. Magnitude of effect provides an indication of the scale and direction of change in the environment following a proposed Project activity. It is defined by the following variables:

- Spatial extent: The extent to which fishing grounds for a certain fishery is likely to be affected;
- Duration: The operational period of the fishing industry in terms of fishing seasons.

17.41. Frequency has been omitted from the assessment of magnitude of effects, as the fisheries operating in the study area typically operate according to the seasons, over which intermittent effects have no meaningful influence. However, it is recognised that frequency is relevant in terms of fish and

shellfish ecology, changes to which indirectly influence commercial fisheries, as these receptors can respond to intermittent effects. These are discussed in more detail within Chapter 10 Fish and Shellfish Ecology.

17.42. Magnitude of effect is then assigned in accordance with the scale provided in Table 17.5 Categorisation.

Table 17.5 Categorisation for magnitude of effects	
Magnitude	Definition
High	Effect lasts for the duration of the life of the Project and affects an area of fishing ground that severely restricts receptor earning capacity.
Medium	Effect lasts for the duration of more than one fishing season up to the length of the construction period and affects an area of fishing ground that severely restricts receptor earning capacity.
Low	Effect lasts for the duration of one fishing season and affects an area of fishing ground that noticeably restricts receptor earning capacity.
Imperceptible	Effect lasts for the duration of less than one fishing season and affects an area of fishing ground that slightly restricts receptor earning capacity.

Impact significance

17.43. Impact significance takes into account the sensitivity of a receptor and the magnitude of effect. This process is guided by the significance matrix described in Chapter 3 EIA Methodology. Impact significance categories are shown in Table 17.6.

Table 17.6 Impact Assessment Matrix

		Sensitivity of a receptor			
		High	**Medium**	**Low**	**Imperceptible**
Magnitude of effect	**High**	Major	Major OR Moderate	Moderate OR Minor	Negligible
	Medium	Major OR Moderate	Moderate Minor	Minor	Negligible
	Low	Moderate OR Minor	Minor	Minor	Negligible
	Imperceptible	Negligible	Negligible	Negligible	Negligible

17.44. Impacts that are considered major or moderate are, for this assessment, deemed to have a likely 'Significant' impact on commercial fisheries. Negligible and minor impacts are reported as 'Not Significant'.

17.3.8. Significant Limitations and embedded mitigation

Limitations

17.45. Official fishing vessel statistics on numbers and landings into local ports (obtained from the MMO) only provide details on vessels greater than 10 metres. Moreover, data on vessel numbers do not include activity levels, i.e. licensed full-time and part-time vessels. In terms of landings, the majority of vessels active within the study area are vessels of 10 metres length and under, which are not legally required to submit landings records. Information on this fleet segment comes from sales notes submitted by buyers of fish from fishing vessels (The Registration of Buyers and Sellers

('RBS') Scheme). Since 2005, statistics are considered reasonably accurate, although the data available for use in this assessment are limited because of data protection covenants. The MMO employs a "rule of 5", whereby data relating to less than 5 vessels are marked as confidential.

17.46. There is no regulatory body that holds information about the activities of charter angling vessels. Where possible, targeted interviews and consultations were held with industry representatives to increase the accuracy of the baseline. Feedback was favourable in terms of the characterisation of the fisheries presented, which improved confidence in the completeness of the baseline.

17.47. Fishing activity is highly seasonal and variable from year to year in response to the natural variability inherent in fish abundance, fuel costs, legislative changes, and a host of other factors that cause fishermen to modify their activities to maximise returns. Therefore, baseline information provides a generalised picture of fishing activity at the time of data collection.

17.48. The fisheries in the study area are highly heterogeneous and fisheries are inherently variable in time and space. For these reasons, the terminology used to describe 'likelihood' in the impact assessment has been restricted to 'likely and 'unlikely'. The scale assigned to the likelihood of impacts occurring is provided in Table 17.7 .

Table 17.7 Categorisation for likelihood

Scale	Definition
Likely	Occurrence of impact is supported by evidence strong enough to establish presumption but not proof
Unlikely	Absence of impact is supported by evidence strong enough to establish presumption but not proof

Embedded mitigation

17.49. There are a number of embedded mitigation measures, which have been applied to the Project through evolution of project design, which will have a beneficial effect on the commercial fisheries impact assessment. The following measures are taken into consideration during the initial impact assessment.

- Soft start procedure for pile driving would be applied. This is a procedure whereby the hammer blow force and therefore the sound levels produced is started at a lower level and gradually increased to full piling blow force. This provides the opportunity for fish and mammals to move out of the area of predicted injury before noise levels reach those capable of causing injury and reduces the overall level of sound exposure;
- Significant archaeological features (such as wrecks) and/or unexploded ordinance ('UXO') will have exclusion zones applied to them. Wrecks are an important feature for charter angling operations in particular, thus exclusion areas that maintain the features will benefit the fishing industry;
- Export Cable Corridor incorporates buffers around aggregate license and applications areas. Commercial fishing currently operates up to the edges of the aggregate extraction areas, thus an area of ground adjacent to the aggregate extraction areas and undisturbed by construction activity would potentially benefit the fishing industry by maintaining an area of fishable ground;
- An area within the Turbine Area has been demarcated for the exclusion of monopile foundations. Noise intensity produced by the 8 m monopiles is greater than that produced by the 3.5 m pin piles. The application of a monopile exclusion zone reduces the number of monopiles used across the area;
- Cables will be buried to an appropriate depth or fixed to the seabed using cable protection material, concrete mattressing or ducting (subject to ground conditions and the presence of other sea users), to provide a distance separation between cables and fish receptors.
- For the export cable corridor installation, it is anticipated that:

- Up to 50% of the route (northern section) will be installed using ploughing and jetting (non-cohesive soils);
- Up to 50% of the route (southern section) will be installed using trenching techniques without jetting (cohesive soils);

➢ Wherever possible cable lengths will be minimised as part of the detailed design for the Project. This approach will reduce the potential for Electro-magnetic Field (EMF) effects on sensitive fauna;

➢ For all layouts, turbines are aligned parallel to the Hurst Point Leading Light boundary, to provide a straight and regular pattern for navigational safety, including of commercial fishing vessels.

17.50. The following assessment considers the potential effects on commercial fisheries receptors, incorporating these design embedded mitigation measures. In some instances, embedded mitigation is sufficient to prevent any significant impacts from occurring.

17.51. The Project will also be developed and operate in accordance with best practice and these are referred to in the following assessment. Such measures include:

➢ A Fisheries Liaison Officer ('FLO') will be appointed for the duration of construction and O&M, who will co-ordinate construction and maintenance activities with the fishing industry. NBDL has already appointed a FLO for the duration of the development period, as best practice to maintain communication with the fishing community; ;

➢ Notices to Mariners will be issued as required to inform marine users of activities relating to construction, cable-laying and maintenance;

➢ Debris arising from construction or temporary structures related to construction will be removed following construction;

➢ Any accidental debris created during construction or maintenance works will be removed as soon as is practical;

➢ The developer will use standard industry guidelines for damage to fishing equipment that is caused by lost equipment and debris which is attributed to the Navitus Bay Wind Park;

➢ Buried cable left *in situ* after decommissioning will be notified to UKHO and marked on relevant Admiralty charts.

17.52. In addition, the Shipping and Navigation assessment in Chapter 16 'Shipping and Navigation' has proposed additional mitigation measures to reduce the navigation risk to the project. Where appropriate, these are also considered in the assessment of impacts on commercial fisheries.

17.4. Baseline Environment

17.53. The following section details the baseline data gathering methodology for the assessment, data sources used and provides an overview of the commercial fisheries baseline for the assessment.

17.4.1. Data sources

17.54. Information held by fisheries authorities relevant to the activity of commercial fisheries in the study area does not provide sufficient detail to determine fishing activity. There is no regulatory body that holds information about the activities of charter angling vessels, and there is no single source of information that provides adequate detail about commercial fishing activity in UK waters.

17.55. The characterisation of fishing activity within the study area was developed through information gathered from a number of sources, notably from consultations with representatives of the fishing industry and data from the MMO. The following sections provide more detail on data sources. The organisations from which relevant information and data were requested are presented in Table 17.8. This was used to inform the baseline and survey programme, and inform the assessment. The data requested and received are outlined in Table 17.8.

Table 17.8 Data sources

Organisation	Data requested	Data received
MMO	Fisheries landings data by port: Annual and monthly landings in value (£) and volume (kg live weight) per species, gear type and port of landing for the period 2006 – 2011.	As requested

Table 17.8 Data sources		
	Fisheries landings data by statistical rectangle: Annual and monthly landings in value (£) and volume (kg live weight) per species group, gear type and ICES rectangle for the period 2006 – 2011.	
	Vessel Monitoring System ('VMS') data for study area: Spatial and temporal activity of vessels in the study area via VMS data for vessels over 15 m in length for 2010.	
	Overflight surveillance data for study area: Spatial and temporal activity of vessels in the study area via overflight surveillance for the period 2010 to end October 2012.	
Rederscentrale CV	VMS data for Belgian fishing vessel activity: Spatial and temporal activity of Belgian bottom trawl vessels in the study area via VMS data for vessels over 15 m in length for the period 2006 – 2009.	As requested

17.56. The above data sources were supplemented with the following:

- Consultations and interviews with representatives of the commercial fishing and charter angling sectors;
- Consultations with SIFCA fisheries officer and Navitus Bay Development Limited ('NBDL') Fisheries Liaison Officer ('FLO');
- Information on fishing vessel activity within the Turbine Area and Export Cable Corridor based on observations conducted by FugroEMU during surveys in summer 2012 (refer to Chapter 10, 'Fish and Shellfish Ecology').

17.4.2. Commercial fisheries baseline

17.57. This section provides a description of the commercial fisheries baseline used to inform the assessment.

17.58. The majority of commercial fishing activity in the study area is undertaken by vessels that are 10 metres and under in length and are not affiliated to a single representative organisation (such as a producer organisation).

17.59. Information collected focussed specifically on local harbours because of their importance to local fishing grounds in and around the proposed Offshore Development Area. The vessels operating from these harbours are typically small, operate with a limited number of crew and are equipped to operate short (less than 24-hour) fishing trips. These small coastal vessels are geographically restricted and limited in their capacity to exploit alternative grounds beyond their operational range.

17.60. The fishing grounds in and around the Turbine Area have also been subject to infrequent fishing activity over the years by nomadic vessels originating from ports in Sussex, Devon, Cornwall, Wales and continental Europe. Consultations with the SIFCA, FLO and local vessel operators indicated that these nomadic vessels have not been regular visitors to the local grounds in recent years, with the exception of mainland European vessels in the most southerly waters of the study area.

17.61. VMS data were also used to verify the views of local fisheries officers and fishermen that European vessels are not regular visitors to the study area (see Table 17.8 for data sources). VMS data indicate that fishing activity in the study area by European vessels was negligible in 2010, although French bass pair trawling teams were spotted about 12 NM south of St Catherine's Point on the Isle of Wight (beyond the study area) in 2013 using AIS data. As with nomadic UK vessels, the lack of reliance on grounds within the study area and the capacity to fish at any accessible grounds throughout permitted waters supports the decision to exclude these vessels from the main assessment.

17.4.3. Summary of fishing activity within broader area

17.62. Summarising fishing activity is a challenging task, as the nature of fishing in a given area changes from year to year in response to the many variables that influence operating patterns and the abundance of fish. Fuel costs, legislative changes, the natural variability inherent in natural resources and a host of other factors cause fishermen to modify their activities to maximise returns.

17.63. The description of fishing activity summarised here should not, therefore, be interpreted as a static, definitive study of the commercial fishing and charter angling operations taking place within the study area. Rather, the information that follows presents a generalised picture of fishing activity within the study area at the current time.

17.64. The section summarises UK fishing activity based on a review of official fisheries statistics compiled by the MMO (see Table 17.8), and a recent MMO evaluation of English fisheries (MMO, 2012). Further information on fishing activity will be provided in support of the Environmental Statement for the Project.

The UK fishing fleet

17.65. The number of registered UK fishing vessels has decreased significantly in recent decades as a result of decommissioning exercises operated by UK fisheries administrations, and the challenging financial environment facing UK fishing vessels. 'Decommissioning' exercises were aimed at reducing overall fishing capacity and effort in the UK fleet to support a drive for sustainable fisheries and to allow vessel owners to make a business decision on whether to remain in the fishery under the terms of fishery management plans. In the UK, all vessels that fish commercially are required to hold a fishing licence issued by UK fisheries departments. A finite number of licenses have been issued and no new licenses are being made available, although licenses can be transferred between vessels. Restrictive licensing controls, increasingly stringent management and enforcement measures, increasing operating costs and the difficulty with attracting a new generation of people to work at sea largely explain the reduction in UK fleet size.

17.66. In 2011, the UK fishing industry had 6,444 registered fishing vessels compared with 7,721 in 2001. The fleet in 2011 comprised 5,056 10-metre and under vessels and 1,388 over 10-metre vessels. Within the English fleet, 82% of vessels are 10 metres and under. The English fleet is involved in several key fisheries which are typically lower volume but higher priced, and of which a significant proportion takes place in inshore areas. These factors have allowed the English fleet to develop with a greater proportion of smaller vessels (10 metres or less in length) that are able to remain economically viable through catching smaller quantities of more valuable fish.

17.67. The administrative port closest to the study area is Poole where a total of 482 vessels and 847 fishermen (full-time and part-time) were registered in 2011. After Newlyn, Poole is the second most important port in terms of the number of vessels and fishermen along the UK's south coast.

17.68. VMS data indicate that activity by UK-registered 15-metre and over fishing vessels in the footprint of Offshore Development Area is limited, with activity in 2010 located within the Turbine Area only and by mobile fishing gears only. VMS data from 2010 indicate the grounds within the footprint of the Offshore Development Area are not significant for the UK 15-metre and over fleet.

Summary of MMO landings data

17.69. An information request was submitted to the MMO requesting data for the years 2006 to 2011, including landings data relating to ICES rectangles 30E8 and 29E8 (within which the Offshore Development Area is situated) and landings data for the ports of Christchurch (Mudeford), Isle of Wight, Lymington and Keyhaven, Poole, Portsmouth, Selsey, Southampton and Swanage.

17.70. In 2011, total landings for all ports combined amounted to just over 6,500 tonnes in volume and £10.3 million in value. The region supports high-value fisheries that are dominated in terms of value by landings of whelks, lobster and brown crab. These three species contribute annual landings of over £1 million each and are targeted by potting gear specific to the target species. The general pattern of overall landings is that the value of landings in the region is probably increasing slightly over time.

17.71. Clams, oysters and scallops are of regional importance in terms of landed value and volume, but are not currently fished from grounds within the footprint of the Offshore Development Area, thus were not considered in the baseline. The most important species within the study area in terms of value are whelks, lobsters, brown crab, bass, sole and cuttlefish. Despite fluctuations from year to year, other species such as skates and rays can also contribute significantly to overall landings.

17.4.4. Characterisation of local fishing activity

Fishing fleet based at local harbours

17.72. The habitat in the waters between Hengistbury Head and the Needles is rich and varied, with a variety of substrates ranging from high-intensity rocky ground to soft sands. Fisheries targeting particular species generally correlate with the substrate. For example, the rocky habitat at Christchurch Ledge is particularly important for vessels deploying lobster pots, which is a critical fishing ground for vessels operating from Mudeford.

17.73. There is high intensity fishing effort in the inshore waters, with fishing grounds within Poole Bay and Christchurch Bay fished by passive (also called static) gear, including nets, pots and traps, around which mobile gears operate, including trawls, long-lines and rod and line. Moving offshore into the Turbine Area, the ground becomes more uniform and fishing is dominated by pots targeting shellfish and crustaceans, and to a lesser extent gillnets. Demersal trawlers operate throughout the inshore waters where the seabed permits, up to the north of the Turbine Area. Trawling is restricted further south by the presence of large pebbles and rough seabed.

17.74. The local harbours within the study area are, from west to east, Swanage, Poole, Mudeford (Christchurch in MMO records), Keyhaven and Lymington. Yarmouth on the Isle of Wight falls within the study area, but the vessels are not reported to fish with the footprint of the Offshore Development Area, relying instead, primarily on potting grounds south-west and south-east of the island.

17.75. SIFCA report a total of 144 vessels with active fishing permits operating from local harbours within the study area. The number of vessels that fish within the footprint of the Turbine Area and the Export Cable Corridor is significantly less than 144, as not all vessels with fishing permits fish the grounds within the study area or in the vicinity of the Offshore Development Area. The majority of vessels registered at Poole, for example, are engaged in fishing activity within Poole Harbour or close to the harbour entrance.

17.76. Discussions with SIFCA and vessel owners active in the footprint of the Offshore Development Area indicate that of the vessels with active fishing permits, between 25-30 commercial fishing vessels and 15-25 charter angling vessels are regularly active at fishing grounds in the vicinity of the Export Cable Corridor and Turbine Area. The number of vessels that obtain a significant proportion of earnings from within the footprint of the Turbine Area is likely to be less, based on interviews and discussions at the fisheries workshops.

17.77. Improving the accuracy of this estimate is difficult, as vessels will alter the grounds fished depending on conditions and circumstances at the time, i.e., one vessel may have more or less reliance on fishing grounds within the Turbine Area in a given year depending on the abundance of target species, quota availability, and weather patterns and so on.

17.78. The significant majority (83%) of vessels owned by the interviewees (n=41) are 10-metres and under, with a crew of between one and three. Over 10-metre vessels operating regularly in the study area operate with crews of three to four. The length of fishing trips generally corresponds to the vessel size, with 10-metre and under vessels fishing day trips and the larger vessels undertaking trips of up to five days. All the fishermen interviewed are full-time fishermen, of whom 82% have been active for over 20 years.

17.79. The annual turnover for vessels indicates significant variability in turnover both within and between fleet segments. Variability in turnover reflects the type of vessel, target species, vessel capability and effort/time at sea.

17.80. A wide range of gear types is operated in the study area, with the majority of interviewees deploying multiple gears, sometimes concurrently, depending on the season, availability of target species, market conditions and other variables. Netting is the most prevalent gear type in operation, followed by lobster and crab pots, whelk pots and cuttlefish traps.

17.81. Economically important target species are varied, reflecting the diverse nature of the fisheries in the area and the multitude of gear types in operation. Certain gears are designed or operated to catch one species only. The remaining fishing gears, nets, longline and trawls, are less selective and result in a more diverse catch, which will be retained or discarded depending on quota restrictions, size of individual fish or shellfish, marketability and quality.

17.82. Charter angling vessels all operate the same method of fishing, essentially rod and line fishing with bait, which is generally bought in advance from bait shops. The vessels will work different locations, known as fishing marks,

depending on the time of year (which influences the availability of target species), weather and to accommodate the requirements of the customer.

17.83. The images shown in Figure 17.2 to Figure 17.7 were developed by compiling polygons of fishing grounds for vessels originating from harbours in the study area, based on the interviews and workshops with fishing business owners. The fisheries that occur regularly in the footprint of the Turbine Area include: crab and lobster potting, bass rod and line fishing, whelk potting and netting. Trawlers may occasionally operate in the northern tip of the Turbine Area but are not reported as regularly fishing there. Charter angling activity also occurs within the Turbine Area, but again is more prevalent in the inshore water and within the footprint of the Export Cable Corridor. The fisheries that occur regularly in the footprint of the Export Cable Corridor include: crab and lobster potting, bass rod and line fishing, whelk potting, netting, ring-netting, trawling, cuttlefish trapping, long-lining and charter angling.

17.84. Figure 17.2 describes the fishing grounds for cuttlefish, which are of key importance to vessels operating within the study area. In Figure 17.3, Christchurch Ledge is significant for vessels targeting lobsters and operating from nearby harbours. Figure 17.4 shows netting grounds, which are primarily fished by static gears, although some vessels state they operate drift nets in waters in Poole Bay. Netting is also conducted within the Turbine Area. The figure represents netting grounds targeted by the bulk of the netting fleet. Figure 17.5 describes trawling, which is widespread throughout the study area although the key grounds for trawlers operating from ports in the study area and vessels with grandfather rights are north of the Turbine Area. In Figure 17.6, whelk pots are distributed over a broader area than shown in the figure, but the grounds highlighted are those, which are of greatest importance to local vessels that specialise in whelk fishing and which are most active in the footprint of the Project. For Figure 17.7, bass rod and line fishing is conducted by dedicated vessels and as a component fishery of multi-gear fishing businesses. The figure here represents important bass rod and line grounds for dedicated vessels targeting bass. Vessels targeting bass as part of a mixed fishery will fish throughout the inshore waters.

17.85. Gear use within the inshore waters (from shore to about 6 NM) shows a more distinct seasonal pattern than the activity in the offshore waters. This is due to the influence of seasonal aggregations of target species in local waters, notably cuttlefish, bass and sole. By contrast, the fisheries in offshore waters are more consistent in terms of gear deployed, with potting for whelks, crab and lobster, and demersal trawling tending to continue throughout the year. The exception is the rod and line bass fishery, which is dictated by the seasonal presence of bass, which fishermen report migrate through and spawn within the study area. This information is in accordance with the findings reported in Chapter 10 of this ES.

17.86. In terms of representation, there is no single organisation or association that represents commercial fishing or charter angling activity in the area. The significant majority of commercial fishing vessels are non-sector, that is, the majority of vessels do not belong to a Producer Organisation. There is a council that was convened to represent local fishermen, the South Coast Fishermen Council, which covers the same area as the SIFCA; however, interviews with fishermen indicate that many are not active participants in associations or councils and operate relatively independently. The relative lack of organisation and representation is characteristic of inshore fisheries operating in many parts of England and hampers the capacity of the local industry to engage in co-ordinated discussion with other marine users.

Shore infrastructure

17.87. Shore infrastructure to support the fishing industry is limited at most sites in the area. There is strong competition for quay space and moorings from leisure craft and housing and commercial development. There are no auction markets and few dedicated facilities for landing, handling and holding of catches, or for servicing the requirements of fishing vessels. Hence a proportion of the catch is landed away at Brixham, Plymouth and Newlyn. Alternatively, buyers frequently organise transport to meet vessels landing their catch at local harbours to transport it to the buyer's centralised facility or via vivier (live transport) to markets in continental Europe.

17.88. To remain operational, vessels require support services including fuel supply, gear supplies and engineering. Fuel is typically obtained from depots in the harbours the vessels are moored in. Fishing gear was more commonly made by the fishermen in the past, however this skill is often outsourced and fishing gear is commonly bought ready-made by specialist

gear manufacturers. Engineering services are required for specialist maintenance for engines, electrical systems or electronics. Notable boat yards are located in, but not limited to, Poole, Lymington, Cowes, Yarmouth and Southampton.

17.89. At some locations there appears to be a need for improved berthing and landing facilities with access and parking, facilities for the supply of fuel, ice and water, holding facilities for fish and shellfish, and storage for gear and bait.

Processing and marketing

17.90. Catch by vessels in the study area is generally sold to a processor/buyer, although there is a limited amount of direct selling to restaurants, hotels and the public via fishmongers. Direct marketing is important for some vessels at Mudeford, with the fishmonger on Mudeford Quay a good example of a direct sales initiative. The fishmonger is reliant on landings by the local fleet.

Valuation of fishing activity

17.91. Data on landed value and volume caught in ICES statistical rectangles 29E8 and 30E8 (See Figure 17.8) were obtained from the MMO for the following species groups, which comprise the key commercial target species:

- Demersal (bass, sole, skate, rays and sharks);
- Crustaceans (lobsters and crabs);
- Molluscs (cuttlefish, scallops and whelks).

17.92. The two statistical rectangles that cover the Offshore Development Area include 29E8 and 30E8. ICES rectangle 29E8 covers the offshore waters, including the southern extent of the Turbine Area, and ICES rectangle 30E8 covers the inshore waters, including the northern extent of the Turbine Area and the Export Cable Corridor (see Figure 17.8).

17.93. The total value of landings caught within 29E8 for the years 2006 to 2011 varied between £413,397 and £1,080,415. The most noticeable feature for value of landings in 29E8 is the dominance of total value and volume by landings of lobster and crab. By contrast, landings in 30E8 are dominated in terms of volume by landings of molluscs (predominantly whelks), while landings of crustaceans, demersal fish and molluscs all make significant contributions to overall value of landings. The total value of landings caught within 30E8 for the years 2006 to 2011 varied between £2,197,334 and £3,431,410.

17.94. For commercial fishing businesses, significant environmental impacts that occur due to the construction and O&M of the Project would ultimately be experienced as a reduction in earnings. Reductions in earnings could be experienced via reduced abundance of target species, reduced fishing efficiency or increased costs associated with mitigating restrictions to normal fishing operations. As individual fishing businesses often operate with tight margins, a reduction in earnings can result in financial hardship for a business.

17.95. There is no formally agreed method to calculate the value of landings in data deficient situations, however, to provide a reference point of the value of landings caught within the footprint of the NBWP Offshore Development Area and Export Cable Route, the baseline applied two approaches to estimating landed value, as described below.

17.96. **Proportional Area Technique** ('PAT'): This method is described within the UK Fisheries Economic Network Impact Assessment Guidance (UKFEN, 2012). The technique assumes that fishing effort and value is distributed evenly throughout the area being assessed, which is a weakness, as there are areas of high and low productivity within the study area.

17.97. The value of landings of key economic species caught within the relevant ICES statistical rectangles was determined from MMO landings data. The second step was to calculate the area of seabed that would be occupied by the Project and to put this into context of the area of the ICES statistical rectangles. By assuming an equal distribution of value of fish and shellfish caught throughout the ICES statistical rectangles, an approximate annual value of landings from the Project area was estimated at £300,000.

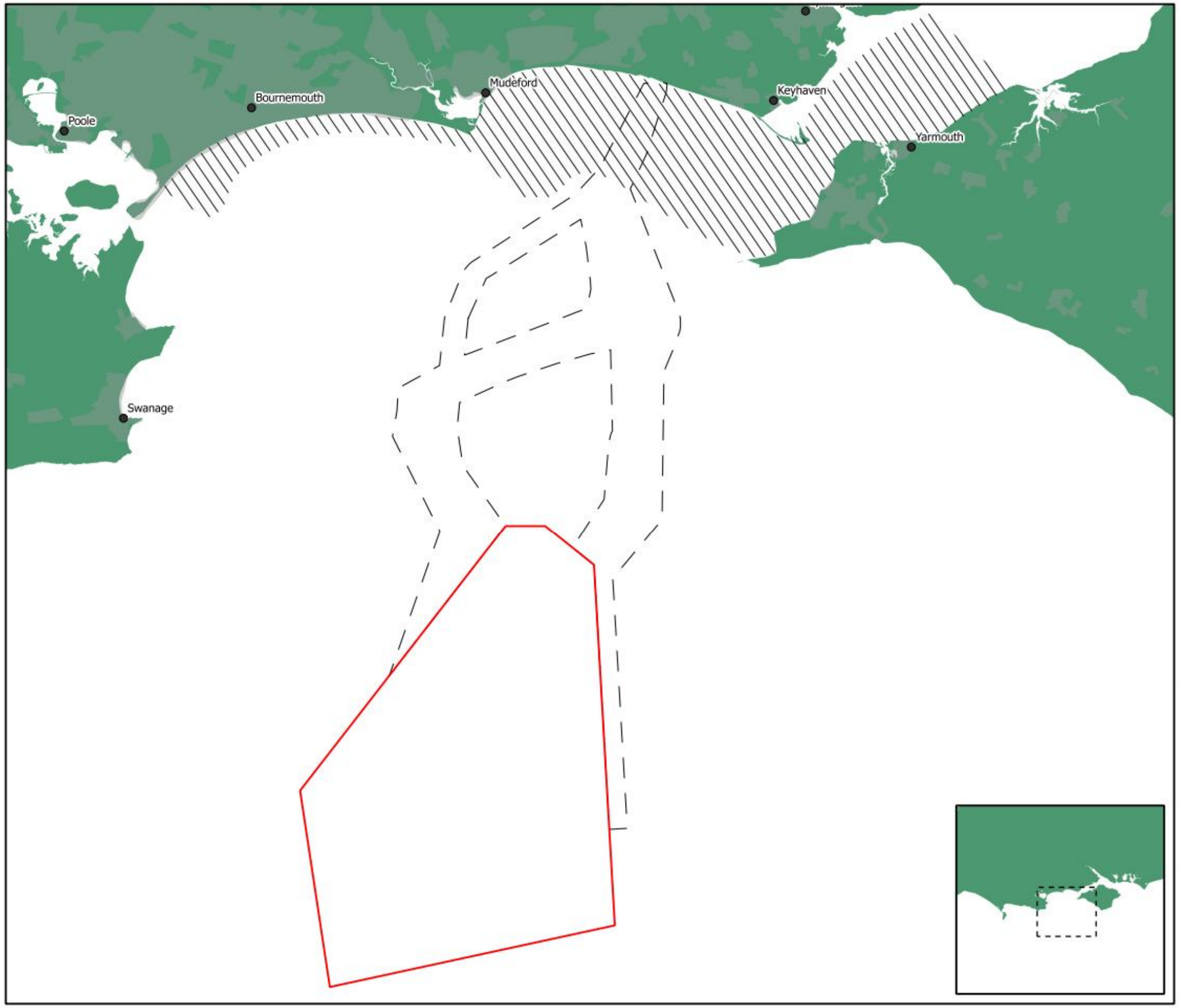
17.98. As noted, the productivity of fishing grounds throughout the study area is highly variable and so a second reference point was determined by applying a second approach to valuation, which requires:

- Identification of the categories of vessels that are operational within the Project area;

- Identification of the number of vessels within each of these categories active in the Project area;
- Estimating the average annual gross earnings of each fleet category; and
- Estimating the proportion of vessel earnings derived from the fishing grounds within the Project area.

17.99. Although reported annual earnings of vessels varied significantly between fleet categories, broad estimates were derived based on knowledge gained during the consultations and published analyses of the economic performance of sectors of the UK fishing fleet.

17.100. The value of landings from the footprint of the Project estimated using this approach was about £430,000 per annum. Information on the financial performance of charter-angling vessels was dependent entirely on information from the sector. The majority of charter-angling vessels are part-time and there is significant variance between businesses in terms of the number of trips conducted per year. Given the uncertainties about the financial performance of charter angling operators and uncertainty on the dependence on marks within the footprint of the Offshore Development Area, no estimate of earnings was produced for the baseline.



Navitus Bay Development Ltd

Cuttlefish Trap Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery Extent

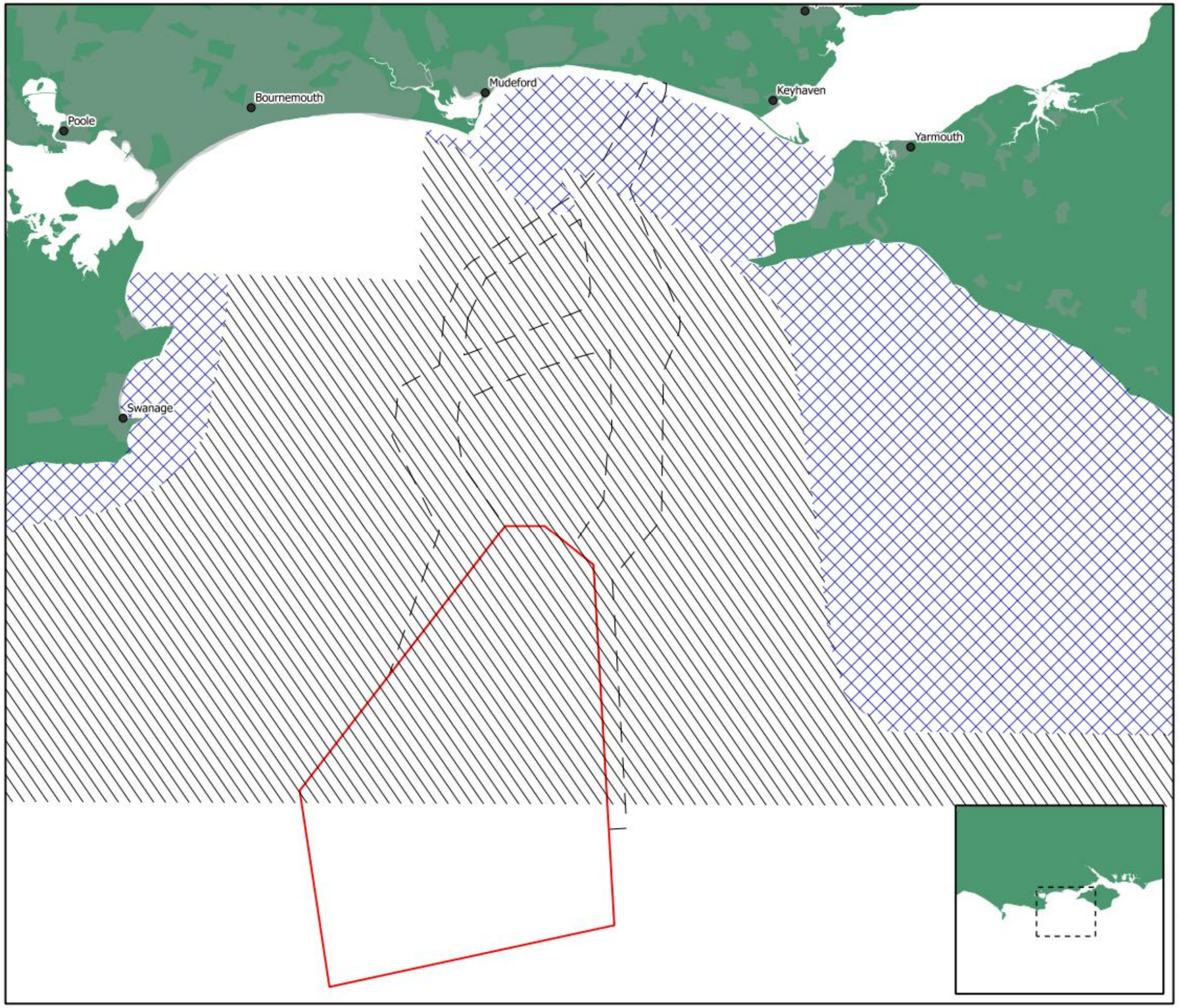
Fig. No.: Figure 17.2		**Date:** 17/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.2	

0 5 nm

0 5 km

N

NAVITUSBAY



Navitus Bay Development Ltd

Potting Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery activity level

High

Low

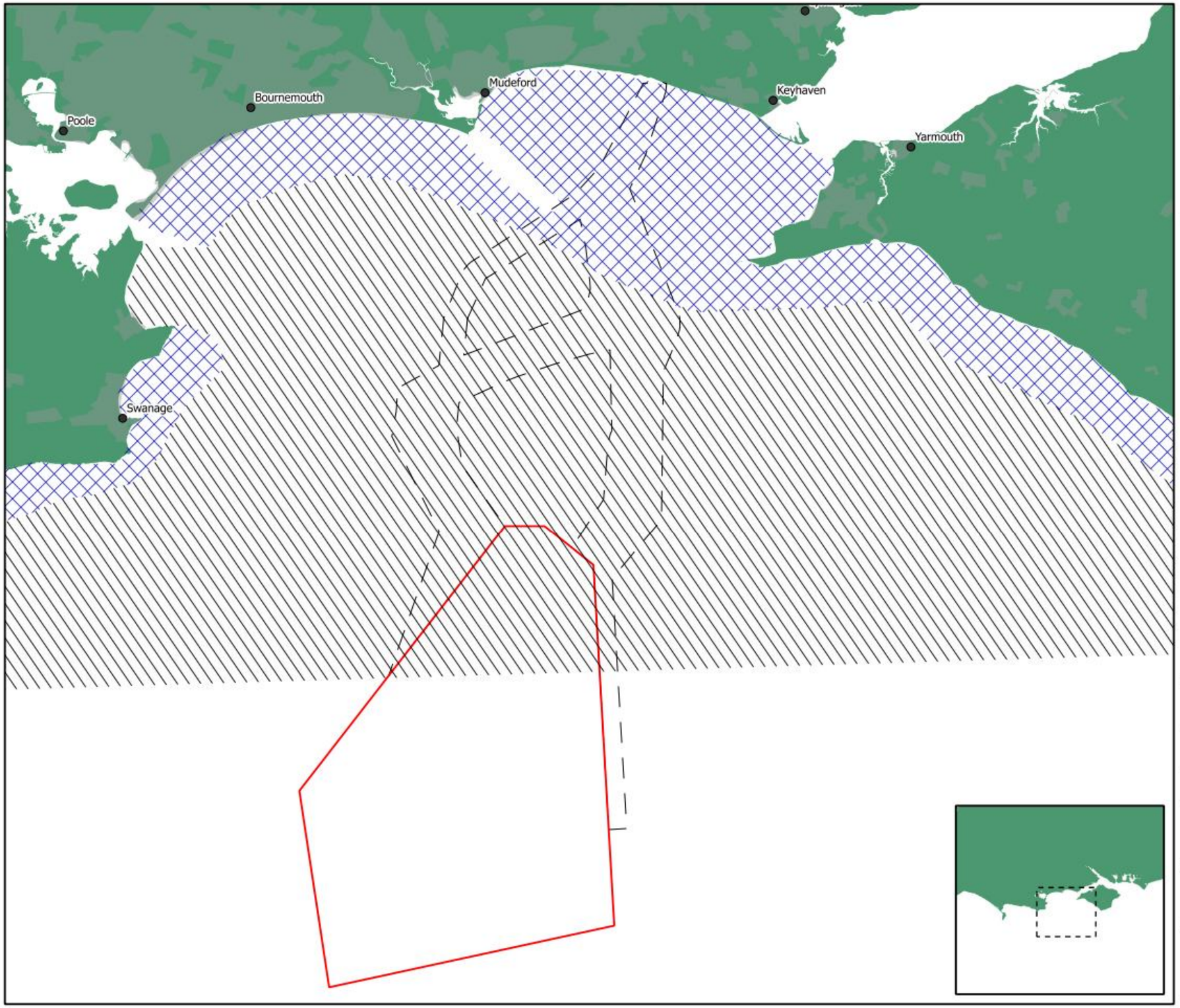
Fig. No.: Figure 17.3		**Date:** 17/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.3	

0 5 nm

0 5 km

N

NAVITUSBAY



Navitus Bay Development Ltd

Netting Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery activity level

High

Low

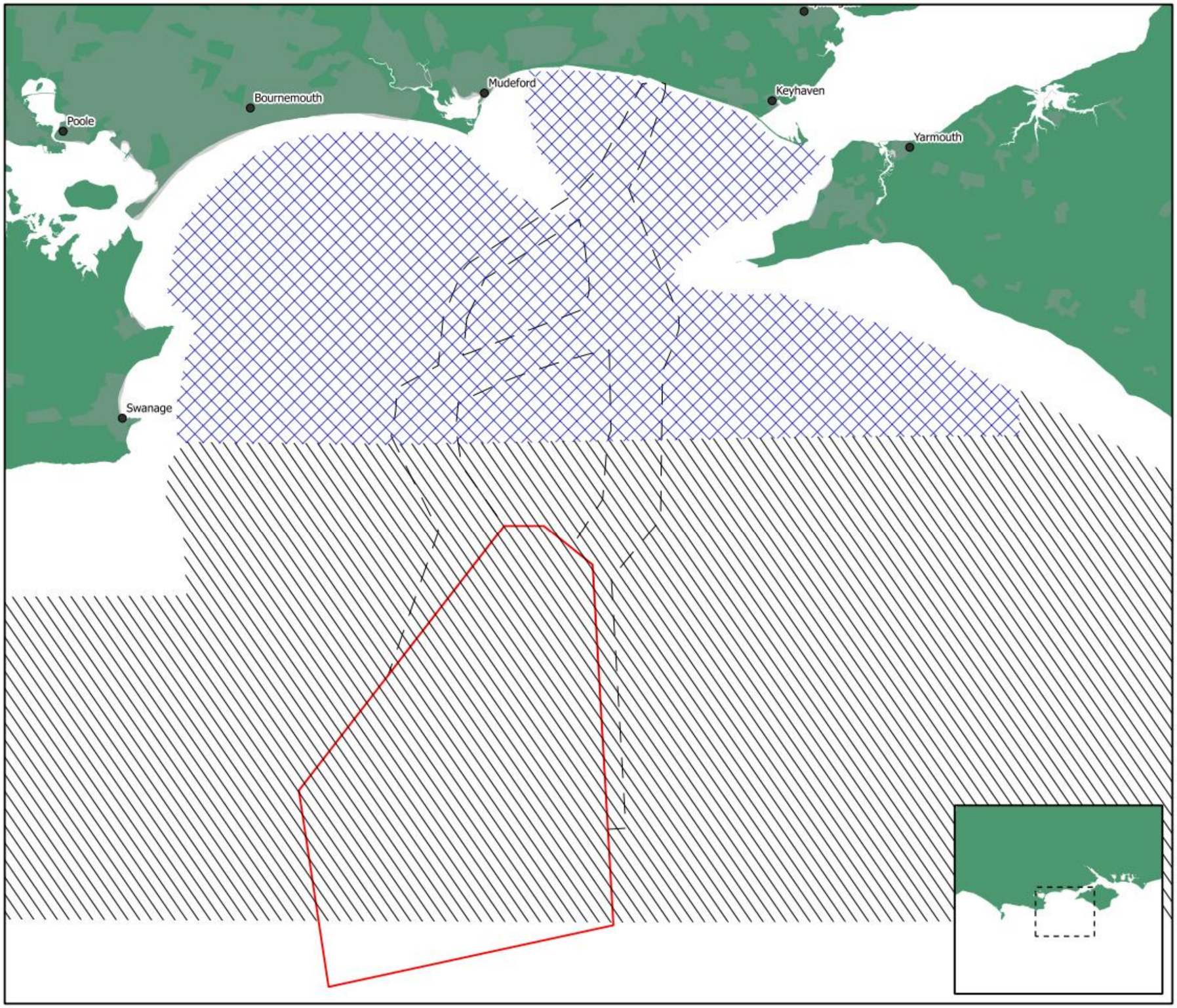
Fig. No.: Figure 17.4		**Date:** 17/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.4	

0 5 nm

0 5 km

N

NAVITUSBAY



Navitus Bay Development Ltd

Trawling Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery activity level

High

Low

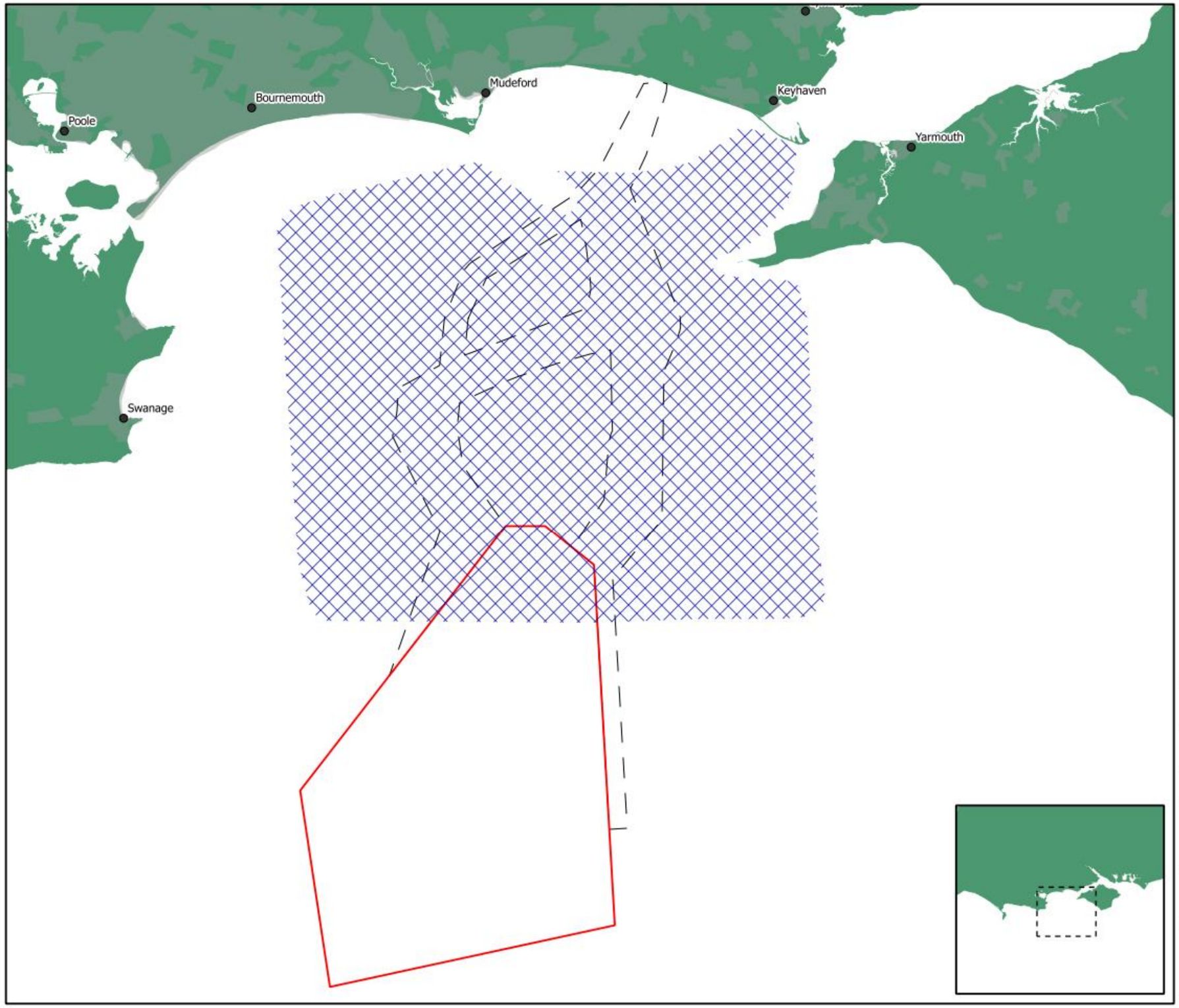
Fig. No.: Figure 17.5		**Date:** 17/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.5	

0 5 nm

0 5 km

N

NAVITUSBAY



Navitus Bay Development Ltd

Whelk Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery activity level

High

Low

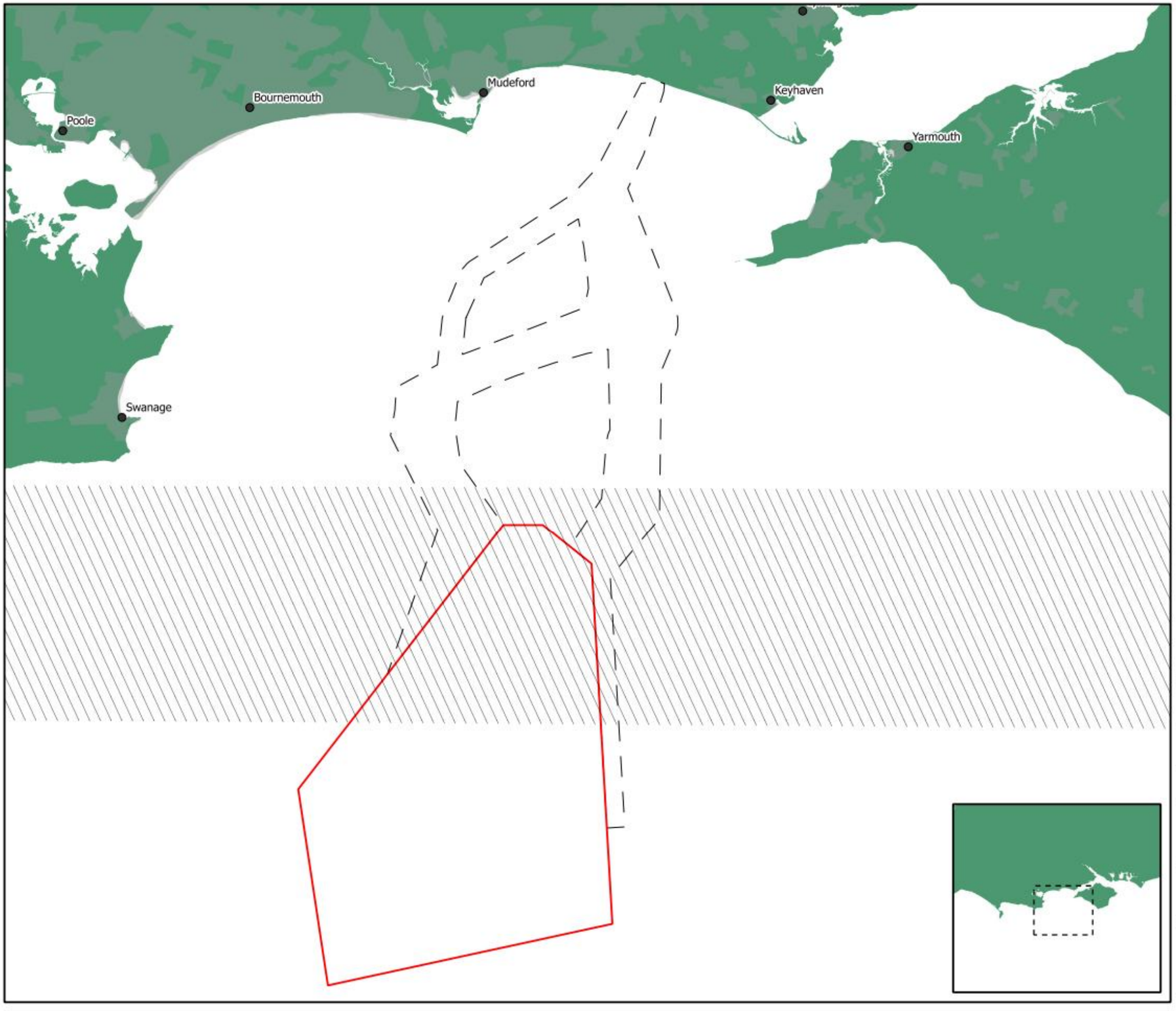
Fig. No.: Figure 17.6		**Date:** 17/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.6	

0 5 nm

0 5 km

N

NAVITUSBAY



Navitus Bay Development Ltd

Rod and Line Fishing Grounds

Legend

Proposed Navitus Bay Site

Proposed Offshore Export Cable Corridor

Fishery activity level

High

Low

Fig. No.: Figure 17.7		**Date:** 16/06/2013
Author: MEP	**Checked:** MEP	**Approved:** MEP
Scale@A3: As Scale Bar		**Revision No.:** 4
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** MEP OS
Datum: WGS 1984	**Ref. No.:** MEP/2526/ES/17.7	

0 5 nm

0 5 km

N

NAVITUSBAY

520000 560000 600000 640000 680000

5640000

5600000

5560000

Wells
Andover
Farnham
Alton
Wilton
Salisbury
Winchester
Horsham
Somerton
Wincanton
Midhurst
Yeovil
Totton
Southampton
Ringwood
Chichester
30E8
Bournemouth
Cowes
Ryde
Poole
Wareham
Yarmouth
Swanage
Weymouth
Ventnor
29E8

Navitus Bay Development Ltd

Statistical Rectangles 29E8 and 30E8

Legend

- Turbine Area
- Offshore Export Cable Corridor
- Statistical Rectangles

Fig. No.: Figure 17.8		**Date:** 15/08/2013
Author: CG	**Checked:** NDU	**Approved:** SMF
Scale@A3: 1:600,000		**Revision No.:** 02
Coordinate System: WGS 1984 UTM Zone 30N		**Data Sources:** Ordnance Survey
Datum: WGS 1984	**Ref. No.:** 0205130417258/02	

0 5 10 NM

0 15 30 km

N

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17.5. Impact Assessment

17.5.1. Realistic worst case scenario

17.101. The parameters which have been used to define the Rochdale Envelope for the Project have been used to describe the Realistic Worst Case Scenario ('RWCS') for each potential effect on commercial fisheries. This is detailed in Table 17.9.

17.102. During the construction and decommissioning phases of the Project, a 500 m 'rolling' safety zone will be applied around each wind turbine and other offshore structures for navigational safety. During operation, where exceptional, major maintenance is required, a 500 m safety zone is proposed to be employed. A 50 m safety zone may also be applied for around the structures when construction works have been completed but prior to the wind farm being commissioned. (refer to Chapter 16 'Shipping and Navigation' for further details). The realistic worst case scenario for the commercial fisheries assessment considers the application of safety zones during construction and decommissioning.

17.103. With regard to operational safety zones, at this stage of the consent process there is not currently no 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;

17.104. The likelihood is that commercial fishing vessels would maintain a distance from established structures when operating fishing gear as a safety precaution. Although at this stage of the consent process it is not the intention to apply for safety zones, to provide a worst case scenario assessment with regards to displacement of commercial fisheries activity, the application of operational safety zones of 50 m are included

.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Construction		
Loss of access to traditional fishing grounds.	Rolling safety zone of maximum 500 m to be applied around structures, partially completed structures and vessels actively installing subsea cables. Maximum of 218 x wind turbines, 3 x offshore substations, 1 x Meteorological Mast ('met mast') Maximum of 4.5 years of construction activity, in three installation phases	Rolling safety zones affecting the entire Offshore Development Area during the three installation stages provide for the greatest loss of fishing grounds. Fishing can be excluded from an area of more than 500 m around each structure as construction activities for turbine installation are taking place. As a worst-case scenario, a 500 metre rolling safety zone is applied during construction that excludes all types of fishing activity.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Interference with fishing operations by construction traffic and plant.	Maximum number of heavy vessel movements over total construction period is estimated as 1,141 comprising approximately: ➢ 3 x Foundation installation vessels (400 vessel movements); ➢ 3 x Wind turbine installation vessels (200 vessel movements); ➢ 2 x Substation installation vessels (18 vessel movements); ➢ 2 x Inter-array cable laying vessels (100 vessel movements); ➢ 1 x Export cable laying vessel (18 vessel movements); ➢ 2 x Meteorological Mast ('met mast') Installation vessels (5 vessel movements); ➢ 1 x Scour protection vessel (400 vessel movements). Maximum number of light vessel movements over total construction period is 6,300 comprising: ➢ 300 towing and anchoring vessels movements; ➢ 2,500 crew transfer vessel movements; ➢ 2,500 commissioning vessel movements; ➢ 1,000 guard vessel movements.	Maximum estimated number of vessel movements required to cause greatest interference with fishing vessels. This assumes a maximum construction schedule of 24 hours a day, 7 days a week for a maximum construction period of 4.5 years. Maximum number of heavy vessel movements per year: 253 assuming a 4.5 year construction period. Maximum number of light vessel movements per year: 1400 assuming a 4.5 year construction period.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Interference with fishing activities by seabed objects and obstructions.	Turbines: maximum 218 x gravity base, diameter of 37.5 m at seabed reducing to a maximum diameter of 8 m at sea level. Maximum spacing of 756 m x 1,008 m between turbines Substations: maximum 3 x gravity base, diameter of 45 m at seabed reducing to a maximum diameter of 8 m at sea level Met Mast: maximum 1 x monopile, diameter of 4 m throughout water depth Scour protection: maximum diameter 12.5 m around foundations Construction period: maximum 4.5 years, in three installation phases of 30 months each	Within the Offshore Development Area and during the 4.5 years of construction activity, the greatest number of structures gives rise to the greatest potential for debris and fasteners to be placed on the seabed.
	Inter-array cables: Up to 296 km associated with turbine foundations and back-up connections (redundancy loops). Up to 22 km cables requiring surface laying and cable protection (7 m width), maximum 154,700 m^2 seabed area take	Greatest potential for obstructions on the seabed.
	Inter-substation cables: Up to 70 km of cabling with a two circuit inter-connection (35 km for a single cable connection), up to 5.4 km cables requiring surface laying and cable protection (7 m width), maximum 37,800 m^2 seabed area take	Greatest potential for obstructions on the seabed.
	Export cables: Up to 210 km cable, based upon 6 x 132 kV export cables (35 km each)	Greatest potential for obstructions on the seabed.
Ecological impacts on fish and shellfish resources associated with commercial fisheries from construction activities.	Full details are reported in Chapter 10 'Fish and Shellfish Ecology'. However, noise effects related to: Maximum (peak) hammer energy of 1,800 kilojoules ('kJ') per monopile foundation and active piling for one monopile foundation, and based on 4 hours over a 24 hour installation period; Maximum (peak) hammer energy of 1,400 kJ per for pin piles required for space frame foundations, and based on active piling for each jacket foundation is 8 hours over a 48 hour installation period.	The scenarios set out in Chapter 10 Fish and Shellfish Ecology indicate a likelihood of disturbance to commercially fished species and therefore secondary disturbance for commercial fisheries targeting those species. These include disturbance to spawning, nursery and feeding habitats, and target species and their prey.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Operation and maintenance		
Loss of access to traditional fishing grounds.	A 50 m safety zone around each turbine and offshore substation within the Turbine Area. Maximum of 218 x 5 MW turbines Maximum of 3 x offshore substations Maximum of 1 x met mast	Maximum effect on static gear receptors able to operate within the Turbine Area assumed by application of 50 m safety zones around turbines and offshore substation. Maximum effect on towed gear receptor through loss of access to fishing grounds due to inability for vessels to fish safely within the Turbine Area due to presence of cables.
Permanent loss of fishing grounds due to seabed structures.	For the life of the Project, the assessment assumes a loss of fishing grounds due to the placement of: Maximum of 218 x turbines with minimum crosswind spacing of 756 m and downwind spacing of 1008 m; Maximum of 3 x offshore substations Maximum of 1 x met mast Maximum of 296 km inter-array cabling including back up connections, maximum of 22 km inter-array cabling requiring 154,700 m^2 surface protection Maximum of 70 km of inter-substation cables with a two circuit inter-connection (35 km for a single cable connection), maximum of 5.4 km cabling requiring surface laying and cable protection (7 m width), maximum 37,800 m^2 seabed area take	Within the Turbine Area, the worst-case scenario provides for the greatest seabed occupancy from the Offshore Development Area resulting in permanent loss of seabed habitat that may otherwise have been exploited by commercial fishing vessels. Export cables are anticipated to be buried to an appropriate depth, resulting in no permanent loss of fishing grounds due to seabed structures.
Interference of fishing activities by cabling.	Up to 296 km associated with turbine foundations and back-up connections (redundancy loops). Up to 22 km cables requiring surface laying and cable protection (7 m width), maximum 154,700 m^2 seabed area take Up to 70 km of cabling inter-substation cables with a two circuit inter-connection (35 km for a single cable connection). Up to 5.4 km cables requiring surface laying and cable protection (7 m width), maximum 37,800 m^2 seabed area take	Within the Turbine Area, the worst-case scenario provides for the greatest potential for interference of fishing activities by cabling.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Interference with fishing activity by O&M traffic.	Maximum level of vessel activity across the Project area through scheduled and unscheduled maintenance and inspection visits Maximum of 218 x turbines requiring maintenance and inspection Maximum of 3 x offshore substations requiring maintenance and inspection Maximum of 1 met mast requiring maintenance and inspection. Maximum of 5 service vessels making 1,000 vessel movements per annum for scheduled and unscheduled maintenance	Maximum number of turbines, offshore substations and met mast requiring maintenance and inspection, which maximises the potential for interference with fishing vessels and gear. Realistic worst case scenario is maintenance vessels transiting through established fishing grounds and interacting with fishing vessels operating within the Project area during the operational phase.
Ecological impacts on fish and shellfish resources associated with commercial fisheries from O&M activities.	Full details are reported in Chapter 10 'Fish and Shellfish Ecology'. However, the maximum seabed and associated habitat loss from foundation installation and cable laying is considered to be the RWCS.	The scenarios set out in Chapter 10, Fish and Shellfish Ecology indicate a likelihood of disturbance to commercially fished species and therefore secondary disturbance for commercial fisheries targeting those species.
Decommissioning		
Interference and displacement from decommissioning activities	Removal of the maximum number structures above the seabed associated with the Project including: 218 x turbine foundations, towers and nacelles, 3 x offshore substations (foundations and tower) and 1 x met mast (foundation and tower) Buried cables remain *in situ* Maximum number of decommissioning vessels required	Maximum number of structures results in maximum decommissioning activities and maximum vessel numbers. A full decommissioning plan will be agreed with the relevant government department at the point of decommissioning. At present, decommissioning assumes removal of all structures above the sea bed. Rolling safety zones affecting the entire Offshore Development Area during decommissioning provide for the greatest loss of fishing grounds. Fishing can be excluded from an area of more than 500 m around each structure as decommissioning activities are taking place. As a worst-case scenario, a 500 m rolling safety zone is applied during construction that excludes all types of fishing activity.

Table 17.9 Rochdale envelope parameters relevant to the commercial fisheries impact assessment

Potential effect	Realistic Worst Case Scenario	Rationale
Ecological impacts on fish and shellfish resources from decommissioning	Full details are reported in Chapter 11 'Fish and Shellfish Ecology'. However, removal of all structures associated with the Project (Maximum of 218 x turbines (foundations, towers and nacelles), 3 x OSP, 1 x met mast), and buried cables remain in situ, is considered the RWCS.	The scenarios set out by in Chapter 10; Fish and Shellfish Ecology indicate a likelihood of disturbance to commercially fished species and therefore secondary disturbance for commercial fisheries targeting those species.

17.5.2. Potential effects

17.105. Based on information from the interviews, fisheries workshops and discussions with the SIFCA and FLO, a series of pathways were identified through which commercial fisheries may be impacted during the life of the Project. As discussed within the Scope of the Assessment section, the sources and the pathways through which the effects are transmitted were first analysed through a source-pathway-receptor analysis for construction (Table 17.10), O&M (Table 17.11) and decommissioning activities (Table 17.12).

A cognitive mapping exercise identified the effects selected for further analysis, i.e., those that represent a unique node in the network and which are marked in blue in Figure 17.9 and

17.106. Figure 17.10. Each unique node is an effect for which the level of impact significance would be determined in relation to the identified receptors.

17.107. Following the source-pathway-receptor analysis and cognitive mapping, it was determined that some overlap existed between all the effects and receptors identified within the baseline. None of the receptors could therefore be scoped out.

17.108. As specified within the baseline, regional, nomadic vessels originating from ports in Sussex, Devon, Cornwall, Wales and continental Europe have not been regular visitors to the local grounds in recent years. Therefore, these vessels were excluded from the assessment. However, vessels originating from continental Europe will be considered, in terms of potential Transboundary Issues, within the Environmental Statement that will form part of an application for development consent.

Experience with inshore fleets operating in other areas of the UK demonstrates that fishing vessels, particularly those in the inshore fleet, operate with narrow financial margins. A modest reduction in earnings or a modest increase in costs can have significant financial implications for individual vessel owners potentially impacted by the proposed Project. Figure 17.9 to

17.109. Figure 17.10 indicate that all pathways, with the exception of "risk to navigational safety" ultimately lead to a loss of earnings and/or increased costs for affected vessels.

17.110. Where vessels' fishing activity is spatially restricted or fishing efficiency is diminished, for example, as a direct result of the proposed Project activities, vessel displacement to alternative fishing grounds is considered likely. As all fishing grounds within the study area currently experience fishing effort, this potential displacement may increase competition for resources or increase steaming times to access alternative fishing grounds. Consultations with fishermen highlighted these concerns, with fishermen expressing concern about 'stepping on others' toes' if they need to relocate to alternative grounds outside the footprint of the Turbine Area or Export Cable Corridor.

17.111. Redistribution of fishing effort from fishing grounds, directly impacted by the proposed Project activities, to grounds not previously fished by those being displaced, could enable these vessels to maintain earnings. However, redistribution of fishing effort within the study area could reduce catch per unit effort of all boats working within those grounds experiencing increased competition. This indirect effect is more likely at fishing grounds with target species that are resource limited e.g. lobsters, which are associated with rocky habitat that are only found at specific locations within the study area. The degree to which displacement influences a business is considered an inherent part of the sensitivity of a receptor.

Table 17.10 Commercial Fisheries source-pathway-receptor analysis for construction activities

Source (assumed scenario)		pathway(s) through which an effect is transmitted	how receptor(s) is/are likely to be affected	Receptor(s)
Pile driving for foundations (in the northern area of the Turbine Area)	Steel monopiles Space frame structures	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition	Reduced availability of target species leading to reduced fishing efficiency and/or displacement of fishing vessels onto other grounds through: ➢ Injury/mortality and avoidance/displacement of commercially fished species; ➢ Disrupted migration routes of commercially fished species; ➢ Potential effect on site fidelity for some commercially fished species (bass); ➢ Localised changes to benthic habitat structure and community composition leading to altered prey availability and habitat function for commercially fished species.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Drilling (or drill drive combined solution) in middle and southern area of the Turbine Area	Steel monopiles Space frame structures	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition		
Seabed preparation (seabed levelling, removal of upper chalk layers)	Gravity base structures Suction caisson	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition Alteration of benthic substratum		
Scour protection installation to prevent seabed erosion at base of 30% of the foundation structures	Loose rock/rough gravel Concrete mattresses Fronded mats	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition		
Cable protection installation close to foundation entries (2 entries per foundation)	Rock placement Mattressing	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition		
Cable laying	Ploughing Jetting	➢ Noise and vibration ➢ Increase in suspended		

Table 17.10 Commercial Fisheries source-pathway-receptor analysis for construction activities

	Trenching	sediments ➢ Increase in sediment deposition		
Sediment disposal (onsite or at licensed disposal site)		➢ Increase in suspended sediments ➢ Increase in sediment deposition ➢ Alteration of benthic substratum	Reduced availability of target species leading to reduced fishing efficiency and/or displacement of fishing vessels onto other grounds through: ➢ Smothering of sessile fauna and displacement of commercially fished species; ➢ Localised changes to benthic habitat structure and community composition leading to altered prey availability and habitat function for commercially fished species.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Rolling safety zones during construction (of 500 m around each structure and partially completed structures)	Turbines Substations Met mast	Loss of access to traditional fishing grounds within safety zones	➢ Loss of access to traditional fishing grounds, leading to loss of earnings for affected vessels and/or temporary displacement of excluded fishing vessels onto other fishing grounds, which may result in increased steaming times, gear conflicts with increased competition for resources at unaffected grounds and increased costs and reduced earnings associated with relearning unfamiliar fishing grounds.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area. ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Construction traffic (material transport and construction plant on site)	Foundations Turbines	Interference with fishing operations by construction traffic	➢ Reduced fishing efficiency as fishermen have to adapt/interrupt fishing	➢ Commercial fisheries and charter anglers operating within the

Table 17.10 Commercial Fisheries source-pathway-receptor analysis for construction activities				
	Substations Met mast Cables Cable landfall		operations due to the presence of construction vessels; ➢ Risk to gear damage and vessel down time as fishing gear may get snagged by construction vessels; ➢ Risk to navigational safety due to interactions between construction and fishing vessels, or due to snagging of fishing gear by construction vessels.	construction area; ➢ Commercial fisheries and charter anglers in transit through the construction area.
Seabed objects and obstructions		Interference of objects and obstructions with fishing operations	➢ Risk to navigational safety due to potential for snagging of fishing gear; ➢ Risk to gear damage and vessel down time; ➢ Temporary loss of access to traditional fishing grounds, leading to reduced earnings and/or displacement; ➢ Reduced fishing efficiency as fishermen have to adapt fishing operations due to the presence of debris and fasteners (e.g. interrupt existing tow tracks).	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.

Table 17.11 Commercial Fisheries source-pathway-receptor analysis for o&m

Source (assumed scenario)		Pathway(s) through which an effect is transmitted	How receptor(s) is/are likely to be affected	Receptor(s)
Seabed structures	Turbines Substations Met mast	➢ Seabed occupancy of turbines, substations and met mast ➢ Increased habitat complexity	➢ Loss of access to traditional fishing grounds for selected gear types; ➢ Reduced fishing efficiency as fishermen have to adapt fishing operations to the presence of seabed structures, with increased risk to gear damage and vessel down time; ➢ Increased availability of some target species due to increased habitat availability for benthic communities and increased habitat function for commercially fished species with potential beneficial (spill-over, aggregation) effects on some fisheries.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Turbine Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Operation of cables	Inter-array Inter-substation Export Inter-substation Export	➢ Emission of electro-magnetic frequencies (EMF) ➢ Heat emission of cables	➢ Interference with geomagnetic orientation, migration patterns and displacement in sensitive commercially fished species (e.g. skates and rays, sea lamprey, European eel, Atlantic salmon and sea trout, cuttlefish); ➢ Localised shift in prey abundance around cables, leading to localised shift in distribution patterns of commercially fished species.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Export Cable Corridor

Table 17.11 Commercial Fisheries source-pathway-receptor analysis for o&m				
Scour protection to prevent seabed erosion at base of 30% of the foundation structures	Loose rock/rough gravel	➢ Presence of seabed structures ➢ Increased habitat complexity	➢ Loss of access to traditional fishing grounds for selected gear types, leading to loss of earnings for affected vessels and/or displacement of excluded fishing vessels onto other fishing grounds, which may result in increased steaming times, gear conflicts with increased competition for resources at unaffected grounds and increased costs and reduced earnings associated with relearning unfamiliar fishing grounds. ➢ Reduced fishing efficiency as fishermen have to adapt fishing operations to the presence of seabed structures, with increased risk to gear damage (snagging) and vessel down time; ➢ Increased availability of some target species due to increased habitat availability for benthic communities and increased habitat function for commercially fished species with potential beneficial (spill-over, aggregation) effects on some fisheries.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.
	Concrete mattresses			
	Fronded mats			
Cable protection for exposed cables (rock placement and/or mattressing)				
Buried cables				

Table 17.11 Commercial Fisheries source-pathway-receptor analysis for o&m			
Assumed safety zone of 50 m applied to each turbine and offshore substation within the Turbine Area during operation	➢ Loss of access to traditional fishing grounds, corresponding to less than 1% of total Turbine Area ➢ Loss of access to 175 km^2 of traditional fishing grounds for trawlers only due to inability to operate safely within Turbine Area	➢ Loss of access to traditional fishing grounds for the duration of operation, leading to loss of earnings for affected vessels and/or displacement of excluded fishing vessels onto other fishing grounds, which may result in increased steaming times, gear conflicts with increased competition for resources at unaffected grounds and increased costs and reduced earnings associated with relearning unfamiliar fishing grounds.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Turbine Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Operational and maintenance traffic	Interference with fishing operations by O&M traffic	➢ Reduced fishing efficiency as fishermen have to adapt/interrupt fishing operations due to the presence of O&M vessels; ➢ Risk to gear damage and vessel down time as fishing gear may get snagged by O&M vessels; ➢ Risk to navigational safety due to interactions between construction and fishing vessels, or due to snagging of fishing gear by O&M vessels.	➢ Commercial fisheries and charter anglers operating within the Offshore Development Area; ➢ Commercial fisheries and charter anglers in transit through the Project area.

Table 17.12 Commercial Fisheries source-pathway-receptor analysis for decommissioning activities based on rwcs

Source (assumed scenario)	Pathway(s) through which an effect is transmitted	How receptor(s) is/are likely to be affected	Receptor(s)
Removal of all above seabed structures	➢ Noise and vibration ➢ Increase in suspended sediments ➢ Increase in sediment deposition ➢ Alteration of benthic substratum	Reduced availability of target species leading to reduced fishing efficiency and/or displacement of fishing vessels onto other grounds through: ➢ Injury/mortality and avoidance/displacement of commercially fished species; ➢ Disrupted migration routes of commercially fished species; ➢ Potential effect on site fidelity for some commercially fished species (bass); ➢ Localised changes to benthic habitat structure and community composition leading to altered prey availability and habitat function for commercially fished species.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.

Table 17.12 Commercial Fisheries source-pathway-receptor analysis for decommissioning activities based on rwcs			
Rolling safety zones during decommissioning	Loss of access to traditional fishing grounds within safety zones	➢ Loss of access to traditional fishing grounds, leading to loss of earnings for affected vessels and/or temporary displacement of excluded fishing vessels onto other fishing grounds, which may result in increased steaming times, gear conflicts with increased competition for resources at unaffected grounds and increased costs and reduced earnings associated with relearning unfamiliar fishing grounds.	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area. ➢ Commercial fishing operations and charter anglers at unaffected grounds.
Decommissioning traffic (material transport and plant on site)	Interference with fishing operations by decommissioning traffic	➢ Reduced fishing efficiency as fishermen have to adapt/interrupt fishing operations due to the presence of construction vessels; ➢ Risk to gear damage and vessel down time as fishing gear may get snagged by construction vessels; ➢ Risk to navigational safety due to interactions between construction and fishing vessels, or due to snagging of fishing gear by construction vessels.	➢ Commercial fisheries and charter anglers operating within the construction area; ➢ Commercial fisheries and charter anglers in transit through the construction area.

Table 17.12 Commercial Fisheries source-pathway-receptor analysis for decommissioning activities based on rwcs			
Seabed objects and obstructions permanently left *in situ*	Interference of objects and obstructions with fishing operations	➢ Risk to navigational safety due to potential for snagging of fishing gear; ➢ Risk to gear damage and vessel down time; ➢ Reduced fishing efficiency as fishermen have to adapt fishing operations due to the presence of debris and fasteners (e.g. interrupt existing tow tracks).	➢ Commercial fishing operations and charter anglers with dependency on traditional fishing grounds within the Offshore Development Area; ➢ Commercial fishing operations and charter anglers at unaffected grounds.

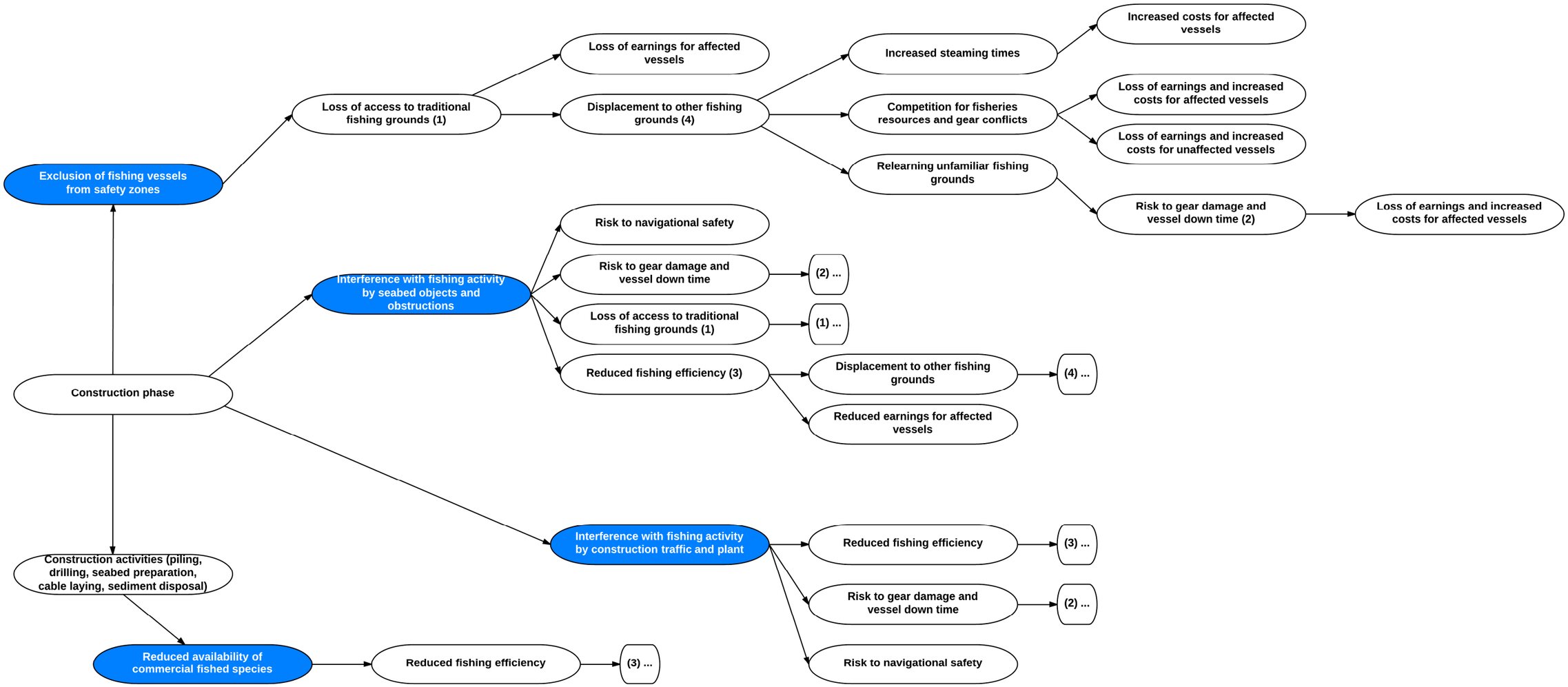

Figure 17.9 Cognitive mapping of pathways during the Construction phase

Effects taken further in the impact assessment are shown as blue nodes. Interlinkages are indicated by (. . .) and a number linking to the corresponding pathway. *Unaffected vessels signify vessels, which do not operate within the Offshore Development Area.

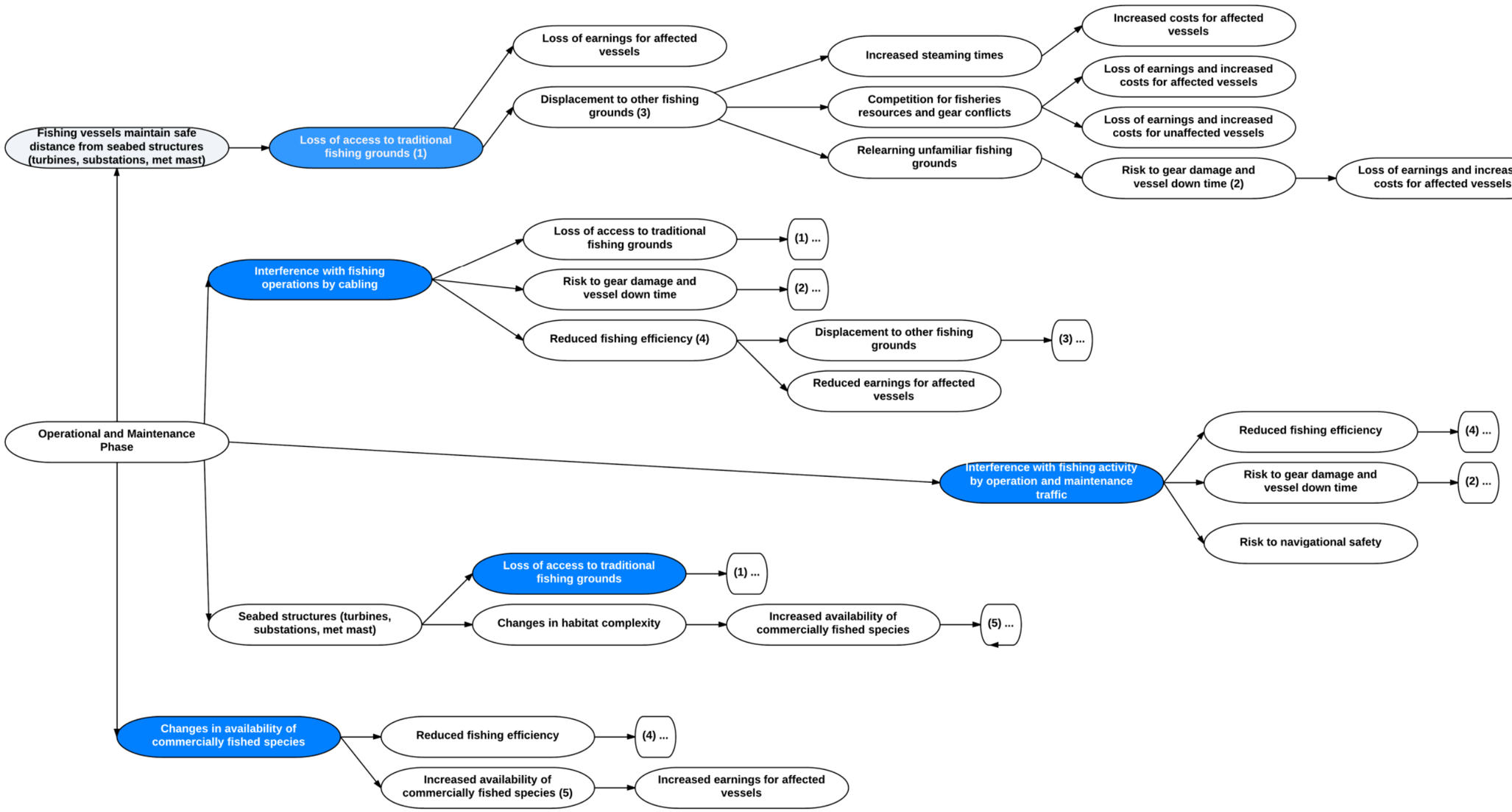

Figure 17.10 Cognitive mapping of pathways during the Operational and Maintenance phase

Effects taken further in the impact assessment are shown in blue. Interlinkages are indicated by (. . .) and a number linking to the corresponding pathway. *Unaffected vessels signify vessels which do not operate within the Offshore Development Area.

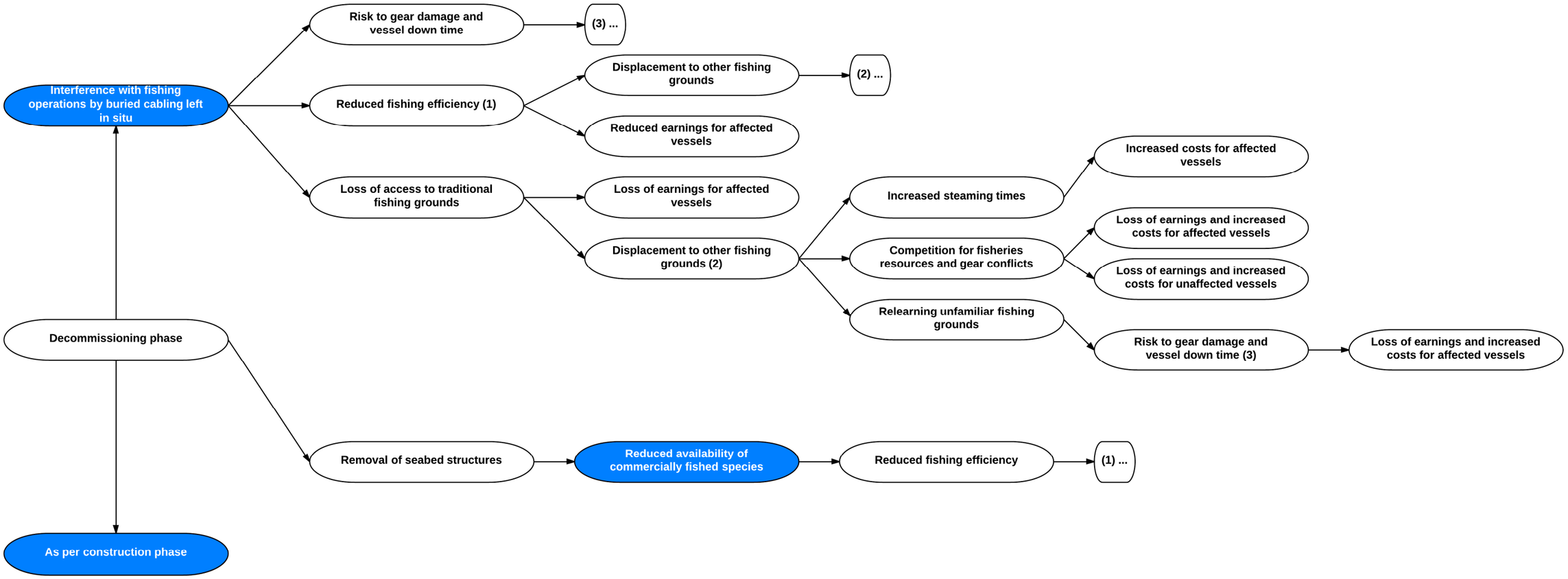

Figure 17.11 Cognitive mapping of pathways during the Decommissioning phase

Effects taken further in the impact assessment are shown in blue. Interlinkages are indicated by (. . .) and a number linking to the corresponding pathway. *Unaffected vessels signify vessels which do not operate within the Offshore Development Area.

17.5.3. Construction

17.112. The following sections describe the potential effects on commercial fisheries during the Project construction phase. Where appropriate, sensitivity of a receptor and magnitude of effects are discussed. For each receptor, a distinction was made between the general sector (e.g. entire static gear fleet in the study area) and individual vessels where required.

Loss of access to traditional fishing grounds due to safety zones

17.113. The impact assessment is based on the application of a "rolling" safety zone of 500 metres around the location of the each of the wind turbines, offshore substations and met mast (and partially completed structures). 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. This would include when large construction vessels such as any jack-up vessel, cable lay barge and heavy lift vessel are employed in the construction or subsequent major maintenance each wind turbine, offshore substation and met mast (whether uncompleted or completed during their construction and subsequent commissioning activities), and a safety zone of 500 m radius would be applied for. A rolling programme prevents fishing vessels being excluded from the entire Offshore Development Area at any one point in time, although multiple safety zones may be in operation simultaneously. It is likely that commercial fishing activity would be temporarily restricted access within or close to the safety zone.

17.114. The loss of access to traditional fishing grounds could lead to a reduction in earnings for those vessels that are unable to relocate to alternative fishing grounds. Other vessels, which have the capacity to move to adjacent, unaffected grounds, could experience increased steaming times, increased competition for fisheries resources and potential gear conflicts with vessels already fishing those grounds, as well as increased costs associated with fishing at unfamiliar grounds. These indirect effects are likely to affect fishing businesses through a reduction in earnings stemming from reduced fishing efficiency or through increased gear; vessel maintenance or fuel costs (Figure 17.9). The level of impact significance for the key effect of loss of access to traditional fishing ground has been estimated for each of the receptors identified, based on the magnitude of the effect and sensitivity of a receptor. The results are presented in Table 17.13 .

17.115. There is also a potential for charter anglers to avoid the location due to the impact of noise, which is a perceived impact on the recreational users who book such trips. This impact has been considered as part of the Recreational assessment in Chapter 22.

Table 17.13 Impact assessment during construction: loss of access to traditional fishing grounds due to safety zones

Receptor	Magnitude	Sensitivity	Impact level	Significance
Static gear (nets, pots and traps)				
General sector - Turbine Area	**Low** Safety zones would be applied during the construction period. The spatial extent of the Turbine Area in context of netting and trapping activity is low, as vessels operating these gears are predominantly found in the inshore waters. Potting occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area where pots are set. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating static gears often operate a number of types of gear, reducing the reliance on one fishing ground or target species. There remains a risk that disturbance to one target species, if it occurs at the peak time for the static gear fleet, could have serious financial implications for vessels operating static gear on or around the Project. Loss of access to traditional fishing grounds is likely to lead to vessels being displaced onto adjacent unaffected grounds. The majority of vessels active in the study area are under 10-metre vessels with limited capacity to access alternative grounds. Interviews with fishermen indicate that grounds suitable for static gear deployment adjacent to the Turbine Area are presently subject to fishing effort. Sensitivity is assessed to be medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the static gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** Safety zones would be applied during the construction period. The spatial extent of the Export Cable Corridor is small in terms of the area fished in inshore waters by netting, potting and trapping vessels that operate in Poole Bay, Christchurch Bay and surrounding waters, and the period of time over which the export cables will be laid would be relatively short, i.e. less than one fishing season. Magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Whelk pots				
General sector - Turbine Area	**Low** Safety zones would be applied during the construction period. The spatial extent of the Turbine Area in comparison with the area of grounds where whelking activity takes place is small. Magnitude of the effect is assessed to be low.	**Medium** Loss of access to traditional fishing grounds is likely to lead to displacement of affected whelk vessels onto adjacent unaffected grounds. Interviews with whelk fishermen indicate that the remaining whelk grounds outside the Project area are subject to fishing effort at present. Sensitivity is assessed to be medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the whelk potting fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**

Table 17.13 Impact assessment during construction: loss of access to traditional fishing grounds due to safety zones				
General sector - Export Cable Corridor	**Low** Safety zones would be applied during the construction period. The spatial extent of the cable is small in terms of the area fished in inshore waters by vessels deploying whelk pots. Magnitude of the effect is therefore assessed to be low.		**Minor**	**Not Significant**
Individual vessels – Export Cable Corridor	**Medium** A sub-sector of the whelk potting fleet obtains a proportion of earnings from fishing grounds within the Export Cable Corridor. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
Towed gear				
General sector - Turbine Area	**Low** Safety zones would be applied during the construction period. The spatial extent of the Turbine Area in context of trawling is very low, with no trawlers regularly trawling within the Turbine Area. Trawling occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is assessed to be low.	**Medium** Loss of access to traditional fishing grounds is likely to lead to displacement of affected trawling vessels onto other, unaffected grounds. The majority of trawl vessels active in the study area are under 10-metre vessels with limited capacity to access remote alternative grounds. Interviews with trawl fishermen indicate that the remaining local grounds outside the Project area are fished at capacity. Sensitivity is assessed to be medium.	**Minor**	**Not Significant**
General sector - Export Cable Corridor	**Low** The rolling safety zones would be applied during the three installation stages of the construction period. The spatial extent of the cable is small in terms of the area fished in inshore waters by vessels operating trawl gear. Magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Individual vessels – Export Cable Corridor	**Medium** A sub-sector of the trawl fleet obtains a proportion of earnings from fishing grounds within the Export Cable Corridor. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**

OTHER GEAR				
General sector - Turbine Area	**Low** The rolling safety zones would be applied during the three installation stages of the construction period. The spatial extent of the Turbine Area in context of rod and line fisheries is low, and the majority of vessels that at some time deploy rod and line gear, operate in the inshore waters. Other activities such as long-lining, ring-netting and drift netting are not reported to occur in the Turbine Area. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating rod and line are generally highly mobile and access a number of banks throughout the study area, increasing their ability to offset disturbance to fishing grounds within the Turbine Area. However, loss of access to historical fishing grounds is likely to lead to displacement of those vessels onto other, unaffected grounds. Interviews with fishermen also indicate grounds adjacent to the Turbine Area are fished at capacity. Sensitivity is assessed to be medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the rod and line fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** The rolling safety zones would be applied during the three installation stages of the construction period. The spatial extent of the Export Cable Corridor is small in terms of the area fished using rod and line, long-lines, ring-netting or drift-netting in inshore waters. Magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Charter angling				
General Sector – Offshore Development Area	**Low** The rolling safety zones would be applied during the three installation stages of the construction period. The spatial extent of charter angling activity in the Project area is broad, with suitable marks and wrecks found throughout the study area. Vessels are also highly mobile and able to access numerous marks in a trip, thus spatial extent of the Offshore Development Area in relation to fished grounds is assessed as low. Magnitude of the effect is assessed to be low.	**Low** Charter angling vessels, particularly those able to operate offshore are highly mobile and are not reliant on one fishing mark. These vessels should therefore have a relatively high level of tolerance to restricted, temporary access to a limited number of marks. Sensitivity is assessed to be low.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the charter angling fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Minor**	**Not Significant**

Interference with fishing activities by seabed objects and obstructions

17.116. The construction of the Offshore Development Area would involve large engineering plant and multiple construction vessels working on and transiting to and from the site. One potential effect of these activities would be objects or obstructions on the seabed. These may involve accidental loss of equipment overboard, scour protection or rock placement material. For mobile gears, the introduction of these materials increases the risk of damage to or loss of fishing gear. This is also true for static gears, which, despite the name can move significant distances in heavy swells or strong tides.

17.117. The hazards associated with trawl gear coming fast on the seabed are evident in records held by the Marine Accident Investigation Branch ('MAIB'), which record incidents of vessels and lives lost due to vessels capsizing or flooding as a result of gear coming fast. The most recent incident was in Lyme Bay in 2012, resulting in the loss of the vessel. Therefore, fishing vessels operating in the vicinity of offshore works are exposed to increased risk of gear damage and vessel down time, reduced access to traditional fishing grounds and/or reduced fishing efficiency as fishing vessels adapt their operations to the presence of debris or fasteners (Figure 17.9).

17.118. Licenses issued for Deposits in the Sea in Connection with Marine Construction Works typically require the License Holder to ensure that any debris or temporary work placed below Mean High Water Springs to be removed on completion of each phase of the construction works authorised by the license. The standard condition is for a detailed audit sheet to be developed for offshore works to ensure that materials used in the construction process are accounted for. Where significant items are lost, the developer will be responsible for locating and recovering them at their own cost. Notices to Mariners ('NtM') and liaison via the FLO would also further reduce risk.

17.119. Safety zones will be in place when construction activities are taking place, but lifted when these activities cease. However, where objects or obstructions are accidentally left on the seabed after construction, fishing operations are at risk of gear snagging within the affected areas. The spatial extent of this effect would be small as potential obstacles are likely to occupy, in relative terms, a small area of seabed. Any object or obstacle accidentally left on the seabed would be managed in line with established industry guidelines. Where an obstacle is reported, the obstacle would subsequently be removed where necessary and practical to do so.

17.120. Sensitivity is considered **high** as snagging may cause gear damage and/or loss of income. While the magnitude of effect remains a risk throughout the entire construction period of 4.5 years, as these unplanned events are managed under standard industry guidelines the effect is considered **imperceptible**. The level of impact significance for all receptors identified would therefore be **negligible** and likely adverse impacts are considered **Not Significant**.

Interference with fishing operations by construction vessels and plant

17.121. Interference of construction traffic and plant activities with fishing operations within the study area are unlikely to increase the risk to navigational safety, gear damage and reduced fishing efficiency, as fishing vessels would reasonably be expected to adapt their operations to accommodate construction traffic if navigational safety procedures are not followed.

17.122. Controls to manage traffic interference include a transit route being established for construction traffic and a marine traffic coordinator appointed for the construction period. Any construction activities will also be communicated with the fishing industry via Notices to Mariners and the FLO.

17.123. The harbour for construction has not yet been identified. Vessel traffic from harbours in the study area already exists and transits through the area. It is assumed that there would be a maximum annual increase in overall vessel traffic of 253 two-way heavy vessel movements (or 0.69 two-way heavy vessel movements per day) and 1,400 two-way light vessel movements (or 3.84 two-way light vessel movements per day). The level of impact significance of this effect is explored in further detail in Table 17.14 , based on sensitivity and magnitude.

Table 17.14 Impact assessment during construction: interference with fishing operations by construction vessels and plant

RECEPTOR	MAGNITUDE	SENSITIVITY	IMPACT LEVEL	SIGNIFICANCE
STATIC GEAR (NETS, POTS AND TRAPS)				
General sector - Turbine Area	**Low** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and overlap with areas where static gear is deployed. The spatial extent of the Turbine Area in context of netting and trapping activity is low, as the majority of vessels deploying static gears are operating in the inshore waters. Potting occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating static gear would be at risk of disturbance if construction traffic transits or operates at areas where static gear is deployed. The risk is that gear is lost or dragged by construction traffic, resulting in losses to the owner of the fishing gear. The tolerance of the receptor is assessed to be low but recoverability would be rapid, as once the construction traffic ceases, the receptor would be able to operate as before, leading to sensitivity being assessed as medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the static gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and overlap with areas where static gear is deployed in the Export Cable Corridor area. The spatial extent over which fishing vessels may be affected by construction traffic transiting the Export Cable Corridor is very small in terms of the area fished in inshore waters by static gear vessels that operate in Poole Bay, Christchurch Bay and surrounding waters. Magnitude of the effect is therefore estimated as low.		**Minor**	**Not Significant**

Whelk pots				
General sector – Turbine Area	**Low** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and overlap with areas where whelk gear is deployed in the Turbine Area. The spatial extent of the Turbine Area in the context of whelk grounds is low, as the majority of vessels deploying whelk gear operate in the inshore waters. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating whelk gear would be at risk of disturbance if construction traffic transits or operates in areas where strings of whelk pots are deployed. The risk is that gear is lost or dragged by construction traffic, resulting in losses to the owner of the fishing gear. The tolerance of the receptor is assessed to be low but recoverability would be rapid, as once the construction traffic ceases, the receptor would be able to operate as before, leading to sensitivity being assessed as medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the whelk gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and interact with the whelk fleet operating in the Export Cable Corridor area. The spatial extent over which fishing vessels may be affected by construction traffic transiting the Export Cable Corridor is very small in terms of the area fished in inshore waters by whelk vessels that operate in Poole Bay, Christchurch Bay and surrounding waters. Magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Towed gear				
General sector – Project area	**Imperceptible** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and cross fishing grounds targeted by vessels operating mobile fishing gear. The spatial extent over which fishing vessels may be affected by construction traffic transiting the Export Cable Corridor is very small in terms of the area trawled in Poole Bay, Christchurch Bay and surrounding waters. The duration of the impact would be negligible, as once construction traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** Construction traffic outside a safety zone, e.g., if transiting to or from a construction area, would be obliged to keep clear of a fishing vessel towing gear. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**

Whelk pots				
Other gear				
General sector – Project area	**Imperceptible** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and cross fishing grounds targeted by vessels operating rod and line and long-line fishing gear. The spatial extent over which fishing vessels may be affected by construction traffic transiting the Export Cable Corridor is very small in terms of the area fished in Poole Bay, Christchurch Bay and surrounding waters. The duration of the impact would be negligible, as once construction traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** Due to the high mobility of vessels deploying mobile gear, the risk of interactions between this receptor and construction traffic is low. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**
Charter angling				
Project area	**Imperceptible** As the homeport for construction vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that construction vessel traffic would transit across the study area and cross areas of seabed that are targeted by charter angling. The spatial extent over which charter angling vessels may be affected by construction traffic transiting the Export Cable Corridor is very small in terms of the area within the study area. The duration of the impact would be negligible, as once construction traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** Due to the high mobility of charter angling vessels, the risk of interactions between this receptor and construction traffic is low. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**

Reduced availability of commercially fished species

17.124. A detailed assessment of the potential impacts on fish and shellfish ecology has been described in Chapter 10 Fish and Shellfish Ecology. The chapter provides details on the construction impacts on commercially fished species relating to the following effects:

- Underwater noise and vibration;
- Temporary increases in suspended sediment concentrations from seabed preparation works;
- Temporary increased deposition of sediment plumes;
- Temporary seabed habitat disturbances from preparation works and inter-array cable installation;
- Accidental spills and releases of environmentally harmful substances.

17.125. This assessment considers the worst case scenarios described in Chapter 10, Fish and Shellfish Ecology. The embedded mitigation described within the Assessment Methodology section has also been assumed in undertaking the fish ecology assessment, and is therefore assumed for the assessment of commercial fisheries.

17.126. Underwater noise and vibration can affect fish and shellfish species through injury and mortality, as well as through behavioural changes. The effects of pin piling noise through injury and mortality during construction were modelled using the Halvorsen *et al* (2012) Injury Criteria (refer to Chapter 10 'Fish and Shellfish Ecology). The assessment found that all fish within 60 m from each piling operation and for the duration of pile driving activities may experience death or traumatic injury under the RWCS. However, the embedded mitigation of a soft start procedure is likely to enable fish to flee beyond the distance at which mortality and injury are likely to occur. Overall the sensitivity of fish to noise, sufficient to cause mortality and/or injury, is considered low for fish with swim bladders and negligible for all other fish and crustaceans. Thus the overall magnitude of effect is considered to be low.

17.127. The impact significance on injury and mortality to fish is considered to be minor and so overall impact is deemed to be Not Significant. Impacts on commercial fisheries targeting fish with swim bladders are therefore also likely to be of **minor** significance. The overall impact on shellfish was considered to be **negligible** (Chapter 10 Fish and Shellfish Ecology). Impacts of pin piling noise on commercial fisheries targeting shellfish are therefore also likely to be of **negligible** significance. The likely adverse effects of noise and vibration from pin piling through injury and mortality on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.128. Impacts of moderate significance were identified for seahorses, sprat, Dover sole, black bream and sea bass. Of these, only sea bass is considered as a key target species for commercial fisheries in the study area. Sea bass nursery grounds occur inshore throughout the region. A small proportion of available nursery habitat would be affected by noise likely to result in a behavioural response. Barrier effects from construction noise may prevent juvenile fish from reaching their inshore nursery grounds (Chapter 10 Fish and Shellfish Ecology). For commercial fisheries targeting bass, the following receptors are likely to be affected:

- Operators using static gear (nets)
- Other gear types (rod and line)
- Charter angling

17.129. The duration of effects of underwater noise and vibration on sea bass is likely to last up to the end of the construction period, and include most of the Offshore Development Area. As such, magnitude is assessed as **medium**. With the exception of 'other gear types', vessels operating static gear (nets) or that are charter angling can target a variety of species and have some capacity to offset any reduced availability of sea bass with catches of other species.

17.130. Sea bass remains a key target species for these receptors (static gear (nets) and charter angling) and sensitivity is considered **medium**. Therefore, the overall level of impact significance is assessed as **moderate**. The likely adverse effects of noise and vibration through behavioural responses of sea bass on these receptors are considered **Significant**.

17.131. For other gear types (rod and line) there is a high reliance on catches of sea bass than other receptors operating static gear and charter angling within the Offshore Development Area. For this reason, sensitivity was assessed as

high. Level of impact significance was therefore assessed as **major** or **moderate**. Considering the high importance of this resource for this receptor, a precautionary approach was adopted in this assessment and a **major** level of impact significance designated. The likely adverse effects of noise and vibration through behavioural responses of bass on the 'other gear' receptor are therefore considered **Significant**.

17.132. For the towed gear receptor, a range of species are targeted, which may include sea bass, but it is not considered a key target species for this receptor. As such, sensitivity is assessed as **low** and the overall level of impact significance is assessed as **minor**. The likely adverse effects of noise and vibration through behavioural responses of bass on the towed gear receptor are therefore considered **Not Significant.**

17.133. The fish and shellfish ecology chapter also considered the effects of underwater noise and vibration due to the installation of export cables, including ploughing, jetting and trenching activities and the movement of construction vessels. The impact significance was assessed to be minor on the basis that these sources of underwater noise, where they occur, are considered to be spatially and temporally limited. Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of underwater noise and vibration due to the installation of export cables on the resource availability of all commercial fisheries receptors would be **Not Significant**.

17.134. The impact assessment on fish and shellfish ecology assessed the temporary increases in suspended sediment concentrations ('SSC') from seabed preparation works to be of minor significance. This was based on raised SSC's remaining localised, intermittent and short-term. Moreover, increases in SSC associated with construction activities are predicted to be within the range of the natural variation to which fish and shellfish receptors will be tolerant (Chapter 11, Fish and Shellfish Ecology). Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of temporary increases in SSC in the Turbine Area on the resource availability of all commercial fisheries receptors would be **Not Significant**.

17.135. Increases in SSC in the Export Cable Corridor are expected to occur as a result of the ploughing, jetting, trenching activities associated with the export cable installation. Hydrodynamic regimes and sediments within the proposed export cable corridor vary to those within the Turbine Area by being less energetic with a greater thickness of surface (Chapter 5, Physical Processes). The shallow (<20 m) inshore regions of the export cable corridor are used by Dover sole and common cuttlefish as spawning and nursery grounds. In addition, species such as sea bass, mackerel, tope shark and undulate ray also use the inshore region as foraging and nursery grounds. These species may, therefore, be temporarily displaced as the sediment plume spreads. For visual predators (sea bass and common cuttlefish) a temporary reduction in hunting ability may be incurred due to visual impairment. Other shellfish, such as brown crab, European lobster and native oyster, are also present within the region of the proposed Export Cable Corridor and are likely to be susceptible to gill smothering from elevated levels of SSCs. The resulting sediment plume in shallow water may disperse further than in deeper waters; however, natural background SSCs are likely to be higher within these regions due to wave and tidal action (Chapter 5, Physical Processes). Fish and shellfish species, such as those discussed above, are therefore considered to be more tolerant to high levels of SSC that may be experienced during construction activities. This effect was considered to be localised and of short duration. Impact significance was there assessed as minor. Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of temporary increases in SSC in the Export Cable Corridor on the resource availability of all commercial fisheries receptors would be **Not Significant**.

17.136. In relation to a temporary increased deposition of sediment plumes in the Turbine Area, the fish and shellfish ecology assessment determined that the effect would be localised, intermittent and short-term. The effects of sediment deposition outside the highly localised deposition zone were predicted to be within the range of natural variation. The level of impact significance was therefore assessed as minor (Chapter 10, Fish and Shellfish Ecology). Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of a temporary increase in sediment deposition in the Turbine Area on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.137. Temporary increased deposition of sediment plumes is also likely to occur in the Export Cable Corridor. Much of the shallow inshore regions of

Christchurch Bay are associated with areas of spawning and nursery for fish and shellfish. The construction of nests, and laying of eggs on the seabed by species like black bream and common cuttlefish means that they may be susceptible to potential influences of smothering and increased egg mortality from sedimentation. However, as they spawn inshore these species may be able to tolerate fluctuations in sedimentation. Other species that spawn within the inshore regions include Dover sole, which produce buoyant pelagic eggs, and are less susceptible to sedimentation. The fish and shellfish ecology assessment considered this effect to be localised and short-term throughout the cable installation phase. Impact significance was therefore assessed as **minor**. Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of a temporary increase in sediment deposition in the Export Cable Corridor on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.138. Temporary seabed habitat disturbances would occur as a result of seabed preparation works and export cable installation in the Export Cable Corridor. Ploughing, jetting and trenching techniques are likely to cause seabed disturbances to potential spawning, nursery and feeding grounds for species such as Dover sole, common cuttlefish, tope shark and plaice; however, with immediate infill, impacts should be highly localised with short-term displacement of fish and shellfish into surrounding areas. Where cable protection materials are not used seabed recovery to baseline conditions is expected to be fairly rapid.

17.139. Indirect seabed disturbances would cause abrasion and compaction of benthic habitats and associated communities leading to a reduction in overall invertebrate biomass. Fish and shellfish may therefore be indirectly affected through a loss of prey species with recovery of benthic habitats forecast to be complete within eight years following cessation of the disturbance. On the basis that this effect would be localised and short-term, impact significance was assessed as minor. Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of habitat disturbance in the Export Cable Corridor on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.5.4. Impact during the operation and maintenance phase

17.140. The following sections detail the potential effects and impact significance for each of the key effects identified during the O&M phase. For each receptor, a distinction was made between the general sector (e.g. entire static gear fleet in the study area) and individual vessels where required.

Loss of access to traditional fishing grounds due to safety zones and seabed structures

17.141. For the purpose of this assessment, an assumed 50 m safety zone is applied to each turbine, met mast and Offshore Substation within the Turbine Area to provide a worst case scenario for assessment. Seabed occupancy by the placement of the met mast, three substations and turbines would also lead to a loss of access to traditional fishing grounds for the duration of the life of the project. The overall loss of available fishing grounds within the Turbine Area, taking into account 50 m safety zones, would be less than 1%.

17.142. For the towed gear receptor, a worst-case scenario has been assumed where no fishing activity with trawl gear would take place within the Turbine Area for the duration of the life of the Project, as trawl vessels may not be able to operate safely within the Turbine Area. For the towed gear receptor, this corresponded to a loss of access to fishing grounds of 175 km^2. For all other receptors, it assumed that fishing activities would take place as usual beyond the assumed 50 m safety zones, resulting in a net loss of less than 1% of the total Turbine Area.

17.143. In general, the loss of access to traditional fishing grounds is likely to lead to a direct loss of earnings for those vessels that are unable to exploit alternative fishing grounds. Other vessels which have the capacity to move to adjacent grounds (unaffected by the proposed Project) are likely to be affected by:

- Increased steaming times and fuel costs;
- Increased competition for fisheries resources and potential gear conflicts with vessels already fishing those grounds;
- Increased costs associated with learning the locations of fasteners at unfamiliar fishing grounds.

The indirect effects are likely to affect fishing businesses through a loss of earnings associated with reduced fishing efficiency or increased gear and vessel maintenance (

17.144. Figure 17.10). The level of impact significance for the key effect of loss of access to traditional fishing ground was estimated for each of the receptors identified, based on the sensitivity of a receptor and magnitude of effect. The results are presented in Table 17.15 .

Interference with fishing activities by export corridor cabling

17.145. For the Export Cable Corridor, the impact assessment anticipates that all cabling will be buried. Despite being buried, cabling may lead to an increased risk of interference with demersal towed fishing gear that penetrates the seabed. The presence of the Export Cable Corridor could therefore lead to a loss of access to traditional fishing grounds, potential gear damage, and reduced fishing efficiency. The results are presented in Table 17.

Table 17.15 Impact assessment during operation and maintenance: Loss of access to traditional fishing grounds due to safety zones

Receptor	Magnitude	Sensitivity	Impact level	Significance
Static gear (nets, pots and traps)				
General sector - Turbine Area	**Imperceptible** The loss of access to traditional fishing grounds would be continuous for the duration of the life of the project. The spatial extent of the Turbine Area in context of netting and trapping activity is small as these gears are concentrated in the inshore waters. Potting occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is therefore estimated as imperceptible.	**Medium** Vessels operating static gears often operate a number of types of gear, reducing the reliance on one fishing ground or target species. Loss of access to traditional fishing grounds is likely to lead to vessels being displaced onto adjacent unaffected grounds. The majority of vessels active in the study area are under 10-metre vessels with limited capacity to access alternative grounds. Interviews with fishermen indicate that grounds suitable for static gear deployment in the study area are presently subject to fishing effort. Sensitivity is assessed to be medium.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**Low** A sub-sector of the static gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. However, the loss of access to traditional fishing grounds in the assumed safety zones would be spatially small in relation to grounds exploited by these vessels. For these vessels, magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Whelk pots				
General sector - Turbine Area	**Imperceptible** The loss of access to traditional fishing grounds would be continuous for the duration of the life of the project. The spatial extent of the Turbine Area in context of whelking activity is low. Magnitude of the effect is therefore estimated as imperceptible.	**Medium** Loss of access to traditional fishing grounds is likely to lead to displacement of affected whelk vessels onto adjacent unaffected grounds. Interviews with whelk fishermen indicate that the remaining whelk grounds outside the Project area are subject to fishing effort at present. Sensitivity is assessed to be medium.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**Low** A sub-sector of the whelk fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. However, the loss of access to traditional fishing grounds in the assumed safety zones would be spatially small in relation to grounds exploited by these vessels. For these vessels, magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**

TOWED GEAR				
General sector - Turbine Area	**Low** The loss of access to traditional fishing grounds within the Turbine Area would be continuous for the duration of the life of the project. The spatial extent of the Turbine Area in context of trawling is very low, with no trawlers regularly operating within the Turbine Area. Trawling occurs over a widespread area, generally north of the Turbine Area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is assessed to be low.	**Medium** Loss of access to traditional fishing grounds is likely to lead to displacement of affected trawling vessels onto other, unaffected grounds. The majority of trawl vessels active in the study area are under 10-metre vessels with limited capacity to access remote alternative grounds. Interviews with trawl fishermen indicate that the remaining local grounds outside the Project area are fished at capacity. Sensitivity is therefore estimated as medium.	**Minor**	**Not Significant**
Other gear				
General sector - Turbine Area	**Imperceptible** The loss of access to traditional fishing grounds would be continuous for the duration of the life of the project. The only 'other' gear type known to operate within the Turbine Area is the rod and line fishery for bass. The spatial extent of the Turbine Area in context of rod and line fisheries is low, as the majority of vessels in this receptor group operate over a broad area. Magnitude of the effect is therefore estimated as imperceptible.	**Medium** Vessels operating rod and line are generally highly mobile and access a number of banks throughout the study area, increasing their ability to offset disturbance to fishing grounds within the Turbine Area. However, loss of access to historical fishing grounds is likely to lead to displacement of those vessels onto other, unaffected grounds. Interviews with fishermen also indicate grounds adjacent to the Turbine Area are fished at capacity. Sensitivity is assessed to be medium.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**Low** A sub-sector of this receptor category obtains a proportion of earnings from fishing grounds within the Turbine Area. However, the loss of access to traditional fishing grounds in the safety zones would be spatially small in relation to grounds exploited by these vessels. For these vessels, magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**

CHARTER ANGLING				
Turbine Area	**Imperceptible** The loss of access to traditional fishing grounds would be continuous for the duration of the life of the project. The spatial extent of charter angling activity in the Project area is broad, with suitable marks and wrecks found throughout the study area. Vessels are also highly mobile and able to access numerous marks in a trip, thus the spatial extent of the Turbine Area in relation to fished grounds is assessed as low. Magnitude of the effect is assessed to be imperceptible.	**Low** Charter angling vessels, particularly those able to operate offshore, are highly mobile and are not reliant on one fishing mark. These vessels should therefore have a relatively high level of tolerance to restricted, temporary access to a limited number of marks.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**Low** A sub-sector of the charter angling fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. However, the loss of access to traditional fishing grounds in the assumed safety zones would be spatially small in relation to grounds exploited by these vessels. For these vessels, magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**

Table 17.16 Impact assessment during operation and maintenance: interference with fishing activities by cabling – export cable corridor

Receptor	Magnitude	Sensitivity	Impact level	Significance
Static gear (nets, pots and traps)				
General sector - Export Cable Corridor	**Low** The Export Cable Corridor would be present for the duration of the life of the Project. The spatial extent of the Export Cable Corridor is small in terms of the area fished in inshore waters by netting, potting and trapping vessels that operate in Poole Bay, Christchurch Bay and surrounding waters. Magnitude of the effect is assessed to be low.	**Low** Vessels operating static gears often operate a number of types of gear, reducing the reliance on one fishing ground or target species. Static gear is unlikely to be affected by buried cabling and this receptor therefore has high tolerance. Sensitivity to this effect is assessed as low.	**Minor**	**Not Significant**
Whelk pots				
General sector - Export Cable Corridor	**Low** The Export Cable Corridor would be present for the duration of the life of the Project. The spatial extent of the cable is small in terms of the area fished in inshore waters by vessels deploying whelk pots. Magnitude of the effect is assessed to be low.	**Low** Whelk gear is unlikely to be affected by buried cabling and this receptor therefore has high tolerance. Sensitivity to this effect is assessed as low.	**Minor**	**Not Significant**
Individual vessels – Export Cable Corridor	**Medium** A sub-sector of the whelk potting fleet obtains a proportion of earnings from fishing grounds that lie within the area of ground proposed for the Export Cable Corridor. For these vessels, magnitude of the effect is assessed to be medium due to the greater spatial extent of the Export Cable Corridor relative to the operational characteristics of these vessels.		**Minor**	**Not Significant**
Towed gear				
General sector - Export Cable Corridor	**Low** The Export Cable Corridor would be present for the duration of the life of the project. The spatial extent of the cable is small in terms of the area fished in inshore waters by vessels operating trawl gear. Magnitude of the effect is therefore estimated as low.	**Low** The presence of disturbed ground at the areas where the export cable is buried may present a fastener risk for vessels towing fishing gear that contacts the seabed. This could result in vessels that currently trawl at or near the Export Cable Corridor having to relocate to alternative grounds or experiencing reduced fishing efficiency through having to conduct shorter tows.	**Minor**	**Not Significant**

Table 17.16 Impact assessment during operation and maintenance: interference with fishing activities by cabling – export cable corridor				
Individual vessels – Export Cable Corridor	**Medium** A sub-sector of the trawl fleet obtains a proportion of earnings from fishing grounds within the Export Cable Corridor. For these vessels, magnitude of the effect is assessed to be medium due to the greater spatial extent of the Export Cable Corridor relative to the operational characteristics of these vessels.	It is assumed, however, that the cable would be buried in such a way that any fastener risk would be minimised. Sensitivity is therefore estimated as low.	**Minor**	**Not Significant**
Other gear				
General sector - Export Cable Corridor	**Low** The Export Cable Corridor would be present for the duration of the life of the project. The spatial extent of the Export Cable Corridor is small in terms of the area fished using rod and line, long-lines, ring-netting or drift-netting in inshore waters. Magnitude of the effect is therefore estimated as low.	**Imperceptible** These gear types do not contact the seabed and would not be affected by disturbed ground associated with the buried cabling and therefore have high tolerance. Sensitivity to this effect is therefore assessed as low.	**Negligible**	**Not Significant**
Charter angling				
Export Cable Corridor	**Low** The Export Cable Corridor would be present for the duration of the life of the project. The spatial extent of charter angling activity in the Project area is broad, with suitable marks and wrecks found throughout the study area. Vessels are also highly mobile and able to access numerous marks in a trip, thus spatial extent of the Export Cable Corridor in relation to fished grounds is assessed as low. Magnitude of the effect is therefore assessed as low.	**Imperceptible** Charter angling vessels are highly mobile and are not reliant on one fishing mark. Furthermore, this gear type does not contact the seabed and would not be affected by disturbed ground associated with the buried cabling and therefore have high tolerance. Sensitivity is assessed to be imperceptible.	**Negligible**	**Not Significant**

Interference with fishing activities by inter-array cables

17.146. Inter-array cabling would be largely buried where practical to do so within the Turbine Area (refer to RWCS). However, for the purpose of this assessment, it is assumed that fishing vessels operating trawl gear would be unable to operate safely within the Turbine Area.

17.147. Both shallow buried and exposed inter-array and inter-substation cabling increase the risk of interference with fishing gear within the Turbine Area. For bottom-towed gear, this could lead to a loss of access to traditional fishing grounds for vessels unable to fish affected grounds, an increased risk to gear damage, vessel down time and navigational safety, and reduced fishing efficiency as vessels adapt their operations to the presence of the cables (

17.148.

17.149. Figure 17.10). The results are presented in Table 17.17 .

Interference of fishing operations by O&M traffic

This section considers the effect of O&M traffic on normal fishing operations. The likely effects include an increased risk to navigational safety, increased risk of gear damage as O&M traffic may interfere with set fishing gear, and reduced fishing efficiency as fishing vessels adapt their area of operations to accommodate the traffic (

17.150. Figure 17.10). A series of best practice control measures outlined above include a transit route being established for O&M vessel traffic associated with the Offshore Development Area, and a marine traffic coordinator being appointed for the duration of the life of the Project. Any maintenance activities will also be communicated with the fishing industry via Notices to Mariners and the FLO.

17.151. The harbour for maintenance vessels has not yet been identified. Vessel traffic from harbours in the study area already exists and transits through the area. It is assumed that there would be a maximum annual increase in overall vessel two-way traffic of 1,000 vessel movements (or 2.74 two-way vessel movements per day).

17.152. The level of impact significance of this effect is explored in further detail in Table 17.18 based on sensitivity and magnitude.

Table 17.17 Impact assessment during operation and maintenance: interference with fishing activities by cabling - inter-array cables				
Receptor	Magnitude	Sensitivity	Impact level	Significance
Static gear (nets, pots and traps)				
General sector – Turbine Area	**Low** The cabling would be present for the duration of the life of the Project. The spatial extent of the Turbine Area in context of netting and trapping activity is small as these gears are concentrated in the inshore waters. Potting occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is therefore estimated as low.	**Low** Vessels operating static gears often operate a number of types of gear, reducing the reliance on one fishing ground or target species. Static gear is unlikely to be affected by buried cabling in particular and this receptor therefore has high tolerance. Sensitivity to this effect is assessed as low.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**High** A sub-sector of the static gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be high.		**Moderate or minor** The majority of cabling in the Turbine Area would be buried. On the basis that static gear is unlikely to interact with buried cabling, this effect is assessed as being of **minor** impact significance.	**Not Significant**
Whelk pots				
General sector - Turbine Area	**Low** The cabling would be present for the duration of the life of the Project. The spatial extent of the Turbine Area in context of whelking activity is low. Magnitude of the effect is therefore estimated as low.	**Low** Whelk gear is unlikely to be affected by buried cabling in particular and this receptor therefore has high tolerance. Sensitivity to this effect is	**Minor**	**Not Significant**

Table 17.17 Impact assessment during operation and maintenance: interference with fishing activities by cabling - inter-array cables				
Individual vessels – Turbine Area	**High** A sub-sector of the whelk fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be high.	assessed as low.	**Moderate or minor** The majority of cabling in the Turbine Area would be buried. On the basis that whelk gear is unlikely to interact with buried cabling, this effect is assessed as being of **minor** impact significance.	**Not Significant**
Towed Gear				
Assumed total loss of access to Turbine Area (see assessment in Table 17.15)				
Other gear				
General sector - Turbine Area	**Low** The cabling would be present for the duration of the life of the Project. The only 'other' gear type known to operate within the Turbine Area is the rod and line fishery for bass. The spatial extent of the Turbine Area in context of rod and line fisheries is low, as the majority of vessels in this receptor group operate over a broad area. Magnitude of the effect is therefore estimated as low.	**Imperceptible** These gear types do not contact the seabed and would not be affected by disturbed ground associated with the buried or exposed cabling and therefore have high tolerance. Sensitivity to this effect is therefore assessed as imperceptible.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**High** A sub-sector of this receptor category obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be high.		**Negligible**	**Not Significant**

CHARTER ANGLING				
Turbine Area	**Low** The cabling would be present for the duration of the life of the Project. The spatial extent of charter angling activity in the Project area is broad, with suitable marks and wrecks found throughout the study area. Vessels are also highly mobile and able to access numerous marks in a trip, thus the spatial extent of the Turbine Area in relation to fished grounds is assessed as low. Magnitude of the effect is assessed to be low.	**Imperceptible** Charter angling vessels are highly mobile and are not reliant on one fishing mark. Furthermore, this gear type does not contact the seabed and would not be affected by disturbed ground associated with the buried or exposed cabling and therefore have high tolerance. Sensitivity is assessed to be imperceptible.	**Negligible**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the charter angling fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Negligible**	**Not Significant**

Table 17.18 Impacts assessment during operation and maintenance: interference of fishing operations by O&M traffic				
Receptor	Magnitude	Sensitivity	Impact level	Significance
Static gear (nets, pots and traps)				
General sector - Turbine Area	**Low** As the homeport for operation/maintenance vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that Project vessel traffic would transit across the study area and overlap with areas where static gear is deployed. The spatial extent of the Turbine Area in the context of netting and trapping activity is low, as the majority of vessels deploying static gears are operating in the inshore waters. Potting occurs over a widespread area and the Turbine Area is spatially small in comparison with the overall area. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating static gear would be at risk of disturbance if wind farm traffic transits or operates at areas where static gear is deployed. The risk is that gear is lost or dragged by wind farm traffic, resulting in losses to the owner of the fishing gear. The tolerance of the receptor is assessed to be low but recoverability would be rapid, as once the traffic ceases, the receptor would be able to operate as before, leading to sensitivity being assessed as medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the static gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that wind farm vessel traffic would transit across the study area and overlap with areas where static gear is deployed in the Export Cable Corridor area. The spatial extent over which fishing vessels may be affected by wind farm traffic transiting the Export Cable Corridor is very small in terms of the area fished in inshore waters by static gear vessels that operate in Poole Bay, Christchurch Bay and surrounding waters. Magnitude of the effect is therefore estimated as low.		**Minor**	**Not Significant**

WHELK POTS				
General sector – Turbine Area	**Low** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that Project vessel traffic would transit across the study area and overlap with areas where whelk gear is deployed in the Turbine Area. The spatial extent of the Turbine Area in context of whelk grounds is low, as the majority of vessels deploying whelk gear operate in the inshore waters. Magnitude of the effect is assessed to be low.	**Medium** Vessels operating whelk gear would be at risk of disturbance if O&M traffic transits or operates in areas where strings of whelk pots are deployed. The risk is that gear is lost or dragged by wind farm traffic, resulting in losses to the owner of the fishing gear. The tolerance of the receptor is assessed to be low but recoverability would be rapid, as once the traffic ceases, the receptor would be able to operate as before, leading to sensitivity being assessed as medium.	**Minor**	**Not Significant**
Individual vessels – Turbine Area	**Medium** A sub-sector of the whelk gear fleet obtains a proportion of earnings from fishing grounds within the Turbine Area. For these vessels, magnitude of the effect is assessed to be medium.		**Moderate**	**Significant**
General sector - Export Cable Corridor	**Low** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that wind farm vessel traffic will transit across the study area and interact with the whelk fleet operating in the Export Cable Corridor area. The spatial extent over which fishing vessels may be affected by wind farm traffic transiting the Export Cable Corridor is very small in terms of the area fished in inshore waters by whelk vessels that operate in Poole Bay, Christchurch Bay and surrounding waters. Magnitude of the effect is assessed to be low.		**Minor**	**Not Significant**
Towed gear				
General sector – Project area	**Imperceptible** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that wind farm vessel traffic would transit across the study area and cross fishing grounds targeted by vessels operating mobile fishing gear. The spatial extent over which fishing vessels may be affected by O&M traffic transiting the Export Cable Corridor is very small in terms of the area trawled in Poole Bay, Christchurch Bay and surrounding waters. The duration of the impact would be negligible, as once wind farm traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** O&M traffic outside a safety zone, e.g., if transiting to or from the offshore development area, would be obliged to keep clear of a fishing vessel towing gear. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**
Other gear				

WHELK POTS				
General sector – Project area	**Imperceptible** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e., assuming that wind farm vessel traffic would transit across the study area and cross fishing grounds targeted by vessels operating rod and line and long-line fishing gear. The spatial extent over which fishing vessels may be affected by O&M traffic transiting the Export Cable Corridor is very small in terms of the area fished in Poole Bay, Christchurch Bay and surrounding waters. The duration of the impact would be negligible, as once O&M traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** Due to the high mobility of vessels, deploying mobile gear the risk of interactions between this receptor and O&M traffic is low. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**
Charter angling				
Project area	**Imperceptible** As the homeport for O&M vessels has not been identified, the worst-case scenario has been applied here, i.e. assuming that wind farm vessel traffic would transit across the study area and cross areas of seabed that are targeted by charter angling. The spatial extent over which charter angling vessels may be affected by O&M traffic transiting the Export Cable Corridor is very small in terms of the area within the study area. The duration of the impact would be negligible, as once O&M traffic has transited an area, there would be no obstruction to fishing vessels. Magnitude of the effect is assessed to be imperceptible.	**Imperceptible** Due to the high mobility of charter angling vessels, the risk of interactions between this receptor and O&M traffic is low. Tolerance is assessed as high and the rate of recovery fast, thus sensitivity is assessed as imperceptible.	**Negligible**	**Not Significant**

Changes in the availability of commercially fished species

17.153. A detailed assessment of the impacts on fish and shellfish ecology has been described in Chapter 10, Fish and Shellfish Ecology, which provides detail on the O&M impacts on commercially fished species relating to the following effects:

- Net loss of seabed habitat
- Introduction of new habitat
- Changes in hydrodynamic regimes
- Operational noise
- Electromagnetic field emissions
- Heat emissions
- Accidental spills and releases of environmentally harmful substances

17.154. This assessment considers the worst case scenarios described in Chapter 10. The design embedded mitigation has also been assumed in undertaking the fish ecology assessment, and is therefore assumed for this assessment.

17.155. The loss of potential spawning and nursery habitats in the Turbine Area for demersal spawning species including sand eel, cuttlefish and elasmobranchs is considered to be of minor significance. This is based on the loss of suitable habitats representing less than 0.5 % of the total Turbine Area and as the suitable habitats are widely represented within the region. For species that are pelagic spawners i.e. sprat, cod and plaice, the effects of habitat loss were considered to be negligible (Chapter 10, 'Fish and Shellfish Ecology'). Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely adverse effects of loss of seabed habitat in the Turbine Area on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.156. New hard habitat will be introduced to the Offshore Development Area over the four and a half year construction period. This includes new mid-water habitat created by the presence of turbine foundations. The presence of the turbines and scour protection materials would increase the structural complexity of the existing habitats and may provide a colonisation opportunity for both fish and crustaceans (see Linley *et al.*, 2007; Inger *et al.*, 2009). This may have an indirect effect on fish populations by providing a change to food resources as well as offering a potential refuge from predators and commercial fishing (Chapter 10, Fish and Shellfish Ecology). The impact significance of the introduction of new habitat is not necessarily positive, as this would constitute a change in the diversity and abundance of species compared to baseline conditions. However effects would be localised and species colonising introduced structures are likely to be those already colonising this habitat and thus impacts were assessed to be of minor significance (Chapter 10, Fish and Shellfish Ecology). Impacts on commercial fisheries are therefore also likely to be of **minor** significance. The likely effects of the introduction of new habitat in the Turbine Area on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.157. Local changes in hydrodynamic regimes leading to secondary scour impacts to fish habitat will last throughout the duration of the O&M phase of the Turbine Area. Impact significance was judged to be minor on the basis that the effect would be highly localised around only 30% of the turbines where scour material is required, and habitats are widely distributed throughout the wider region. The effect on commercial fisheries is likely to be of **minor** significance. The likely adverse effects of local changes in hydrodynamic regimes on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.158. In relation to operational noise, this effect was considered to be long-term and continuous. However, as noise emissions are predicted to be of low amplitude and localised, the overall impact on fish populations was predicted to be of minor significance. The effect on commercial fisheries is therefore also likely to be of **minor** significance. The likely adverse effects of operational noise on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.159. The electromagnetic fields ('EMF') created by the electric current passing through the inter-array cables are composed of both an induced electric field (E field) and a magnetic field (B field) that electrosensitive fish, such as Atlantic salmon, tope shark and undulate ray, can detect (Chapter 10, Fish and Shellfish Ecology). Impact significance of this effect in the Turbine Area was assessed to be minor on the basis that the effect of EMF is thought to be highly localised around the cables and would be reduced by the steel

armouring around the cabling. In addition, elasmobranchs and some migratory species are expected to have low sensitivity as potential foraging grounds occur throughout the wider region. The effect on commercial fisheries is therefore also likely to be of **minor** significance. The likely adverse effects of EMF emissions in the Turbine Area on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.160. In the Export Cable Corridor, migratory species such as sea lamprey, European eel, Atlantic salmon and sea trout may be exposed to higher levels of EMF within the inshore regions as the inshore export cable corridor is relatively shallow (<20 m) compared to the water depths of the inter-array cable (>20 m). These species could therefore be affected during their migration to and from the SAC River Avon and the Rivers Frome, Test and Itchen as EMF emissions may induce a change of direction or present a barrier to their migration patterns (Chapter 10 Fish and Shellfish Ecology). However, the Export Cable Corridors are parallel to the migration routes of these species, suggesting that there is likely to be no influence on the direction of migration from EMFs. On this basis, and considering the fact that the effect of EMFs is thought to be highly localised around the cable with steel armouring further reducing the potential extent of EMF emissions, impact significance was assessed as minor (Chapter 10, Fish and Shellfish Ecology). The effect on commercial fisheries is therefore also likely to be of **minor** significance. The likely adverse effects of EMF emissions in the Export Cable Corridor on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.161. Emitted thermal radiation by the inter-array cabling has the potential to increase the temperature of the surrounding environment, leading to a highly localised shift in abundance from around the cables of thermo-intolerant species, which in turn may lead to a highly localised shift in prey abundance for species like Dover sole, plaice and sea bass. The impact significance of this effect was judged to be negligible on the basis that the effect is likely to be highly localised around the cable and sensitivity of mobile fish and shellfish to this effect is negligible. The effect on commercial fisheries is therefore also likely to be of **negligible** significance. The likely adverse effects of heat emission in the Turbine Area on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.162. In the Export Cable Corridor, the export cable would use a higher maximum voltage in comparison to the inter-array cable, resulting in higher heat emissions into the surrounding environment. The substrate present throughout much of the Export Cable Corridor would also contain less interstitial water than that found in the Turbine Area and therefore retain more heat. However, the impact significance of this effect was judged to be negligible on the basis that the effect is likely to be highly localised around the cable and sensitivity of mobile fish and shellfish to this effect is negligible. The effect on commercial fisheries is therefore also likely to be of **negligible** significance. The likely adverse effects of heat emission in the Export Cable Corridor on the resource availability of all commercial fisheries receptors are therefore considered **Not Significant**.

17.163. The impact to fish and shellfish from accidental spills and releases of environmentally harmful substances during the O&M phase is considered to be the same as those outlined for the construction phase. As such, impacts on commercial fisheries are therefore likely to be **negligible**. The likely adverse effects of accidental spills and releases of environmentally harmful substances on the resource availability of all receptors are therefore considered **Not Significant**.

17.5.5. Impacts during the decommissioning phase

17.164. The following sections detail the levels of impact significance for each of the key effects identified during the project decommissioning phase of the Project. Where appropriate, sensitivity of a receptor and magnitude of effects are discussed for the Turbine Area and the Export Cable Corridor separately. For each receptor, a distinction was made between the general sector (e.g. entire static gear fleet in the study area) and individual vessels where required.

17.165. Decommissioning would involve the dismantling of structures and complete removal of all offshore structures above the seabed, probably in reverse order to the construction sequence, involving similar plant to that used during their installation. The effects of these activities on commercial fisheries are considered to be similar to, or less than those occurring as a result of construction. Therefore, the effects of decommissioning are

considered to be no greater than those described for the construction phase, with the exception of those effects discussed in the sections below.

Interference with fishing activities by buried cabling

17.166. In accordance with the Decommissioning Plan buried cables would be cut, left in place and notified, in line with current practice. Across the Turbine Area and in line with the Project Design as a worst-case scenario, it is assumed that the majority of inter-array and inter-substation cabling would be buried with some lengths of cable requiring cable protection (refer to RWCS).

17.167. Buried cabling may lead to an increased risk of interference with fishing gear. The presence of any cabling left *in situ* within the cable export corridor and the Turbine Area could therefore lead to a loss of access to traditional fishing grounds for vessels unable to fish affected grounds, an increased risk to gear damage, vessel down time and navigational safety, and reduced fishing efficiency as vessels adapt their operations to the presence of the cables (Figure 17.11).

17.168. The level of impact significance for the key effect of interference with fishing activities by the cabling in the Turbine Area was estimated for each of the receptors identified, based on the magnitude and sensitivity. The results are presented in Table 17.19.

Table 17.19 Impact assessment during decommissioning: interference with fishing activities by buried cabling				
Receptor	**Magnitude**	**Sensitivity**	**Impact level**	**Significance**
Static gear (nets, pots and traps)				
General sector – Project Area	**Low** The cabling would be present permanently. The spatial extent of both the Turbine Area and Export Cable Corridor is small in terms of the area fished by netting, potting and trapping vessels. Magnitude of the effect is assessed to be low.	**Low** Vessels operating static gears often operate a number of types of gear, reducing the reliance on one fishing ground or target species. Static gear is unlikely to be affected by buried cabling and this receptor therefore has high tolerance. Sensitivity to this effect is assessed as low.	**Minor**	**Not Significant**
Whelk pots				
General sector – Project Area	**Low** The cabling would be present permanently. The spatial extent of both the Turbine Area and Export Cable Corridor is small in terms of the area fished by vessels deploying whelk pots. Magnitude of the effect is assessed to be low.	**Low** Whelk gear is unlikely to be affected by buried cabling and this receptor therefore has high tolerance. Sensitivity to this effect is assessed as low.	**Minor**	**Not Significant**
Towed gear				
General sector – Project Area	**Low** The cabling would be present permanently. The spatial extent of the cable is small in terms of the area fished in inshore waters by vessels operating trawl gear. The spatial extent of the Turbine Area in context of trawling is imperceptible, as no trawlers were identified as having a regular reliance on grounds within the proposed Turbine Area. Magnitude of the effect is therefore estimated as low.	**Medium** The presence of disturbed ground at the areas where cables are buried may present a fastener risk for vessels towing fishing gear that contacts the seabed. This could result in vessels that currently operate at those grounds having to relocate to alternative grounds or experiencing reduced fishing efficiency through having to conduct shorter tows. Interviews with fishermen indicate that the fishing grounds outside the cable export route are already subject to fishing effort. Sensitivity is therefore estimated as medium.	**Minor**	**Not Significant**
Individual vessels – Export Cable Corridor	**Medium** A sub-sector of the trawl fleet obtains a proportion of earnings from fishing grounds within the Export Cable Corridor. For these vessels, magnitude of the effect is assessed to be medium due to the greater spatial extent of the Export Cable Corridor relative to the operational characteristics of these vessels.		**Moderate**	**Significant**
Other gear				

Table 17.19 Impact assessment during decommissioning: interference with fishing activities by buried cabling				
General sector - Project Area	**Low** The cabling would be present permanently. The spatial extent of the Export Cable Corridor is small in terms of the area fished using rod and line, long-lines, ring-netting or drift-netting in inshore waters. The only 'other' gear type known to operate within the Turbine Area is the rod and line fishery for bass. The spatial extent of the Turbine Area in context of rod and line fisheries is low, as the majority of vessels in this receptor group operate over a broad area. Magnitude of the effect is therefore estimated as low.	**Imperceptible** These gear types do not contact the seabed and would not be affected by disturbed ground associated with the buried cabling and therefore have high tolerance. Sensitivity to this effect is therefore assessed as imperceptible.	**Negligible**	**Not Significant**
Charter angling				
General sector – Project Area	**Low** The cabling would be present permanently. The spatial extent of charter angling activity in the Project area is broad, with suitable marks and wrecks found throughout the study area. Vessels are also highly mobile and able to access numerous marks in a trip, thus spatial extent of the Export Cable Corridor in relation to fished grounds is assessed as low. Magnitude of the effect is therefore assessed as low.	**Imperceptible** Charter angling vessels are highly mobile and are not reliant on one fishing mark. Furthermore this gear type does not contact the seabed and would not be affected by disturbed ground associated with the buried cabling, and therefore have high tolerance. Sensitivity is assessed to be imperceptible.	**Negligible**	**Not Significant**

17.6. Potential mitigation

17.169. The impact assessment undertaken identifies a number of effects that may be significant for commercial fisheries receptors. Significant effects are associated with individual vessels including static gear, whelk pots and other gear (i.e. rod and line fishing) and charter anglers. Effects may be significant for individual operators within these receptor categories, as they obtain a proportion of earnings from fishing grounds within the Turbine Area or Export Cable Corridor and have less flexibility to offset any reduction in target species.

17.170. Where significant effects are identified, appropriate mitigation is being developed in close consultation with the fishing community, to ensure impacts are minimised. The development of mitigation measures is currently on-going and will be finalised in discussions with key consultees. Further details of the mitigation proposed would be detailed in the Environmental Statement that will form part of the application for development consents, but in summary such measures may include:

- A project-specific fisheries liaison programme, to establish a formal system of communication between the Project and fisheries stakeholders. NBDL has developed good contacts with the local fishing industry through the existing FLO which will provide a good foundation to develop a practical programme that would operate in accordance with current best practice guidelines.
- Commercial discussions with individual vessels owners: NBDL has entered into advanced discussions with individual commercial fishing vessel owners identified as likely to experience a material reduction in fishing grounds due to the establishment of the Turbine Area and/or cable laying activities.
- During construction and operational phases, vessels with appropriate certification may be contracted as guard vessels and also to undertake surveys.

References

Blyth-Skyrme, R.E. (2010). Options and opportunities for marine fisheries mitigation associated with wind farms. Final report for Collaborative Offshore Wind Research into the Environment contract FISHMITIG09. COWRIE Ltd, London. 125 pp.

Cefas (2004) Offshore wind farms: Guidance note for environmental impact assessment in respect of FEPA and CPA requirements. V2 June 2004. Prepared by Cefas on behalf of Marine Consents and Environment Unit (MCEU).

Cefas (2012) Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects. ME5403, Cefas, 98pp.

Countryside Council for Wales (2001) A glossary of Marine Nature Conservation and Fisheries, Bangor.

Curtis, H. and Anderson, J (2012). 2010 Economic Survey of the UK Fishing Fleet. Seafish Economics, Seafish, Edinburgh. 2012. 114pp.

Elliott, M., Hargreaves, J. Pilgrim, S. (2011) UK Sea Fisheries Statistics. A National Statistics Publication in conjunction with the Marine Management Organisation. London, UK, 2012.

Elliott, M. and Pilgrim, S (2012). The UK Fishing Industry in 2011. Structure and Activity. © Marine Management Organisation 2012. Available online at: http://www.marinemanagement.org.uk/fisheries/statistics/documents/ukseafish/2011/structure_activity.pdf (last accessed 23/10/2012).

English Nature (2001). South Wight Maritime European marine site - English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. 58 pp.

ICPC (2006). Fishing and submarine cables – working together. International Cable Protection Committee 54 pp.

Inger, R., Attrill, M. J., Bearhop, S., Broderick, A. C., Grecian, J. W, Hodgson, D. J., Mills, C., Sheehan, E., Votier, S. C., Witt, M. J. and Godley, B. J. (2009) Marine renewable energy: potential benefits to biodiversity? An urgent call for research Journal of Applied Ecology, doi: 10.1111/j.1365-2664.2009.01697.x.Lieberknecht, L.M., Hooper, T.E.J., Mullier, T.M., Murphy, A., Neilly, M., Carr, H., Haines, R., Lewin, S., and Hughes, E. (2011). Finding Sanctuary final report and recommendations. A report submitted by the Finding Sanctuary stakeholder project to Defra, the Joint Nature Conservation Committee, and Natural England. Available at The UK National Archives http://tna.europarchive.org/*/http://www.finding-sanctuary.org/

Linley, E. A. S., Wilding, T. A., Black, K., Hawkins, A. J. S. and Mangi S. (2007) Review of the reef effects of offshore wind farm structures and their potential for enhancement and mitigation Report from PML Applications Ltd and the Scottish Association for Marine Science to the Department for Business, Enterprise and Regulatory Reform (BERR), Contract No: RFCA/005/0029P.

Løkkeborg, S.; Humborstad, O-B.; Jørgensen, T.; Vold Soldal, A. (2002) Spatio-temporal variations in gillnet catch rates in the vicinity of North Sea oil platforms. ICES Journal of Marine Science, 59, S294-S299.

Finding Sanctuary, Irish Seas Conservation Zones, Net Gain and Balanced Seas. (2012). Impact Assessment materials in support of the Regional Marine Conservation Zone Projects' Recommendations. Annex I1 Impacts of individual recommended Marine Conservation Zones (Balanced Seas). Part 3. 239 pp.

Mackinson, S, Curtis, H, Brown, R, McTaggart, K, Taylor, N, Neville, S and Rogers, S. (2006). A Report on the Perceptions of the Fishing Industry into the Potential Socio-economic Impacts of Offshore Wind Energy Developments on their Work Patterns and Income. Sci. Ser. The. Rep., 133: 99pp. Cefas: Lowestoft.

MMO (2012). Evaluating the distribution, trends and value of inshore and offshore fisheries in England. A report produced for the Marine Management Organisation. Pp 761. MMO Project No: 1011.

Natural England. (2012). Studland to Portland possible Special Area of Conservation - Draft Formal Advice under Regulation 35 (3) of the Conservation of Habitats and Species Regulations 2010 (as amended).

Poole Harbour Commissioners (2006/2011) Poole Harbour Aquatic Management Plan 2006, Amended 2011.

Seafish (2012). Best Practice Guidance for Fishing Industry Financial and Economic Impact Assessments. Available online at: http://www.seafish.org/media/634910/ukfen%20ia%20best%20practice%20guidance.pdf.

Symes, D. and Boyes, S. (2005). Review of fisheries management regimes and relevant legislation in UK waters. Report to: Countryside Council for Wales, English Nature and Scottish Natural Heritage. Institute of Estuarine and Coastal Studies. University of Hull. Report YBF051-F-2005. 108 pp.

UK Statistics Authority (2011). Assessment of compliance with the Code of Practice for Official Statistics: statistics on UK Sea fisheries. Assessment report 126, July 2011. UK Statistics Authority, London, UK.

Wilson, C.A.; Van Sickle, V.R.; Pope, D.L. (1987) Louisiana Artificial Reef Plan; Louisiana Department of Wildlife and Fisheries, Technical Bulletin No. 41, November 1987.

Woolmer, A. (2009). National Shellfish Resource Base: Cost-effective & efficient methodology to map inshore <10 m shellfish fleet. Report to Shellfish Industry Development Strategy. Salacia-Marine. 70pp.

Glossary

TERM	DEFINITION
Access rights	Authorisation granted by the coastal state for others to fish within the coastal state's fishery limits. Access may be granted free of charge or licensing fees can be levied by the competent authority. The EU negotiates with third countries allowing them access to fish between 12 and 200 miles of EU coastal state baselines and vice versa. Some states have the 'historic right' to fish within specified sections of the UK 6-12 mile fishery limits.
Baselines	The point from which the Territorial Sea, fishery limits (3, 6, 12 and 200 nautical miles) and the exclusive economic zone (EEZ – 200 nautical miles) are measured. The baseline is normally mean low water but it can be measured from a 'bay closing line' where the bay's headlands are separated by less than 24 nautical miles (2 x 12 nautical miles of Territorial Sea).
Bass nursery area	37 designated coastal and estuary sites around the coast of England and Wales in which fishing for bass from boats is either prohibited or restricted. Some areas are restricted throughout the year but the majority are subject to a closed season, e.g. May – December inclusive.
Beam trawl	A bottom trawl that is kept open laterally by a rigid beam. Each end of the beam is attached to the apex of a roughly triangular metal 'trawl head' or 'shoe' circa 0.5-0.75m high.
Benthic	A description for animals, plants – the benthos and habitats associated with the seabed.
Benthos	All plants (phytobenthos) and invertebrate animals that live in or on seabed habitats, including the intertidal zone.
Biodiversity	The variability among living organisms from all sources including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species and ecosystems.
Biogenic reef	Any structure that has been formed from living material. It can be applied to many fossilised structures, such as chalk cliffs, but is normally used to describe living structures such as those created by cold-water coral, colonial worms and molluscs.
Bottom fishing gear	Any fishing gear that is operational when in contact with the seabed but usually applied to trawls, dredges and some seine nets.
Bottom trawl	A trawl net that is towed across the seabed rather than through mid-water. They are also referred to as a **demersal** trawl and include both beam trawls and otter trawls.
Byelaw	Legislation introduced at a local level to meet a specific need. Local authorities, Inshore Fisheries Conservation Authorities (IFCA) and ports and harbour authorities, for example, all have the power to introduce and enforce byelaws that can have a bearing on the marine environment and its resources.
Catch	The total quantity of fish that is retained by fishing gear and brought onto the deck or fishing station, i.e. landings plus discards.
Catch per unit of effort	The quantity of a given species, or all species combined, that is taken from the sea for each unit of effort (e.g. days at sea, hours trawling) that is expended in its capture. It provides a simple index of species abundance in the area of a fishery.
CFP	The Common Fisheries Policy of the European Union. It provides the framework for the management of the EU fishery sector, including all marine fisheries within 200 miles of member states' baselines.
Clam	A colloquial name for bivalve molluscs that live buried in the seabed, but typically those species that can close the two shells completely, e.g. cockles, palourdes.
Closed area	An area within which fishing by one or more methods of fishing, or fishing for one or more species of fish, is prohibited. Such areas may be permanently closed or be subject to closed seasons.
Closed season	A period during which fishing for a particular species, often within a specified area, is prohibited.

TERM	DEFINITION
Decommissioning	The formal procedure for removing a vessel from the fishing register and reducing the total tonnage of vessels or vessel capacity units (VCU) engaged in commercial fishing. A reduction in fleet size/capacity is a requirement of the multi-annual guidance programme (MAGP).
Demersal	Fish that live and feed on or near the bottom of the sea.
Drift nets	Curtains or sheets of netting that hang vertically in the water, either at the surface or lower in the water column. Fish are trapped when they try to swim through them but are too big and become wedged.
EEZ	Exclusive economic zone; the area of sea (typically 200 nautical miles from baselines) over which the coastal state claims ownership of all economic resources, e.g. minerals, hydro-carbons and fish.
Fixed/static gear	Any fishing gear that is anchored or attached in some other way to the seabed so that it does not drift or move while it is in fishing mode, e.g. crab pots, long-lines and bottom set gill nets.
Gear	An all-embracing term for fishing equipment in total or in part, e.g. warps, long-line, tickler chains, bridles, dredges.
Gear restriction	A fishery management measure that prohibits or otherwise restricts the use of particular fishing methods in a specified area or season.
Gill nets	Curtains of netting that hang vertically in the water, either in a fixed position (e.g. surface or seabed) or drifting, that trap fish by their gill covers when they try to swim through the net's meshes.
Habitat	The place where an organism lives, as characterised by the physical features. For example, rocky reefs, sandbanks and mud holes all provide particular habitats that are occupied by animals adapted to live in or on one of them but probably cannot thrive, or even survive in the others.
Landings	That part of the catch which is put ashore.

TERM	DEFINITION
Licensing	A widespread method of fishery management that limits entry to a fishery. Licence conditions can vary from simply granting an individual the right to fish, through to specifying not only the gear used and quantity/number of fish that may be taken but the time and place of fishing too. Anyone who wishes to fish commercially in the UK must obtain a license.
Logbook	A set of forms issued by the EC that skippers of vessels >10 m in length must complete after each haul recording: date, time, place, duration of fishing, species composition and estimated weight of retained catch. Completed forms must be handed in on return to harbour or produced at sea at the request of a fishery inspector.
Longline	A method of fishing with baited hooks. An inshore cod longline, for example, has hooks set on short (*ca* 0.5 m) lengths of line – 'snoods'– attached to the main line at intervals of 2-5 m. The total length of line can range from 2-300 m to several km in high seas longline fisheries – where the snoods are longer and set rather further apart.
Mobile/towed fishing gear	Any gear that is towed or otherwise moved through the water, e.g. trawls, seines, and dredges.
PO	Producer organisation: associations of individuals, companies and other bodies within the fishing industry intended to optimise supply and increase efficiency of marketing – both fundamental objectives of the CFP. Some POs also manage the quotas awarded, under licence, to members' boats.
Pots	A general term to describe traps used to catch crabs, lobsters, larger species of prawns, e.g. Nephrops, and some molluscs, e.g. whelks and octopus.
Quota	A fixed proportion of the Total Allowable Catch (TAC) allocated to each fishing nation. This national quota allocation is further sub-divided into quotas for specific areas, seasons, fisheries or organisations, e.g. producer organisations (PO).
Recreational fisheries	Any fishery that is undertaken for pleasure rather than income; most frequently it is represented by beach and boat angling. Recreational sea fishing is not licensed but it is subject to minimum landing size (MLS) regulations and its activities can be curtailed by quota restrictions.

TERM	DEFINITION
Rod and line/handline	A hook-and-line method of fishing, e.g. for bass, ostensibly hauling by hand but an increasing number of 'handliners' are now fitted with hydraulic shooting and hauling systems.
SAC	Special area of conservation: a site designation specified in the Habitats Directive. Each site is designated for one or more of the habitats and species listed in the Directive. The Directive requires a management plan to be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated. In combination with special protection areas (SPA), these sites contribute to the Natura 2000 network.
Trammel nets	A variation on gill nets, where demersal fish can also become entangled in the nets' mesh.
Traps	Any form of static gear that catches fish by enclosing them and preventing their escape but without holding them fast as with gill nets or long-lines.
Trawl	A large, funnel-shaped net that is towed through the water by single or paired boats. The mouth of the net is held open by a beam (beam trawl) or floats along the headline, weights along the groundrope and is pulled open.
Vivier	Live transport using trucks containing large fish tanks, which are aerated to keep the shellfish fresh.

Abbreviations

TERM	DEFINITION
AIS	Automatic Identification System
Cefas	Centre for Environmental, Fisheries and Aquaculture Science
CEMP	Construction Environmental Management Plan
CFP	Common Fisheries Policy
COWRIE	Collaborative Offshore Wind Research Into the Environment
CPA	Coastal Protection Act
CPUE	Catch per unit of effort
Defra	Department for Environment, Food and Rural Affairs
EC	European Community
EEZ	Economic Exclusive Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic field
EMS	European Marine Sites
EN-1	National Policy Statement for Energy
EN-3	National Policy Statement for Renewable Energy Infrastructure
EU	European Union
FEPA	Food and Environment Protection Act 1985
FLO	Fishing Liaison Officer
FLOWW	Fishing Liaison with Offshore Wind and Wet renewables group
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authority
MAGP	Multi-Annual Guidance Programme
MAIB	Marine Accident Investigation Branch
MCEU	Marine Consents and Environment Unit
MCZ	Marine Conservation Zone
MEP	MacAlister Elliott & Partners Ltd

TERM	DEFINITION
MLS	Minimum Landing Size
MMO	Marine Management Organisation
NBDL	Navitus Bay Development Limited
NM	Nautical Mile
NPS	National Policy Statement
O&M	Operational and Maintenance phase of the Project
RBS	Registration of Buyers and Sellers Scheme
SAC	Special Area of Conservation
SIFCA	Southern Inshore Fisheries Conservation Authority
SOEC	Solent Ocean Energy Centre
SPA	Special Protection Area
SSC	Suspended Sediment Concentrations
TAC	Total Allowable Catch
UXO	Unexploded Ordinance
VCU	Vessel Capacity Units
VMS	Vessel Monitoring System
ZOI	Zone of Influence