UK – FRANCE HVDC INTERCONNECTOR

SCOPING REPORT FOR ENVIRONMENTAL IMPACT ASSESSMENT

Offshore UK

February - 2018

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Scoping Report – Offshore UK

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Acronyms and Abbreviations

Acronym	Definition
AA	Appropriate Assessment
ABP	Associated British Ports
AC	Alternate Current
ACOPS	Advisory Committee on Protection of the Sea
AIS	Automatic Identification System
BAP	Biodiversity Action Plan
BEIS	Business, Energy and Industrial Strategy
CIEEM	Chartered Institute of Ecology and Environmental Management
CLV	Cable Laying Vessel
CPT	Cone Penetration Testing
DC	Direct Current
DP	Dynamic Positioning
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EMF	Electro-magnetic field
EMODnet	European Marine Observation and Data Network
EPC	Engineering, Procurement and Construction
ES	Environmental Statement
EEZ	Exclusive Economic Zone
EUNIS	European Nature System
EU	European Union
FSA	Formal Safety Assessment
FR	France
FLO	Fisheries Liaison Officer
GIS	Geographic Information System
GT	Gross Tonnage
HDD	Horizontal Directional Drilling
HMSO	Her Majesty's Stationery Office
HRA	Habitat Regulations Assessment
HVDC	High Voltage Direct Current
ICES	International Council for the Exploration of the Sea

IEMA	Institute of Environmental Management and Assessment
IFCA	Internal Functional Configuration Audit
IAMMWG	Inter-Agency Marine Mammal Working Group
INNS	Introduction of invasive non-native species
JNCC	The Joint Nature Conservation Committee
km	kilometre (i.e. 1,000 metres)
kV	kilovolt
LSE	Likely Significant Effect
MCA	Maritime and Coastguard Agency
MCZ	Marine Conservation Zone
MFE	Mass Flow Excavation
MHWS	Mean High Water Spring
MMO	Marine Management Organisation
MOD	Ministry of Defence
MW	megawatt
NHLE	National Heritage List for England
NPS	National Policy Statement
NRA	Navigational Risk Assessment
O&M	Operations and Maintenance
OESEA	Offshore Energy Strategic Environmental Assessment
PAH	Pesticides and Polycyclic Hydrocarbons
PEA	Preliminary Ecological Appraisal
PEXA	Practice and Exercise Areas
PLB	Post Lay Burial
ROV	Remotely Operated Vehicle
RYA	Royal Yacht Association
SAC	Special Area Of Conservation
SLB	Simultaneous Lay and Burial
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TJB	Transition Joint Bay
TSS	Traffic Separation Scheme
UK	United Kingdom

UKHO	United Kingdom Hydrographic Office
UKPCZ	United Kingdom Pollution Control Zone
UXO	Unexploded Ordnance
VMS	Vessel Monitoring System
VSC	Voltage Source Converter
WFD	Water Framework Directive
XLPE	Cross-Linked Polyethylene

1 Introduction

1.1 Background

1.1.1 AQUIND Limited (the 'Applicant') is intending to submit applications for planning permission and marine consent (hereafter referred to as the 'Application') for the development of a new subsea and underground High Voltage Direct Current (HVDC) power cable transmission link between Normandie in France and the south coast of England. The development will also include fibre optics data transmission cables of a smaller diameter. With a nominal rating of 2,000 MW – 2,075 MW, the AQUIND HVDC Interconnector *(*the 'Project'*)* will significantly increase the cross-border capacity between the UK and France, increasing competition and improving security of the electricity supply in each of the respective countries. To enhance the security of the installation and the availability of its power transfer capability, the scheme is being designed as two independent links, each of 1,000 MW - 1037.5 MW capacity.

1.1.2 The Applicant is the holder of an Electricity Interconnector Licence under Section 6 (1) (e) of the Electricity Act 1989 granted on 9th September 2016 by Office of Gas and Electricity Markets (OFGEM).

1.1.3 This scoping report is submitted in accordance with Regulation 13 of the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (the "EIA Regulations"). Its purpose is to seek the opinion of the Marine Management Organisation (MMO), as the authority with responsibility for determining applications for marine licences, on the scope of the Environmental Impact Assessment (EIA) which will be submitted to support the application for consents required for the development of the offshore UK works (the 'Proposed Development') proposed for the Project. Following a constraints mapping exercise involving environmental and engineering specialists, a cable corridor has been identified that avoids sensitive receptors as far as practicable.

1.1.4 The mean high water spring (MHWS) level marks the extent of the offshore environment. Therefore, the offshore works is defined as the section of cable between the mean high water marks at the two landfalls. This UK scoping report relates solely to the offshore or marine area within UK waters; from the MHWS mark at the UK landfall location in the Solent to the European Economic Zone (EEZ) median line between UK and French waters in the English Channel as illustrated in Figure 1.1.1.

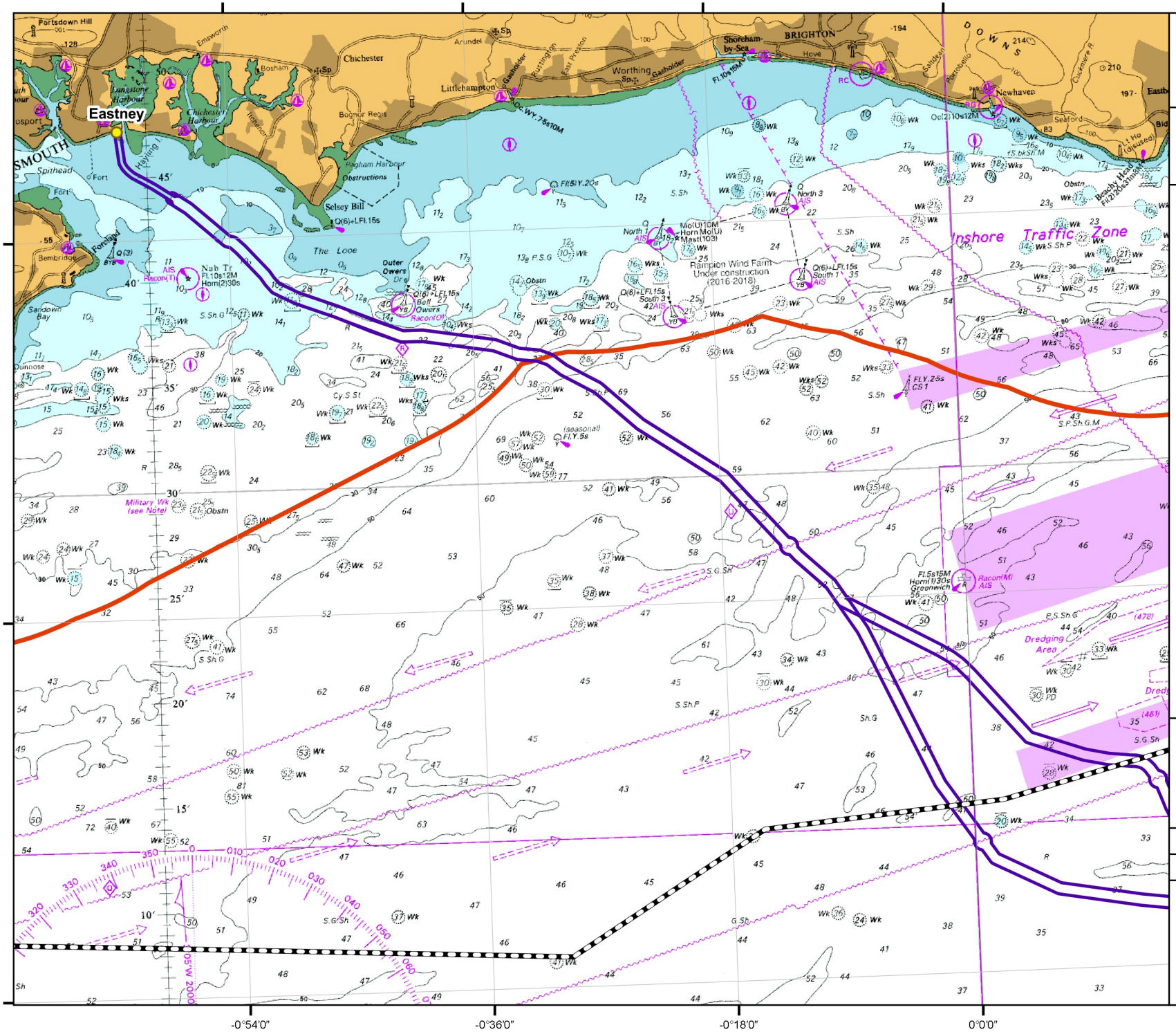
1.1.5 A separate EIA Scoping Report for the UK terrestrial elements of the Project will be submitted to the relevant local planning authorities under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

1.1.6 The scoping process for the French component of the Project will be undertaken separately. A separate report that covers both the onshore and offshore sections of the cable from the EEZ median line to the landfall, and further to the substation location at the grid connection point, is likely to be produced. This document is called the 'Demande de cadrage préalable'.

1.1.7 This offshore scoping report for UK waters provides details of the Proposed Development. It also provides a summary of the baseline environmental information currently available for the area which has been used to inform the proposed cable route. The potential impacts of the Proposed Development have been identified, along with potential cumulative and in combination impacts. Proposed surveys or studies have been provided to further inform the development of the site characterisation. General assessment methodologies for the EIA are

presented, and an outline scope of works for the assessment of each receptor group is provided.

1.1.8 In accordance with the requirements of the Marine and Coastal Access Act 2009, the application for Marine Licence award will be made to the MMO. Where additional consents are required these will be detailed within the Environmental Statement (ES).



Project:

Aquind UK - France Interconnector

Title:

Figure 1.1.1: Proposed Cable Route Corridor - UK Waters

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM Limit
- Exclusive Economic Zone (EEZ) boundary

NOT TO BE USED FOR NAVIGATION

Notes:

a) Information on this map is directly reproduced from digital and other material from different sources. Minor discrepancies may therefore occur. Where further clarification is considered necessary, this is noted through the use of text boxes on the map itself.

b) For the avoidance of doubt and unless otherwise stated:

1. where a line recorded in the key demarcates a boundary on this plan, the boundary edge is the outside edge of the line.
2. this plan should be used for identification purposes only, unless specifically stated above or in accompanying documentation.
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Scale @ A4: 1:460,000

Coordinate System: WGS 84 UTM 30N

0 2.5 5 7.5 10 km

N

Date: 28-11-17	Prepared by: FM	Checked by: SL

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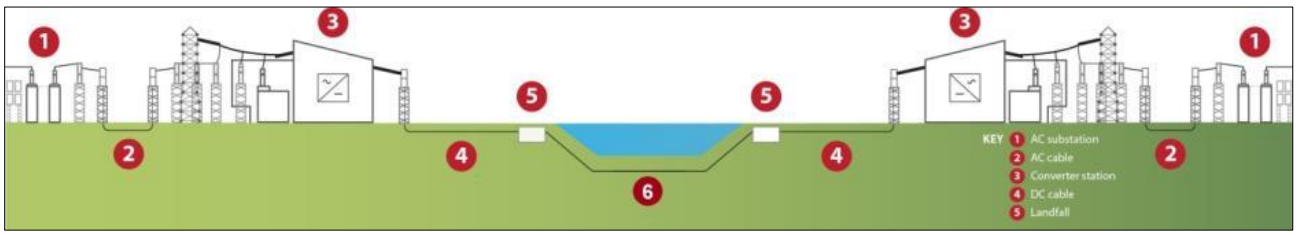
2 Project Description

2.1 Introduction

2.1.1 The Project will comprise the following components; HVDC subsea cables, HVDC underground cables, HVAC underground cables, HVDC converter stations in the UK and France and fibre optic data transmission cables.

2.1.2 The components of a Project are shown below**.**



1. AC grid sub-stations
2. HVAC underground cables
3. HVDC converter stations
4. Underground cable
5. Land/sea transition joint
6. Subsea cable

2.1.3 The Project will increase network capacity and improve security of supply for both countries. The Project shall consist of two independent pairs of electric HVDC cables (“+” and “-“) between (HVDC/AC) convertor stations, one in the UK and one in France. The HVDC cable route will start at a convertor station and will be laid underground until reaching a landing point where a joint with subsea HVDC cables will be made. The subsea HVDC cables will continue to the other shore where another joint at a landing point will be made with underground HVDC cables connecting to the second convertor station. All HVDC cables will have voltage of +/- 320 kV.

2.1.4 A convertor station will be connected to an already existing 400 kV AC substation with underground AC cables. The AC cables will have 400kV voltage and can be either copper or aluminium based with somewhat larger diameter. There might be up to 12 AC cables in total as AC technology has different requirements.

2.1.5 The HVDC link shall be configured as twin symmetrical monopoles and will comprise of four cables between the UK and France.

2.1.6 In the UK, a connection agreement has been signed with National Grid to connect at Lovedean substation, near Portsmouth, East Hampshire. The converter station will be located close to Lovedean substation, approximately 20 km from shore. In France, a connection agreement has been signed with RTE to connect at Barnabos substation, south of Dieppe. The converter station will be located close to Barnabos substation, approximately 30 km from shore. The Project is set to be commissioned in 2022. The grid connection locations have been identified after National Grid and RTE – national transmission system operators in Britain and France respectively – carried out required studies.

2.2 Proposed Cable Corridor and Cable Route

2.2.1 Following engineering and environmental constraints mapping, a cable corridor has been established between the proposed landfalls in the UK and France. The cable route for the Proposed Development will be further developed upon review of the marine survey data and this will inform the choice of installation technology that will be deployed during installation. The following cable route information is therefore indicative only, and represents the most likely technology to be deployed:

- The subsea cable route will be between 190 km to 230 km in length, spanning between the two landfall sites at Eastney (UK) and Pourville or Dieppe (France)
- The British terrestrial cable route will be approximately 18 km long.
- The French terrestrial cable route will be approximately 40 km long.
- The 400kV AC cable routes are not anticipated to exceed several kilometres in both UK and in France.

2.3 Construction Programme

2.3.1 The indicative programme of works for the marine works is outlined in the table below:

Year	Period	Category	Milestone
Marine Survey			
2017	Q4	Survey	Marine Survey Commences
2018	Q2	Survey	Marine Survey Complete
Engineering, Procurement, Construction and Installation			
2019	Q1	EPCI	Cables Contractors Commence Design Works
2020	Q1	EPCI	Subsea Cable Installation Commences
2022	Q3	EPCI	Cable Installation Complete
Completion & Commissioning			
2022	Q4	Commissioning	Commissioning Complete

2.3.2 These timescales are subject to cable production, installation campaigns and environmental considerations.

2.4 Design Status

2.4.1 The subsea cable design and installation methodology of the Proposed Development is evolving and will be determined upon completion of the geophysical and geotechnical surveys. The survey works were commenced in 2017 and will be completed by mid-2018. However, sufficient information is known to identify the likely installation options following completion of the desk top studies.

2.5 Cable Design

2.5.1 The Proposed Development shall consist of four 320kV HVDC marine cables which shall be installed as two bundled pairs or four single cables. The final details of the subsea cables will be determined by the detailed design process, which will be undertaken by the cable manufacturer following the award of EPC contracts.

2.5.2 The subsea cables are likely to have the following properties:

- Copper or aluminium conductors with Cross-linked Polyethylene (XLPE) insulation;
- Lead sheathing to protect against water ingress;
- Steel armouring to assist installation and protect against damage;
- Approximately 140 mm diameter and a weight of approximately 40 kg/m (in air) per cable. Aluminium cables may have a larger diameter.

2.5.3 Fibre optic data transmission cables of a smaller diameter will be laid together with electric cables. These fibre optic cables will be integrated within the subsea cables or installed alongside the subsea HVDC cables within a shared trench.

3 Cable Installation

3.1 Installation Methods

3.1.1 As described above, the cable will be installed as four separate cables or two bundled pairs.

3.1.2 The spacing between bundled pairs is typically driven by the spacing requirement for potential future repairs; normally this is likely to be approximately three times the water depth, however this will be confirmed and possibly reduced at detail design stage. Nearshore, space requirements and constraints may mean that these separation distances are not achievable, and in these conditions, cable may be bundled.

3.1.3 The cable loadout sequencing and installation operations will be dependent upon the cable properties, length, joint requirements and cable lay vessel used. If the cables are laid in bundled pairs, there will probably need to be three to five cable sections for each pair with six to 10 loadouts required overall. Where possible, joint locations will avoid sensitive areas, e.g. shipping channels or anchoring grounds, where the prolonged location of the installation spread is inadvisable.

Survey Requirements to Establish Ground Conditions

3.1.4 The marine surveys are required to enable further development of design and refinement of the cable route and landfall locations. In particular, the results of these surveys, and final routing, will inform cable burial risk assessment studies and identification of any scour protection requirements. The marine surveys include:

- Geotechnical offshore and geophysical investigations are scheduled to take place between late 2017 and mid-2018. These surveys will include geophysics (bathymetry, sidescan sonar, sub-bottom profiling and magnetometer or gradiometer) and geotechnical (cone penetration testing and vibrocore). The magnetometer / gradiometer will also be used for UXO detection.
- Landfall investigations, if required, will be linked to terrestrial ground investigations in late 2017 / mid 2018 this might include boreholes exploration via jack-up vessel.
- Further surveys may be required by the EPC Contractor, once appointed. These might typically take place approximately 3-6 months before installation. This would be to confirm that there were no physical changes since the marine surveys, to identify any detailed UXO survey that is required, and to allow for the final routes to be developed.

3.1.5 The geophysical survey in particular will provide information pertinent to the ES for the Proposed Development, and will be used to inform the baseline characterisation for the benthic and archaeological impact assessments.

Route Preparation

3.1.6 In general, it is envisaged that little or no preparation of the seabed will be required prior to laying the cables. However, there may be short sections along the route which will require some preparation. Different techniques may be required, depending on the findings of the marine survey:

1. Mass flow excavation (MFE) – used in areas of mobile sediments such as sandbanks and sand waves. This pre-sweeping technique removes a portion of the sandbank or sandwave to reduce excessive inclines on the sandwave, creating a flatter alignment for the

proposed burial equipment. Mass flow excavators are a form of jetting machine, which uses high flow water jets to move sediments depending on the findings of the marine survey. It is considered that there may be a requirement for this technique within the Outer Solent.

2. Filling of gulleys – Localised areas where steep slopes or uneven seabed occur may require preparation in the form of filling by rock placement to allow for the cable to be laid.

3. Boulder removal - In order to prepare a clear path for the cable to be laid and buried, boulder removal is often required within the installation corridor. One technique is to tow a plough across the seabed. A swathe between 10 and 14 m (this is bases on the plough width) wide will be cleared of surface boulders. The boulders will be pushed to one side. Boulders are not anticipated in any significant numbers at this stage, but this will be confirmed by the marine surveys.

4. Unexploded Ordinance (UXO) removal – Although, where possible, any potential UXO will be avoided, there remains the possibility that some will need to be removed. The removal of these items will be undertaken by specialist contractors.

5. Pre-rock Placement and Mattress Works – In order to reduce the risk of free spans developing along the cable route, rock placement and mattress installation can be utilised pre cable installation. Free spans are caused by the irregularity of an uneven seabed created by the turbulence or scouring action of water and sand. This method is used to compensate the unevenness by filling in the seabed and reducing stress on the cable.

6. Out of Service (OOS) Cable Removal – For any cables on the seabed which are now out of service, it is often practical to cut and recover a section of cable to clear a path for the burial equipment to install the new cables. The remaining OOS cable will remain on the seabed.

Route Clearance/Pre-lay Grapnel Run

3.1.7 Seabed debris can impede cable lay and burial operations. This could include, for example, abandoned fishing gear or Out of Services (OOS) cables. To clear these in advance of cable lay, a grapnel is towed along the centreline of the cable route to snag and recover any obstructions. This would be towed by a workboat / construction vessel or cable lay vessel. Debris recovered by the grapnel is collected on board the vessel for later recycling process or disposal at suitable onshore facilities.

Vessels

3.1.8 Cable lay and burial will be undertaken on a 24 hour/seven day basis, unless interrupted by weather or other disruptions. This is necessary to maximise the available operational weather windows, efficient vessel and equipment time, and minimise navigational impacts on other users of the sea. Notices to Mariners will be issued in advance, and operations will be carried out in line with all regulatory requirements.

3.1.9 A description of likely vessel groups to be utilised during the installation of the Proposed Development is provided below:

- Vessels for pre and post-installation surveys
- Cable lay vessel(s) (a self-propelled vessel or towed barge);

- Workboats/construction vessels and tugs–may be used for seabed preparation and pre lay grapnel runs, installation of seabed mattresses and installation of rock bags (if required) support for cable pull and floating in, and dive support etc., depending on requirements. These workboats often deploy Remotely Operated Vehicles (ROVs), and will utilise geophysical survey and positioning equipment to monitor the progress of the works, and for positioning of any ROVs or other underwater equipment needed to complete the works.
- Guard vessels – if necessary, these will accompany the cable lay vessel to maintain surveillance around the worksite ensuring other vessels are kept clear, reducing the risk of collision and to protect the cable prior to burial; and
- Rock placement vessel – if rock placement is required for additional cable protection (e.g. at cable crossings), a rock placement vessel may be used. Such vessels feature a rock storage hopper and equipment by which rock can be placed in situ on the seabed. This can be one of a number of techniques, including side dumping, split hopper or fall pipe.

3.2 Cable Lay, Burial and Protection

3.2.1 The cable is carried on carousels or in cable tanks on the cable lay vessel (or barge). From here it is pulled via tensioners overboard, under tension, to the seabed. Depending on the burial technique adopted, it may first pass through the burial tool.

3.2.2 Once on the seabed, the cable must be protected from anthropogenic (e.g. fishing and anchoring) and natural hazards (e.g. currents, mobile sediments). The means and level of protection will depend on local conditions, risk arising from the identified hazard, and probability of that risk. This will be assessed through a Cable Burial Risk Assessment, which will be undertaken after the marine surveys. However, it is likely that, where possible, the cable will be buried to a target depth of lowering[1] of approximately 0.6-3.5 m, or otherwise protected through non-burial techniques.

3.2.3 The Carbon Trust produced cable burial risk assessment guidance which provides a best practice methodology to identify target burial depths for interconnector cables. Target burial depths are a balance between depths required to protect the cable from anthropogenic activities such as fishing and vessel anchoring, and the technical parameters achievable in designing and manufacturing cables and the time, cost and operational impacts (including thermal properties of cables) (practicability) of burying cables at greater depth than necessary. The document provides definition on burial terms[2] as presented below in Table 3.2.1.

[1] See guidelines presented in the Carbon Trust produced 'Cable Burial risk Assessment Methodology - Guidance for the Preparation of Cable Burial Depth of Lowering Specification'' available at https://www.carbontrust.com/media/622265/cable-burial-risk-assessment-guidance.pdf and 'Application Guide for the specification of the Depth of Lowering using the Cable Burial Risk Assessment (CBRA) methodology' available at https://www.carbontrust.com/media/672369/owa-ct-appplication-guide-for-cbra-feb-04-1.pdf

[2] Definitions section of the Carbon Trust best practice document; Application Guide for the specification of the Depth of Lowering.

Table 3.2.1: Definitions of terms provided by the Carbon Trust 'cable burial risk assessment guidance'

Term	Definition provided by Carbon Trust best practice guidance
Depth of Lowering	This is the minimum depth recommended for protection from the external threats. This is the direct output of the risk assessment conducted during the cable corridor route selection in this instance.
Target Depth of Lowering	This is the depth that cable installers should target. 'Target depth of lowering' should be equal to or greater than the 'recommended minimum Depth of Lowering'
Target Trench Depth	This is the trench depth specified to achieve the Target Depth of Lowering. The cable installation contractors should determine the target trench depth according to the Depth of Lowering, cable properties, preferred trenching tool and taking into account the seabed conditions such as minor bedforms.
Depth of Cover	The thickness of material on top of the cable after trenching.

3.2.4 The desk top study conducted to inform the cable corridor selection and initial consultation with fishermen, indicates that commercial scale scallop dredging, otter and beam trawls are likely to occur over regions of the cable corridor. Scallop dredging utilises trawling gear that has the potential to penetrate the sea bed to a depth of up to 30 cm in soft sediments. An otter trawl has a penetration depth limited to the top centimetres of sediment however it utilises otter boards which can dig a narrow trench/furrow up to 35 cm deep (Lucchetti and Sala, 2012[3]). A beam trawl has been demonstrated to generate furrows of up to 10 cm in sediment (Paschen et al., 2000[4]).It should be noted, however that scallop dredgers routinely fish the same areas and are therefore seen as the worst case. The Applicant's engineers have therefore determined a Target Depth of Lowering of 60 cm to reduce the risk of interactions between fishing gear and the cable to acceptable levels. This then leads to a Target Trench Depth of in the order of 0.9 m for such sediments, which can be considered a minimum target trench depth for the purposes of any impact assessment for the cable.

3.2.5 Typical techniques are listed below and more detail provided in subsequent sections.

Burial techniques	Non-burial techniques
Plough Jet Trencher Mechanical Trencher (wheel or chain) Mass Flow Excavator	Tubular product Concrete mattresses Rock placement

3.2.6 Due to the length of the cable route, variations in sediment type are anticipated. However, in general terms sediments within the Solent are anticipated to be sandy, whereas in the main English Channel and French approaches sediments are sandy gravel / gravelly sand. Bedrock (chalk) is anticipated to be near or at the surface in some locations.

3.2.7 Whilst the results of the geophysical and geotechnical marine survey will be required to determine the burial requirements, preliminary studies suggest that burial should be possible along the majority of the routes, and this will need to be confirmed by the proposed surveys. However, unconsolidated sediment thicknesses are known to be predominantly thin (<5 m)

[3] Lucchetti A. Sala A. 2012 . Impact and performance of Mediterranean fishing gear by side-scan sonar technology . Canadian Journal of Fisheries and Aquatic Sciences , 69 : 1 – 11

[4] Paschen M. Richter U. Köpnick W. 2000 . TRAPESE—trawl penetration in the seabed . Final Report EI Contract 96-006, University of Rostock .

within the English Channel. There are known to be areas where rock exposure is anticipated at seabed and therefore specialist burial equipment or alternative protection may be required.

3.2.8 There are a diverse range of cable burial machines available on the market capable of burying and protecting offshore cables. All of the cable burial methods and cable protection methodologies summarised in the following sections are used on a worldwide basis and on different types of subsea cable systems.

Burial Techniques

Ploughs

3.2.9 Ploughs are towed machines generally used for simultaneous lay and burial operations where the cable vessel controls cable laying speed to match plough performance and residual tension targets. Although they are essentially passive, ploughs can be steered, and plough penetration is controlled remotely from the surface via an umbilical cable. Ploughs can either be used as a post lay tool or as a simultaneous lay and burial tool.

3.2.10 There are two principal types of cable plough.

- Displacement ploughs which create an open v-shaped trench into which the cable is laid. These are often used for pre-cut trenching, which may be backfilled by the use of backfill blades at the rear of the machine, a second pass or left to backfill naturally.
- Non-displacement ploughs can also be used and are more common. These ploughs use a thin blade-like share that slices through seabed material without creating an open trench. The plough lifts a wedge of soil and places the cable at the base of the trench before the wedge of soil then naturally backfills over the cable.

3.2.11 Both types of plough are towed either by the cable vessel or an auxiliary vessel moving along closely behind the cable vessel.

3.2.12 Non-displacement ploughs are capable of working in a wide range of soils and perform well in most sediment types but are not optimal for use in sandy sediments where frictional forces and wear rates are high. Displacement ploughs are typically deployed where longer lengths of cable burial are required. In addition to the seabed geology, other considerations for selection of ploughs as a burial tool include control / manoeuvrability requirements, depth of water, installation monitoring, cable bending requirements, and any requirement for pre-lay trenching.

3.2.13 Variant ploughs with enhanced capabilities include jetting ploughs, rock ripping ploughs and vibro ploughs.

Jet trenching

3.2.14 Jet trenching machines are used, typically post-lay, to bury cables within non-cohesive material (e.g. sands and gravels) through the use of high flow and low pressure water jets to enable the sediments to be fluidised and displaced. Conversely, to trench a cable through cohesive sediments (e.g. clay), low flow and high pressure water jets are utilised to cut and transport clay lumps. This would allow a trench to be developed into which the cable can sink. Re-deposition and natural backfill over time may enable the trench to fill.

3.2.15 Jet trenchers can be tracked machines, free flying ROVs or sleds. They commonly perform post lay burial operations, however some can perform simultaneous lay and burial. There are a number of considerations for jet trenching which include seabed geology, control (high

currents and soft sediments can impact on manoeuvrability), burial (including trench stability and cable lowering), and water depths (unless surface water is supplied to the tool).

3.2.16 Over recent years a considerable amount of experience has been gained from installing power cables for offshore wind farms. As a result a number of jet trenchers have been developed or modified specifically for power cable installation.

Mechanical trenching

3.2.17 Mechanical trenchers use either a cutting wheel or a chain to cut a narrow trench into stiff / hard sediments or rock, and are used typically post lay. They can also be used in sands if they have scoop-like teeth on the chains. Mechanical trenchers can be used for pre-lay trenching, post lay burial or can be used for simultaneous lay and burial. However progress rates are slow for simultaneous lay and burial.

3.2.18 The mechanical chain excavator tool usually consists of a number of cutting teeth similar to those used on the mechanical wheel cutter and a further number of mechanical scoops which are used to transport the cut material away from the trench. As with the mechanical wheel cutter, all the teeth on the mechanical chain excavator are replaceable and interchangeable depending on the seabed conditions. Because of the very aggressive nature of the cutting tool, the cable will be guided in an enclosed pathway around the top of the cutting tool to safeguard against any potential damage before it is placed into the base of the cut trench. Therefore, as for the wheel cutter, cable loading and unloading is a diver assisted operation.

3.2.19 There are a number of considerations for cutters which include seabed geology, and targeted burial depth requirements. Soft sediments can result in trench collapse, stability and bearing issues as well as clogging the cutters. The presence of cobbles can also jam the cutters resulting in repeated recovery and maintenance of the machines. Mechanical trenchers typically have slow progress rates, therefore making them impractical to use for long distances, and further equipment may be required to enable spoil to be transported out of the trench to enable cable burial.

Non-burial Cable Protection

3.2.20 Alternatives to burial protection measures may be required in specific sections along the cable route including:

- At cable (or other seabed infrastructure) crossings e.g. between power cable and telecoms cables.
- Across boulder, cobble or gravel fields or in very hard (rocky) seabed including areas with insufficient sediment thickness, where trenching may not be feasible or economic.
- In areas with mobile sediment.
- Where installation activities (e.g. ploughing) have been interrupted and cable was surface laid or minimum depth of lowering could not be reached.
- At a cable repair / joint location.
- Landfalls.

3.2.21 These areas will be identified following the marine survey and cable Burial Risk Assessment, such that design of the protection can be undertaken. Where non burial protection is required, the most appropriate technique should be selected. The options may include:

- **Tubular product**: Tubular protection includes protective sleeves consisting of sections made of polyurethane or ductile iron. Tubular products can make the cable more susceptible to hydrodynamic loading or anchor / fishing gear drag. Tubular products are often used in combination with mattresses or rock placement.
- **Concrete mattresses**: Mattresses are lattices of segmented, mould-produced blocks of concrete or bitumen connected by polypropylene ropes which can be laid over a cable to stabilise and shield it, often at cable crossings. Small sections of the cable or gaps between mattresses may also be protected by pre-filled grout bags or gabion (rock filled) bags. Concrete shields may be a suitable method of protection for extreme external aggression, e.g. in a landfall area.
- **Rock placement, or rock bags**: these are two methodologies for the subsea installation of crushed stones of varying size to form a protective barrier over the cable. Rock placement is, for example, used for scour protection, at infrastructure crossings or where not reaching minimum burial depth left the cable insufficiently protected. Rock berms are relatively resistant against trawling and anchoring activities.

Landfall Cable Installation and Protection

3.2.22 There are two main methods for protecting the cable at the beach/intertidal section between marine and land cable, open trench and transition duct methods.

Open Trench

3.2.23 This method typically involves “floating in” the cable between the cable lay vessel’s position and the beach by supporting the cable using buoyancy, the cable is then usually pulled along the beach on rollers until the cable reaches the transition/jointing pit location. Exposed in an open trench, the cable on the beach can then be buried using standard excavation techniques.

3.2.24 Open trench landfalls are usually considered suitable in locations which are not considered environmentally sensitive[5] and have suitable geology to allow for the open trench excavation. The open trench may be able to be extended into shallow water by use of amphibious or barge mounted excavators. The cable may also need a separate method such as rock dumping for burial or protection from the open trench through to the point that offshore burial can commence.

Transition Duct

3.2.25 This method involves installing a duct under the beach/intertidal area to provide a cable conduit through which the marine cable can be pulled to allow connection to the land cable. There are two main methods of duct installation which are Horizontally Directional Drilling (HDD) and Direct Pipe.

3.2.26 **HDD** can be used to allow cables to cross large constraints such as water ways and beach/intertidal areas, railroads etc. The HDD operations drill holes through the ground that will house ducts through which the cables will be pulled through at a later date. HDD will be used to install the ducts and marine cables in the intertidal area by pulling the cables through

[5] In addition to ecology and other environmental issues, sensitivity may reflect recreational or tourist use.

the installed ducts into the Transition Joint Bays (TJB). This method limits disturbance to the environment and any related constraints that the cable is being diverted around.

3.2.27 HDD operations require a suitable space for the temporary construction area, which can be typically 50 m x 50 m but may vary depending on the length and size of the HDD works. The HDD operations require a working area to locate the drilling rig, generator, layout of ducts and construction equipment. Where additional space is required for HDD crossings, adjacent fields or other areas which will minimise impacts will be utilised to facilitate the HDD construction works.

3.2.28 **Direct Pipe** can be used in softer sediments including water permeable soils as there is no possibility for the drillhole to collapse. An advantage of the Direct Pipe method is that a shallower catenary (i.e. shallower duct from entrance point to exit point) can be achieved compared to that of a traditional HDD. A minimum of 5 m depth below ground is normal to ensure that the drilling fluid under pressure will not break out and cause the drill hole to collapse.

3.2.29 The seaward end of the duct needs to be considered to ensure that the cable is not exposed at this interface. This can usually be achieved by methods such as excavating a pit at the duct exit or by extending the duct along the seabed and burying the duct extension.

Eastney Transition Joint Bay Installation

3.2.30 The Transition Joint Bays (TJBs) will be excavated to a depth of approximately 1.5m to 3m and located at the end of the HDD exit point. The exact location of the TJBs are unknown at this stage. The TJB bay will be constructed with concrete floors, walls, backfilled with soil and sealed with a lid. At ground level it will be as original condition, subject to detailed design. The TJB dimensions will be depend on a number of elements such as soil condition and cable design and typically one TJB may be 12m in length by 3m in width. The TJBs could be combined but will be subject to detailed design.

3.3 Commissioning and Post-lay Surveys

3.3.1 To ensure cables are adequately buried and to prevent navigational risk, a post-installation survey may be undertaken along the cable route to demonstrate that the cables have been protected as per the specification and licensing conditions.

3.4 Operation

3.4.1 The installation of fibre optic cables as part of the Proposed Development is essential for operation. They will be utilised for condition monitoring of the subsea cables as well as transmitting operational and other data.

3.4.2 Temperature and vibration monitoring shall be part of on-going assessment of the cables health, giving an emphasis to areas of mobile sediments (e.g. sandwaves), shipping channels, anchoring grounds and fishing areas. If the temperatures reach maximum cable designed parameters, further investigation and correction actions shall be undertaken.

3.5 Maintenance

3.5.1 Routine surveys utilising geophysical equipment or ROVs are likely to be undertaken to monitor burial depth and crossing/non-burial protection integrity over time.

3.5.2 In the unlikely event of a cable being damaged, it will be located and recovered to the deck of a cable repair vessel for inspection and repair. This may involve accessing the cable up to circa 1 km in length (depending on water depth, location etc.). The repaired cable will be slightly longer than the original, therefore the excess cable will be laid in a loop on the seabed. Protection is likely to be burial by jet-tool or protection by non-burial techniques e.g. mattressing.

3.6 Decommissioning

3.6.1 At the end of the cable's 40 year design life, the options for decommissioning will be evaluated. In some situations, the least environmentally impacting option may be to leave the cable in-situ. The final decommissioning plan is still to be determined, and may depend on requirements and the marine environment at the time.

4 Approach to Environmental Impact Assessment (EIA)

4.1 Introduction

4.1.1 This section confirms the proposed approach to the EIA and provides an appraisal of the key environmental effects to be covered in the EIA (i.e. ‘’scoped in’’) and the issues that do not require further consideration (i.e. ‘’scoped out’’) in the context of key legislative and policy documents. The assessment of environmental impacts will be conducted in accordance with best practice. The following key stages will form the basis of the assessment process:

- Consultation with statutory and non–statutory bodies and relevant stakeholders;
- Establishing a robust baseline of the existing environment on and around the Proposed Development through desk-based assessment and surveys;
- Assessment of the environmental impacts (their magnitude and significance, including any indirect, secondary and cumulative impacts);
- Development of mitigation measures and enhancement measures (where necessary); and
- Identification of residual impacts.

4.1.2 The EIA process will be documented in an ES which will be relevant to the intertidal and subsea works within UK waters. The scope of works that are due to be undertaken for the French landfall and offshore works are not within the scope of this document but will be produced and submitted to the French determining authorities.

4.1.3 The ES document will include a clear description of all the aspects of the Proposed Development, including timescales of the installation, operation and decommissioning stages. The ES will be prepared in accordance with relevant legislation, including the Marine and Coastal Access Act 2009 and the EIA Regulations.

4.1.4 A non-technical summary will also be produced.

4.1.5 The ES will report the likely significant environmental effects that have the potential to result as a consequence of the Proposed Development. Where such significant effects are identified, mitigation measures to prevent or reduce effects (either through project design or adoption of certain installation methodologies), will be proposed and incorporated into the assessment.

4.1.6 The ES will include all the environmental issues identified in Schedule 3 of the EIA Regulations as is required to assess the likely environmental effects of the Proposed Development.

4.1.7 A detailed description of the Proposed Development will be provided within the ES with sufficient information about the site, design, size and scale of the development such that MMO and its stakeholders can reasonably be satisfied that there is sufficient information for determination in full knowledge of the Proposed Development's likely significant effects on the environment.

4.2 Proposed Scope

4.2.1 Based on the understanding of the potential impacts of the installation and operation of the Proposed Development, the following topics will be covered in the EIA:

- Physical environment;

- Benthic ecology;
- Fish and shellfish ecology;
- Ornithology;
- Marine mammals;
- Nature conservation;
- Commercial fisheries;
- Shipping and navigation;
- Other marine users;
- Marine archaeology and cultural heritage; and
- Landscape and seascape.

4.2.2 Sections 5.1-5.10 of this report set out the proposed scope and methodology of these topics for assessing the likely significant environmental impacts of the installation, operation and decommissioning phases of the Proposed Development.

4.2.3 Following established best practice, the overall design of the project will evolve in an iterative manner with the assessment process, led mainly by the consideration of constraints that exist within and around the site (environmental, technical and economic). Once the preferred design is selected, this will form the basis of the impact assessment.

4.3 Non-Significant Issues Scoped out of the EIA

4.3.1 Through the compilation of this scoping document, Aquind will identify all potential routes to impact and likely effects on receptors. Through this process, evidence of the magnitude and consequence of effect on receptors will be appraised. Where sufficient evidence is thought to exist to provide confidence that no significant effects will arise from an effect, this scoping document will propose the potential impact to be 'scoped out' of the EIA and final ES.

4.3.2 This process has been undertaken in a receptor specific manner and presented within Sections 5.1-5.10 below.

4.4 Baseline Information

4.4.1 For each of the topics being assessed the environmental baseline of the site and its surroundings will be established. This will be achieved largely through consultations with relevant authorities and organisations, a desktop review of available data including that generated from consultations, and detailed interpretation of specialist field surveys. During the scoping process, it is anticipated that consultees will be able to identify additional datasets that can be incorporated into the baseline surveys and assessments, where appropriate.

4.4.2 Baseline surveys will be carried out by specialist consultants in a number of different study areas following methodologies agreed with independent stakeholders. These surveys will be aimed at gathering sufficient data to form a picture of the current status of environmental, social and physical elements in the vicinity of the Proposed Development, filling in any gaps in existing historical data. The ultimate aim is to allow the prediction of the potential effects of a subsequent detailed development proposal upon these physical, environmental and social elements.

4.4.3 Methodologies and extent of studies will be developed in consultation with statutory bodies and individual stakeholders to ensure the most appropriate techniques. The baseline studies and surveys will be coordinated to ensure that, where they study separate elements of interacting systems, the methodologies and extent are compatible with one another and provide common data that allow the description and understanding of those systems. This then allows the prediction of indirect effects as well as direct effects of the development on sensitive receptors.

4.5 Assessment of the Proposed Development

4.5.1 As described above, the ES will be based on final design of the Proposed Development and will include embedded mitigation where possible through adoption of best practice installation methodologies. Environmental effects which cannot be avoided or mitigated through careful design will be assessed to determine their significance. A description of the iterative design process will be provided in the ES.

4.5.2 The EIA will be undertaken in accordance with the EIA Regulations and assessments will also adhere to relevant legislation, policy and guidance which relates to the specific disciplines discussed within the relevant technical chapters of the ES.

4.5.3 The assessment will consider effects at the site preparation, installation and decommissioning, and operational stages. The definitions of these are presented below:

- **Site Preparation, Installation & Decommissioning:** Site preparation includes work required to prepare the site for installation including demolition; and
- **Operation:** This relates to effects once the Proposed Development is installed and in use or occupied.

4.5.4 The assessments of the likely significant effects for each discipline will take into account both the installation and operational phases of the Proposed Development as a whole, however the assessments will not consider specific build out stages of each phase. A number of criteria will be used to determine whether or not the potential effects of the Proposed Development are 'significant'. The effects will be assessed quantitatively wherever possible. The significance rating will take account of the following criteria:

- Likelihood of occurrence;
- Geographical extent;
- Adherence of the proposals to legislation and planning policy;
- Adherence of the proposals to international, national and local standards;
- Sensitivity of the receiving environment or other receptor;
- Value of the affected resource;
- Whether the effect is temporary or permanent;
- Whether the effect is short, medium, or long-term in duration;
- Whether the effect is reversible or irreversible;
- Inter-relationship between effects (both cumulatively and in terms of potential effect interactions); and

- The consultation responses.

4.5.5 The effects that are considered to be significant, prior to mitigation, will be identified in the ES. The significance of effects reflects judgements as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. When undertaking these assessments, a common outline methodology will be adopted wherever possible, in order to identify the significance of potential effects. This methodology may alter for individual topic assessments but this section offers a broad outline of the methodology that will be adopted, further detail will be provide in the individual EIA topic chapters.

4.5.6 The evaluation of the significance of an impact is important in determining the resources that should be applied in avoiding or mitigating an adverse impact or the actual value of a positive impact. Furthermore, the combined significance of the various mitigated impacts determines the overall environmental acceptability of a project.

4.5.7 The basic proposed outline methodology for assessing significance takes into consideration relevant guidance/regulations including;

- Guidelines for Environmental Impact Assessment (2004): Institute of Environmental Management and Assessment (IEMA);
- Special Report – The State of Environmental Impact Assessment in the UK – IEMA 2011 Institute of Environmental Management and Assessment (IEMA) (2017) - Delivering Proportionate EIA: A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice; and
- IEMA (2016) - Environmental Impact Assessment Guide to: Delivering Quality Development.
- CIEEM (Chartered Institute of Ecology and Environmental Management) for marine and coastal developments (IEEM, 2010).

4.5.8 In determining the significance of a potential effect, the magnitude of change arising from the proposal is correlated with the 'sensitivity' of the particular environmental attribute under consideration. Sensitivity is assigned at the receptor level, and as such details will be provided within the receptor specific assessments presented in the ES.

4.5.9 The following terms will be used in the ES, unless otherwise stated within individual chapters, to determine the significance of effects:

- **Major positive or negative effect** – where the Proposed Development would cause a large improvement (or deterioration) to the existing environment which will likely (but not exclusively) feature nationally or internationally important assets;
- **Major/Moderate positive or negative effect** – where the Proposed Development would cause a noticeable improvement or deterioration to the existing environment at a national or regional scale;
- **Moderate positive or negative effect** – where the Proposed Development would cause a noticeable improvement (or deterioration) to the existing environment at a local scale;
- **Minor positive or negative effect** – where the Proposed Development would cause a small improvement (or deterioration) to the existing environment; and

- **Negligible** – no discernible improvement or deterioration to the existing environment as a result of the Proposed Development will occur.

4.5.10 Effects which are deemed to be significant for the purpose of this assessment are those which are described as being moderate or major positive or negative. How significance has been determined will be detailed within each technical chapter of the ES as appropriate

4.5.11 Although significance is usually assessed in terms of varying degrees, those effects indicated as 'major' and 'moderate/major' are likely to be regarded as being equivalent to 'significant effects' when considered against Guidelines for Environmental Impact Assessment (2004): Institute of Environmental Management and Assessment (IEMA). In addition, 'moderate' impacts may constitute 'significant effects'. Whether they do so shall be determined by a qualitative analysis of the specific impact to the environment that is identified. Following the iterative design process identified earlier, the significance of each effect would be confirmed or reassessed.

4.5.12 The significance of the effect may also need to be qualified with respect to the international, national, regional or local scale over which it may be felt. The significance of an effect may also be affected by its duration (e.g. the length of the installation period) and by its reversibility, i.e. the degree to which a site could be returned to its baseline conditions following decommissioning. As detailed above, the significance of effects reflects judgements as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes.

4.5.13 The magnitude relates to the level at which the receptor will be impacted, using the duration of the impact, timing, scale, size and frequency to determine the magnitude of the impact to each receptor. Magnitude of change is evaluated in accordance with the definitions set out in Table 4.5.1 below. The definitions of magnitude in Table 4.5.1 should be used as a guide only and may be more specific for some receptors (e.g. marine mammals).

Table 4.5.1: Definitions of 'magnitude' of effect

High	Total loss or major alteration to key elements/features of the baseline (i.e. pre-development) conditions.
Medium	Partial loss or alteration to one or more key elements/features of the baseline (i.e. pre-development) conditions.
Low	Minor shift away from baseline (i.e. pre-development) conditions.
Negligible	Very slight change from baseline (i.e. pre-development) conditions.

4.5.14 For the purpose of carrying out the assessment, a scale of increasing 'sensitivity' of the environmental or human receptor is also defined. This may be defined in terms of quality, value, rarity or importance, and be classed as low, medium, or high. For certain assessment areas, guidance can be taken from value attributed to elements through designation or protection under law, e.g. ecological resources given various levels of protection under law.

4.5.15 Where an assessment of this nature takes place, the correlation of magnitude against sensitivity determines a qualitative expression for the significance of the effect, which determines the relevance of the effects to the terms that will be used in the ES to assess significance. This is demonstrated in Table 4.5.2.

Table 4.5.2: Matrix for determining the significance of effects

		SENSITIVITY OF RECEPTOR / RECEIVING ENVIRONMENT TO CHANGE			
		HIGH	MEDIUM	LOW	NEGLIGIBLE
MAGNITUDE OF CHANGE	HIGH	Major	Major to Moderate	Moderate	Negligible
	MEDIUM	Major to Moderate	Moderate	Minor to Moderate	Negligible
	LOW	Moderate	Minor to Moderate	Minor	Negligible
	NEGLIGIBLE	Negligible	Negligible	Negligible	Negligible

4.5.16 Best practice and guidance requires that certain technical topics are required to follow topic-specific criteria for determining significance. Where this is the case, the criteria to be used will be presented clearly in the EIA methodology section of the ES or where appropriate, within technical chapters within the ES.

4.6 Consideration of Alternatives

4.6.1 The EIA Regulations require that the ES contains '…*a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studies by the applicant, which are relevant to the proposed project, the regulated activity and their specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of environmental effects'* (Schedule 3).

4.6.2 Alternatives considered during the development of the plans will be included in the ES. A summary will be provided of the reasons for selection of the final Proposed Development, taking into account environmental considerations. The ES will include a description of the design alternatives considered as part of the design process.

4.7 Habitat Regulations Assessment

4.7.1 EC Council Directive 92/43/EC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) and EC Council Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive) enable European Union member states to work together within the same legislative framework to protect Europe's most valuable species and habitats, irrespective of political or administrative boundaries. At the heart of these Directives is the creation of a network of Europe's most valuable species and habitat sites known as Natura 2000.

4.7.2 The aim of the Natura 2000 network is to ensure the long-term survival of European threatened species and habitats. The network comprises Special Areas of Conservation (SAC) designated under the Habitats Directive, and Special Protection Areas (SPA) designated under the Birds Directive. SPAs and SACs are designated by the individual member states.

4.7.3 Under Article 6(3) of the Habitats Directive, project-related activities within or adjacent to Natura 2000 sites must be assessed with regard to their implications for the site conservation objectives. In England and Wales, the Habitats and Birds Directives are transposed into national legislation by The Conservation of Habitats and Species Regulations 2017, which

covers the terrestrial environment and marine waters up to the 12 nm limit, and the conservation of Offshore Marine Habitats and Species Regulations 2017, which covers all UK waters beyond the 12 nm limit[6].

4.7.4 Under the Conservation of Habitats and Species Regulations 2017, any development that may have a likely significant effect (LSE) on an SPA or SAC, either alone or in combination with other projects, requires an Appropriate Assessment (AA). The AA is to be carried out by the relevant competent authority, to determine whether or not the development would have an adverse effect on the integrity of these sites. Guidance also requires potential SPAs (pSPA), candidate SACs (cSAC) and Ramsar sites to be subject to the same assessment.

4.7.5 Before an AA is initiated, a screening process is undertaken to determine whether any of the predicted impacts of the development will result in a LSE. This screening assessment provides information to the competent authority to allow them to reach a decision on whether or not the development will have a LSE on any SPA, SAC, cSAC, pSPA or Ramsar site and therefore whether an AA is required.

4.8 Water Framework Directive (WFD)

4.8.1 The sea from the mean low water mark up to 1 nautical mile from shore is protected under the WFD which requires that the licensed project or activity does not 'cause or contribute to deterioration in water body status' or 'jeopardise the water body achieving good status'.

4.8.2 For licence applications in this zone, the MMO must make sure that the marine licence decision is compatible with the WFD and any river basin management plan. The overall objective of the Water Framework Directive (WFD) is to bring about the effective co-ordination of water environment policy and regulation across Europe. The main aims of the legislation are to ensure that all surface water and groundwater reaches 'good' status (in terms of ecological and chemical quality and water quantity, as appropriate), promote sustainable water use, reduce pollution and contribute to the mitigation of flood and droughts.

4.9 Assessment of Potential Cumulative Impacts

4.9.1 Cumulative impacts may result from the combined or incremental effects of future activities (i.e. those developments currently in planning and not included as part of the baseline). While a single activity may itself result in a non-significant impact, it may, when combined with other impacts to the same receptor group (significant or insignificant) that are occurring at the same time, result in a cumulative impact that is significant.

4.9.2 In addition to looking at the key impacts, consideration will be given to the identification of potential reasonably foreseeable cumulative impacts from the Proposed Development and other committed developments in the vicinity. Impacts can arise either from cumulative effects (the same effect from several sources) which will include synergistic effects (combined effects that lead to an increased effect greater than the individual effects), additive effects (where the magnitude of combined effects equal the sum of individual effects, or from in-combination effects (interaction or inter-relationship of different effects from different sources) or transboundary effects (where impacts are not limited to national jurisdictions).

[6] On 31st October 2017 consolidated versions of The Conservation of Species and Habitats Regulations 2017, and The Conservation of Offshore Marine Habitats and Species Regulations 2017 were laid before Parliament. The new Regulations come into force on 30th November 2017 and will replace the 2010 Habitats Regulations and the 2007 Offshore Habitats Regulations.

4.9.3 It is proposed that the ES describing the findings of the assessment will present and explain within each relevant section the EIA criteria that have been applied.

4.9.4 Impacts that can be reasonably expected to arise from neighbouring developments or activities will be considered.

4.9.5 No direct survey work to inform cumulative impact assessments is proposed. Instead, collation of existing environmental information for adjacent developments will be undertaken and utilised in addition to site specific information within the receptor specific assessments. Assessment will be based on impacts on various environmental components as identified in the ES, in combination with those impacts identified for the same components in ESs for adjacent developments.

4.9.6 This will include consideration of the following activities, some of which are also considered further in Sections 5.6-5.8 of this document:

- Sections of the cable covered in other ESs;
- Other activities related to the Proposed Development's cable route not covered in the offshore UK ES (onshore activities);
- IFA 2 Interconnector
- Rampion offshore windfarm;
- Commercial fisheries activity;
- Subsea cables and pipelines;
- Commercial and recreational navigation; and
- Port/harbour development.

4.10 Approach to Mitigation Measures

4.10.1 Mitigation measures will be identified and incorporated into the design, as environmental assessments are developed, and any potentially higher magnitude impacts identified. In this way, the proposal presented within the final design can be seen to have incorporated mitigation measures directly into the design process, and the findings and conclusions of the environmental assessments will reflect the incorporation of those measures.

4.10.2 Most mitigation measures are considered likely to be embedded within the design rather than as 'add-on' measures to ameliorate significant environmental effects. The evolution of the design, therefore, will be reported clearly in the ES, including the rationale behind the preferred choice of project design.

4.10.3 All other measures proposed as mitigation for the project will be reported within the relevant section of the ES. The mechanism by which these measures will be carried through and implemented on site during installation and operation will also be made clear.

4.10.4 The proposed mitigation strategy comprises steps identified in Table 4.10.1.

Table 4.10.1: Mitigation strategy

Avoidance	Where viable, the Proposed Development will be redesigned to avoid impacts. This will also be considered during the assessment of alternative sites/routes.
Reduction	Reduction will be considered when all options for the avoidance of impacts have been exhausted or deemed impractical.
Compensation	Where the potential for avoiding and reducing impacts has been exhausted, consideration will be given to compensating for residual impacts to make the proposal more environmentally acceptable.
Remediation	Where adverse effects are unavoidable, consideration will be given to limiting the level of impact by undertaking remedial work.

4.11 EIA Consultation

4.11.1 Consultation with relevant authorities, organisations and stakeholders will be undertaken throughout the assessment and site design process, commencing with this Scoping Report. The consultation will serve three main purposes:

- To establish a sufficiently robust environmental baseline of the Proposed Development and its surroundings;
- To identify, early in the process, specific concerns and issues relating to the Proposed Development in order that they can be discussed and accounted for appropriately in the design and assessment; and
- To ensure the appropriate involvement of the public and authorities in the assessment and design process.

4.11.2 Public consultation will be developed through a specialist consultancy, built environment group (formerly Remarkable). The significant outcomes of this consultation process for the marine elements of the Proposed Development will be reported through the ES.

5 Preliminary Environmental Baseline and Potential Impacts

As part of the process to determine potential cable route options, a description of the preliminary marine environmental baseline conditions has been compiled. This enabled the identification of key environmental features in the study area, and helped in the identification of constraints to the proposed routing of the subsea cable.

The following sections briefly outline the marine environmental baseline against which the potential impacts of installation and operation of the cable can be assessed, and also note any data sources or techniques that will be used to inform the ES.

5.1 Physical Environment

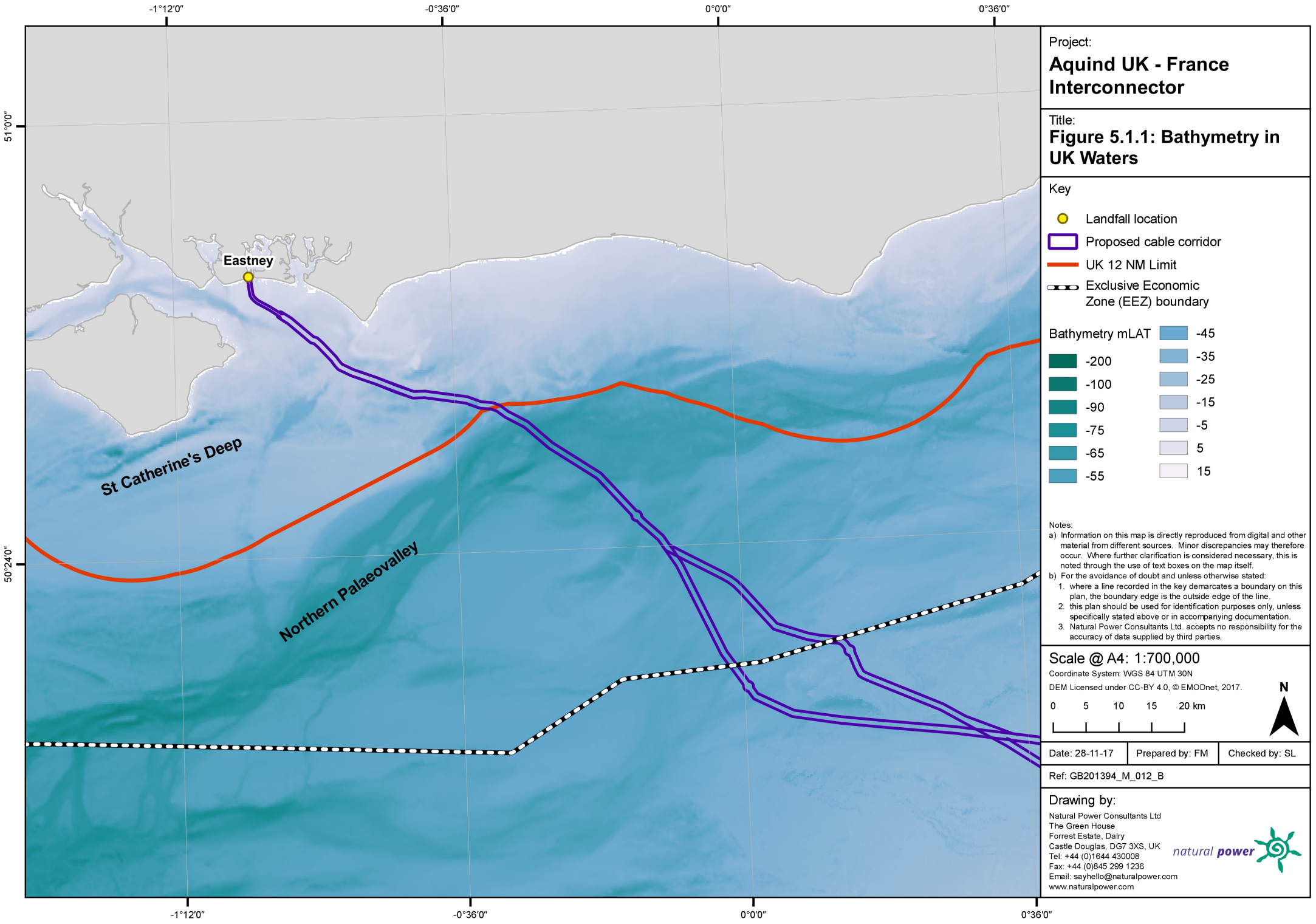
Baseline

5.1.1 Where possible the cable route is selected to avoid areas problematic for cable burial. This process comprises different stages of route development – firstly during the initial desk-based assessment and route planning, and secondly during the route surveys. Following interpretation of the results of the surveys, the route can further be refined to select the optimum route. This will continue as an iterative process and will involve further surveys of the intertidal and offshore marine environment. The marine surveys (geophysical, geotechnical and benthic ecology) and terrestrial investigations of the intertidal environment, due to be undertaken in late 2017 and early 2018, will enable further development of optimisation of the cable route and landfall locations.

Bathymetry

5.1.2 The cable route corridor runs through the eastern English Channel. The eastern half of the English Channel extends from a north-south line between the Isle of White and Cherbourg east to the Dover Strait. The seabed morphology is a very low angled planation surface with maximum depths of 60-70 m in the centre channel and which rises gently to the east at a depth of > 40 m and rises gently to the UK and French coasts[7]. The principle features of this area are the St. Catherine's Deep, a 60 m deep linear channel located just south of the Isle of Wight and the Northern Palaeovalley which is an open channel system which runs across the seabed along much of the fringe of southern England. Both features are shown by the darker blue areas illustrated within Figure 5.1.1.

[7] James *et al.* 2007. The Eastern English Channel Marine Habitat Map. Cefas and British Geological Survey https://www.cefas.co.uk/publications/techrep/tech139.pdf



Project:

Aquind UK - France Interconnector

Title:

Figure 5.1.1: Bathymetry in UK Waters

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM Limit
- Exclusive Economic Zone (EEZ) boundary

Bathymetry mLAT

-200	-45
-100	-35
-90	-25
-75	-15
-65	-5
-55	5
	15

Notes:

a) Information on this map is directly reproduced from digital and other material from different sources. Minor discrepancies may therefore occur. Where further clarification is considered necessary, this is noted through the use of text boxes on the map itself.

b) For the avoidance of doubt and unless otherwise stated:

1. where a line recorded in the key demarcates a boundary on this plan, the boundary edge is the outside edge of the line.
2. this plan should be used for identification purposes only, unless specifically stated above or in accompanying documentation.
3. Natural Power Consultants Ltd. accepts no responsibility for the accuracy of data supplied by third parties.

Scale @ A4: 1:700,000

Coordinate System: WGS 84 UTM 30N

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0 5 10 15 20 km

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Date: 28-11-17	Prepared by: FM	Checked by: SL

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5.1.3 Water depths (in UK Waters) along the proposed cable route from Eastney (the proposed UK landfall) to the EEZ median line, range between the shallower waters of the Solent (0-18 m) to water depths of 60 – 70 m. The deeper parts occur in the Northern Palaeovalley and briefly in mid channel at the UK/FRC EEZ. Throughout much of the proposed cable route water depths range from 30 m to 65 m.

Shallow Geology and Sediment Transport

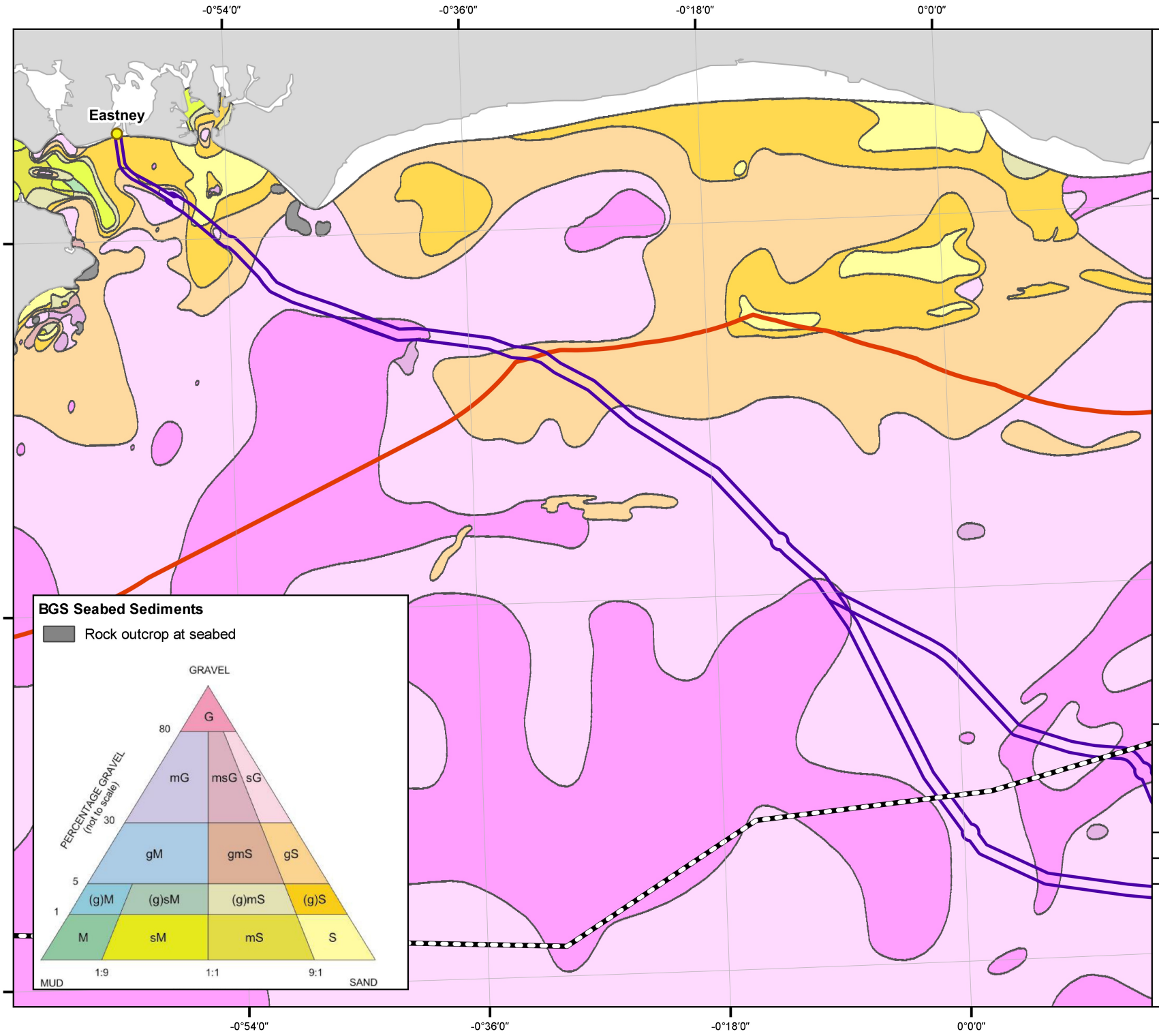
5.1.4 The solid geology that makes up this region is generally >35 Ma (million years; including Upper Jurassic strata of over 142 Ma) and is incised and overlain by unconsolidated Quaternary sediments <2,5 Ma, the majority of which are probably < 0.5 Ma[8].

5.1.5 Holocene and modern seabed sediments overlay the Quaternary channel infill. These comprise sands, muds and gravels and a combination of these textures. The general distribution of seafloor sediments is shown in Figure 5.1.2 (sediment key is based on Folk, R.L. 1954. Journal of Geology, Vol. 62, p344-359).

5.1.6 For much of the cable corridor, the seafloor surficial sediments are dominated by gravels, gravelly sands and sands. Small pockets of finer grained sediments are recorded close to the coasts. However, sediment cover/thickness is known to be predominantly thin (<5m) over most of this area of the Channel. There are known to be areas where exposed bedrock is anticipated at the seabed and therefore specialist burial equipment (or cable protection measures) may be required.

5.1.7 The factors that control the character of the seabed in this area are two-fold. Firstly, the nature and form of the substrate and secondly, the hydrodynamic processes (currents, waves). Gravel dominated sediments on the seabed have largely been derived from reworking of Quaternary deposits during the Holocene transgression and subsequently, sandy sediments have either been derived in a similar way and/or have been winnowed from the gravelly sediments by the relatively strong tidal currents in the region. The long term dominant hydrodynamic force of tide in the area has transported fine sediment and sand to the east and north along the coastal margin.

[8] James *et al.* 2007. The Eastern English Channel Marine Habitat Map. Cefas and British Geological Survey https://www.cefas.co.uk/publications/techrep/tech139.pdf



Project:

Aquind UK - France Interconnector

Title:

Figure 5.1.2: Seabed Sediments in UK Waters

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM Limit
- Exclusive Economic Zone (EEZ) boundary

Notes:

a) Information on this map is directly reproduced from digital and other material from different sources. Minor discrepancies may therefore occur. Where further clarification is considered necessary, this is noted through the use of text boxes on the map itself.

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Scale @ A4: 1:460,000

Coordinate System: WGS 84 UTM 30N

N

0 2.5 5 7.5 10 km

Date: 28-11-17	Prepared by: FM	Checked by: SL

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5.1.8 Figure 5.1.3 (modified from James *et al.* 2007) shows a simplified map of the predominant sediment transport directions within the English Channel. Sediment transport is controlled largely by tidal currents and ocean swells. Swells usually predominate over tide related currents close to the shore, whilst tidal currents prevail over wave influence in deeper waters further off from the coast. For much of the proposed cable route length, residual (net) sediment transport is considered to be in a west to east direction.

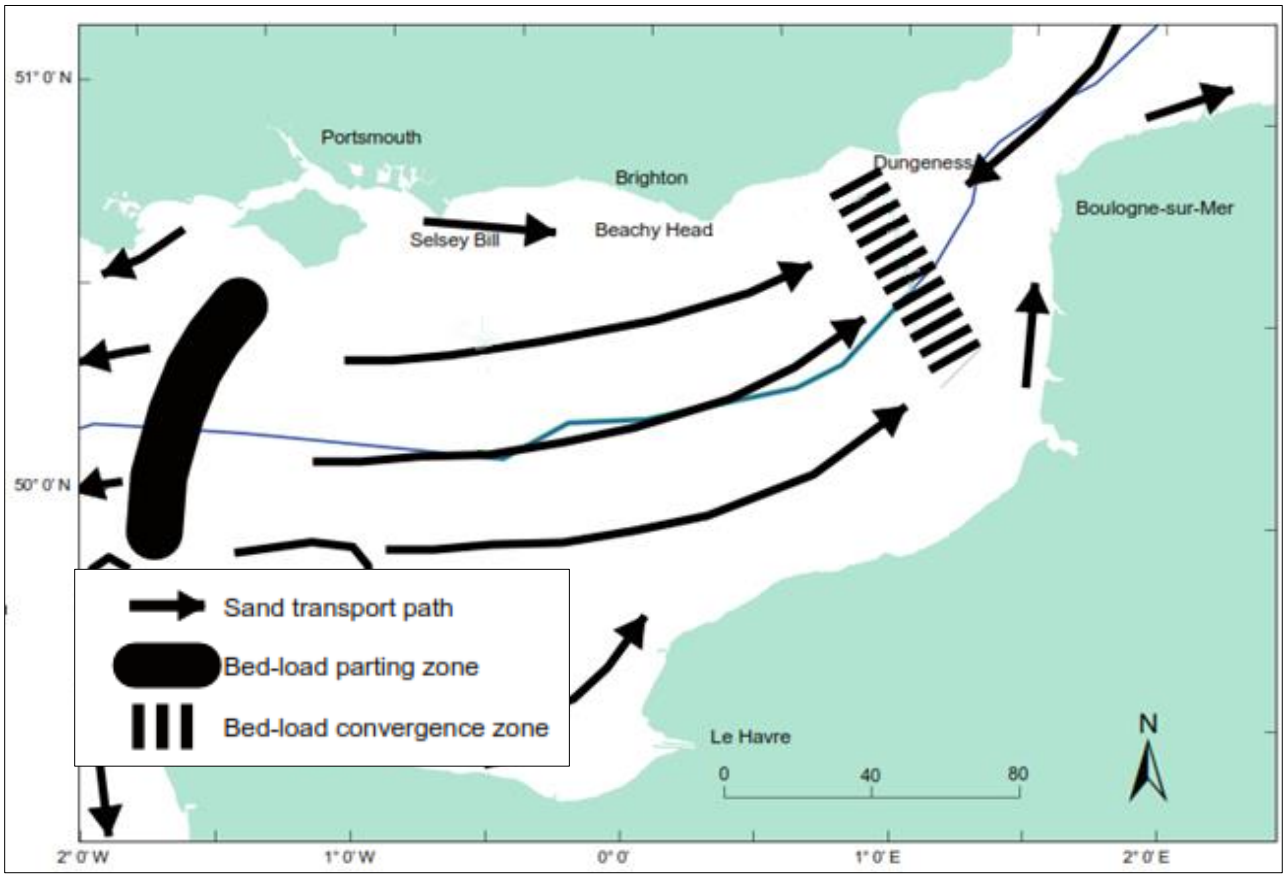


Figure 5.1.3: Sediment transport directions within the English Channel (modified from James *et al*. 2007)

Designated Sites

5.1.9 This area of the Channel also accommodates a number of offshore Marine Conservation Zones (MCZs: Utopia, Offshore Overfalls, Offshore Brighton, Kingsmere) and recommended Marine Conservation Zones (rMCZs: Selsey Bill and the Hounds, East Meridian). These are illustrated on Figure 5.2.1 in Section 5.2 of this document. The mixed sediments in the region and some of the geological features (e.g. English Outburst, High energy circalittoral rock, Northern Paleovalley) are protected features within these designated zones which, as habitats, can support a wide range of animal species. Although the proposed cable route does not travel through any of the MCZs, potential impacts on their geomorphological features and benthic communities will be assessed.

5.1.10 In addition, the Solent Maritime SAC is located in close proximity to the proposed landfall at Eastney; this site is designated in part, for its sediment habitats and the potential impacts of landfall in this location will be assessed.

Currents and Waves

5.1.11 Currents in the eastern English Channel are rectiliner. Tidal current magnitudes are at their strongest in the western English Channel and in the far eastern channel through the Strait of Dover, However, as the tidal wave progresses through the Channel during flooding, current velocities decrease throughout the central region building again towards the Strait of Dover. Tidal velocities in the eastern Channel have been recorded to reach speeds of up to1.2 m/s[9] - 1.75 m/s[10] during Spring tides. Tides are recorded as being weaker closer to the coast in general, in the vicinity of the proposed cable landfall areas.

5.1.12 The marine region is subject to locally generated wind-induced waves and the eastern English Channel is also exposed to the west to swells generated in the Atlantic Ocean. Wave heights of 0.5-1.5 m are common in the area, but extreme 50 year return period significant wave heights of over 8 m have been predicted by models (Cotton *et al*, 1999; cited in James *et al.,* 2007). Although storm events may have a significant impact on movement of seabed sediments, it is considered that wave action is generally less important than tidal currents in the transport of sediments in this region[11].

Water and Air Quality

5.1.13 During the installation phase of the project, suspended sediments may be generated from disturbance of the seabed. The potential release of sediment bound contaminants is considered unlikely to result in significant effects as there are no dredge disposal sites within the vicinity of the Proposed Development. See Section 5.2 of this report (the IFA2 Interconnector Project did consider contaminated sediments within their EIA because the IFA2 cable route was located in closer proximity to dredging sites. However, the samples taken for the IFA2 Project did not reveal any significantly elevated contamination levels).

5.1.14 Further, although the activities to be undertaken for the Proposed Development are not listed in the 'low risk' activities for screening (WFD guidance provided on Environment Agency's website[12]), it is considered that the Proposed Development will not require WFD assessment as it is unlikely to result in any significant effects on water quality. It is acknowledged that usually, activities not listed as low risk would require further assessment. However, it is considered that existing information is sufficient to preclude this requirement for the Proposed Development. The IFA2 Interconnector Project recently (May 2016) undertook a full WFD assessment on similar methods of installation of subsea cables and landfall construction activities within the same Basin District (South East River) and Coastal Water Bodies (The Solent and Isle of Wight East) as the Proposed Development. The IFA2 assessment concluded that the activities are not predicted to cause deterioration to the current status of water bodies or prevent them from achieving future status objectives.

5.1.15 As such, a full assessment for water quality for the Proposed Development is not considered to be a proportionate approach and is proposed to be scoped out of the EIA.

---

[9] Aquind UK – France Interconnector Cable, Marine Cable Route Desk Top Study. WSP June 2017

[10] James *et al.* 2007. The Eastern English Channel Marine Habitat Map. Cefas and British Geological Survey https://www.cefas.co.uk/publications/techrep/tech139.pdf

[11] *Ibid.*

[12] https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters

5.1.16 Air quality along the route is good. Vessel exhaust emissions during cable installation will generally be distant from sensitive receptors, and are not anticipated to result in significant effects. As such, an air quality assessment for the proposed works is not considered a proportionate approach and is therefore proposed to be scoped out of the EIA.

Potential Impacts and Mitigation

5.1.17 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on the physical environment in UK waters may include:

- Installation (and decommissioning):
  - Physical disturbance to seabed geology;
  - Impacts to local sediment regimes;
  - Impacts on water quality;
  - Impacts on air quality; and
  - Impacts to coastal processes.

5.1.18 Potential impacts of the Proposed Development may include physical disturbance to seabed geology, impacts to local sediment regimes and coastal processes. These effects are expected to be limited to a narrow corridor and would arise mainly from installation activities, and maintenance operations during the operation phase, if necessary. Information on the effects on the physical environment that may have secondary effects on other environmental features will be fed in as appropriate to receptor specific assessments e.g. designated sites and features, and marine ecology. Surveys are planned for late 2017, early 2018 and will be ongoing to investigate and provide a detailed baseline of the physical characteristics of the intertidal and offshore environment.

5.1.19 The decision on whether an impact should be further assessed within the EIA is based on whether potentially significant impacts may arise (Table 5.1.1.).

Table 5.1.1: Potential impacts on the physical environment and approach to EIA

Potential impact	Proposed approach	Reason	Proposed mitigation
Installation, operation (and decommissioning)			
Physical disturbance to seabed geology and morphology.	Scope in	Potential direct effects during installation works on seabed geology and features.	Any required mitigation will be identified through the EIA process.
Impacts to local sediment regimes.	Scope in	Potential effects on sediment regimes within the vicinity of the Proposed Development.	Any required mitigation will be identified through the EIA process.
Impacts on water quality	Scope out	Based on existing information, it is considered that the Proposed Development will not result in any likely significant effects on water quality.	
Impacts on air quality	Scope out	Vessel exhaust emissions during cable installation will generally be distant from sensitive receptors, and are not anticipated to result in significant effects.	

Potential impact	Proposed approach	Reason	Proposed mitigation
Impacts to coastal processes.	Scope in	Potential effects on coastal processes within the vicinity of the Proposed Development.	Any required mitigation will be identified through the EIA process.

5.1.20 The presence of seabed features e.g. outcropping bedrock, sandwave and/or megaripple fields will be determined following the marine surveys. Results from the marine surveys will identify if it is likely that the cables will need to be laid around, through or over any of these features if present.

5.1.21 Whilst the results of the marine geophysical survey will be required to determine the burial requirements, preliminary information suggests that burial should be possible along the majority of the routes. However, sediment is known to be thin (<5m) within the English Channel. There are known to be areas where rock is anticipated at seabed and therefore specialist burial or trenching equipment may then be required.

Potential Effects of Cable Installation

5.1.22 Seabed conditions largely dictate the choice of cable installation method. Differing cable installation and protection methods have different potential impacts upon the environment, and a description of the different methods is provided in Section 3 of this document.

5.1.23 All of the cable burial methods and cable protection methodologies described in Section 3 are used worldwide and on different subsea cable systems. However, the suitability of the equipment needs to be assessed based on seabed conditions, nature of the environment, preferred burial methodology and potential for minimising impact.

5.1.24 In addition, non-burial protection measures may be required in specific sections along the cable route. Rock placement or concrete mattresses may be required where:

- Cables cannot be routed around rock that is too strong to trench;
- Where trenching may not be feasible or where sediment is particularly mobile.

5.1.25 The potential effects of mattressing will be dependent upon the mattress size and coverage extent. The requirement for mattressing will be determined following interpretation of data from the marine surveys. It is considered that the height of protection above the seabed that would be required could result in a local elevation of the seabed profile. This will alter the bathymetry slightly (by approx. up to 1 m).

5.1.26 Some sections of the cable may need to be laid through features such as sandwave and/or megaripple fields, if present. Where possible, these features will be avoided in order to preserve the cable burial depth, since free-spans or increased cable cover along the cable may arise as a result of sediment mobility. However, if an alternate route cannot be found then sandwave pre-sweeping may be required. The presence of sandwaves indicates that the environment is dynamic and it is likely that the sandwaves will re-form over a relatively short period of time (weeks to months). The extent of any mobile seabed features will be established following interpretation of data from the marine surveys.

5.1.27 In addition to assessing the key environmental impacts of the Proposed Development, consideration will be given to the identification of potential cumulative impacts between the Proposed Development and other committed future developments in the vicinity. The likely schedules for the other developments will be taken into account, as both construction-phase

and long-term cumulative impacts will be considered. Section 4.9 of this document provides further details on cumulative assessment.

Scope of Assessment and Further Information

5.1.28 Data for the Proposed Development will be derived from several sources, including the aforementioned geophysical, geotechnical, and benthic surveys. Seabed sediment particle size data will be obtained from the results of the geotechnical and benthic survey.

5.1.29 Features to be addressed in the baseline desk study include:

- Seabed sediment composition distribution, and variability in thickness;
- Shallow sub-seabed conditions;
- Sediment transport pathways;
- Existing coastline and shoreline dynamics, including long-term seabed and shoreline stability;
- Scour around adjacent cables and pipelines, and the potential for development of 'free-spans';
- Natural seabed obstructions and features;
- Man-made seabed obstructions and features (debris, wrecks, cables, pipelines, etc.);
- Bathymetric setting, including slopes at the landfalls;
- Oceanographic setting;
- Seasonal variations in climate and weather;
- Typical sea states;
- Seabed currents; and
- Wind and wave data.

5.1.30 Once the collection of baseline data is completed, and the results of the marine surveys have been analysed, the assessment of impacts of the worst case scenario on the physical environment will be undertaken in full. It is considered that given the nature of the project and installation works, that a proportionate assessment be undertaken which can be based on the marine surveys already described and through the use of existing datasets. As such, the Applicant does not propose to deploy any current or wave equipment for data collection but is confident that a robust assessment can be made using the data from existing projects and resources.

5.2 Biological Environment (Intertidal and Benthic Ecology)

Baseline

5.2.1 The environmental baseline for benthic habitats has been drawn from publicly available sources. Where additional baseline data gathering is deemed to be required in order to properly assess the impacts during the EIA, this is identified within the Scope of Assessment and Further Information Requirements section below.

Protected Areas

5.2.2 The proposed Eastney landfall section of the 0.5 km wide cable corridor (becoming up to 0.7 km wide in water depths greater than 10 m) passes through two protected areas designated for benthic habitats; Solent Maritime SAC, and the Chichester and Langstone Harbours Ramsar Site (Table 5.2.1[13]). Several other protected areas lie within 50 km of the Proposed Development, including four SACs (all designated), six designated MCZs, and eight recommended MCZs (Table 5.2.1 and Figure 5.2.1). The East Meridian and Wight-Barfleur Extension MCZ's were not recommended for designation in 2013 (Defra, 2013[14]; Link, 2013[15]), however they have been included at this stage for completeness. While not strictly designated for benthic habitats, the Eastney Beach Local Nature Reserve (located at Eastney landfall) includes an important intertidal habitat of coastal vegetated shingle, which is listed as an Annex I habitat under the Habitats Directive, therefore is included in the table.

Table 5.2.1 Protected areas (designated and recommended) with benthic features UK waters in the vicinity of the Proposed Development

Name	Criteria	Status	Approx. closest Distance to Proposed Development (km)
Chichester and Langstone Harbours (Ramsar)	Annex I habitats: intertidal mudflats; saltmarsh sand and shingle spits	Listed	0.1
Solent Maritime (SAC)	Annex I habitats: estuaries	Designated	0
Eastney Beach Site of Importance for Nature Conservation (SINC)	Coastal vegetated shingle	Designated	0
Selsey Bill and the Hounds (MCZ)	Annex I habitats: reefs (soft corals) Important species: Short-snouted seahorse	Recommended	4.2
South Wight Maritime (SAC)	Annex I habitats: reefs; submerged or partially submerged sea caves	Designated	3.3

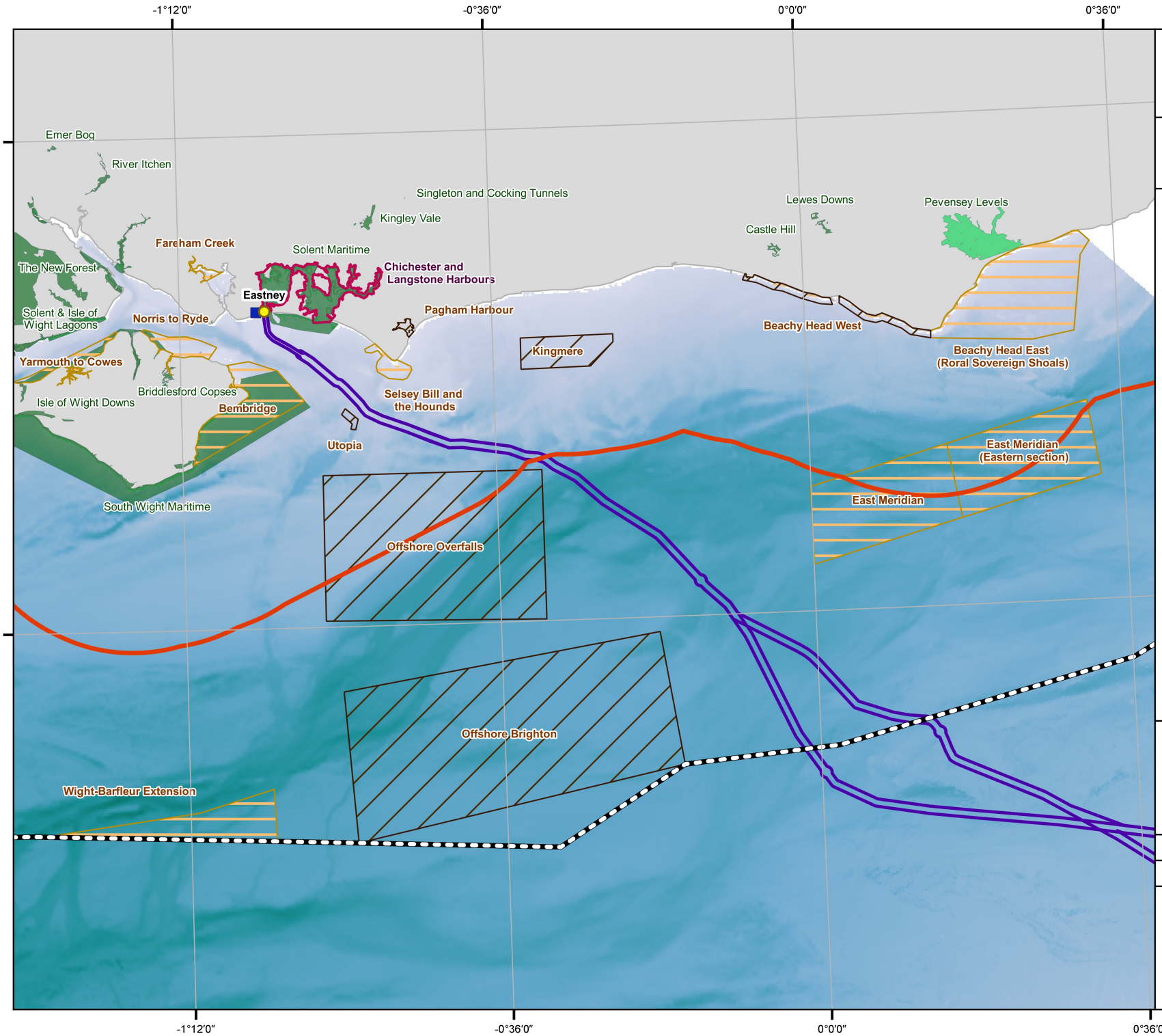
[13] Information available from JNCC website (jncc.defra.gov.uk), Government Website (gov.uk) and the Wildlife Trusts (wildlifetrusts.org).

[14] Defra, 2013. Marine Conservation Zones: Consultation on proposals for designation in 2013 Annex A6 – Sites not suitable for designation. This document can be accessed here: www.gov.uk/government/uploads/system/uploads/attachment_data/file/82714/mcz-annex-a6-121213.pdf

[15] Wildlife and Countryside Link (Link), 2013. response to Defra's consultation on proposals for the designation of Marine Conservation Zones in 2013. This document can be accessed here: www.wcl.org.uk/docs/Link_response_to_MCZ_consultation_28Mar13.pdf

Name	**Criteria**	**Status**	**Approx. closest Distance to Proposed Development (km)**
Bembridge (MCZ)	Subtidal mixed sediments; subtidal coarse sediments; subtidal macrophyte-dominated sediment; subtidal sand; subtidal mud; sheltered muddy gravels; mud habitats in deep water Important species: maerl beds; rossworm reef; short-snouted seahorse; long-snouted seahorse; native oyster beds; peacock's tail seaweed; stalked jellyfish, sea snail, starlet sea anemone	Recommended	3.3
Offshore Overfalls (MCZ)	Subtidal coarse sediment; subtidal mixed sediments; subtidal sand	Designated	0.9
Utopia (MCZ)	Moderate / high energy circalittoral rock; subtidal coarse sediment / mixed and sand Annex I habitats: reefs (fragile sponge and anthrozoan communities)	Designated	1.0
Pagham Harbour (MCZ)	Annex I habitats: *Zostera* beds Important species: Defoin's lagoon snail	Designated	9.6
Solent and Isle of Wight Lagoons (SAC)	Annex I habitats: coastal lagoons	Designated	4.6
Norris to Ryde (MCZ)	Subtidal mud. Annex I habitats: *Zostera* beds.	Recommended	6.9
Fareham Creek (MCZ)	Annex I habitats: sheltered muddy gravel; saltmarsh Important species: native oysters	Recommended	7.6
Offshore Brighton (MCZ)	High energy circalittoral rock; subtidal coarse sediment; subtidal mixed sediments	Designated	8.1
Kingmere (MCZ)	Moderate energy circalittoral rock; moderate energy infralittoral rock; mixed sediment	Designated	10.5
East Meridian (MCZ)	Subtidal sand; subtidal mixed sediments; subtidal sands and gravels Annex I species: rossworm reef	Recommended	10.6
Isle of Wight Downs (SAC)	Annex I habitats: vegetated sea cliffs of the Atlantic and Baltic Coasts	Designated	19.6

Name	**Criteria**	**Status**	**Approx. closest Distance to Proposed Development (km)**
Beachy Head West (MCZ)	Annex I habitats: intertidal coarse sediment; moderate energy circalittoral rock; high energy circalittoral rock; subtidal mixed sediments; subtidal mud; subtidal sand; infralittoral muddy sand; infralittoral sandy mud; low energy infralittoral rock and thin sandy sediment; subtidal chalk; moderate energy circalittoral rock; high energy circalittoral rock. Important species: blue mussel beds; native oyster; short snouted seahorse.	Designated	34.5
East Meridian (eastern Section) (MCZ)	Subtidal sand; subtidal mixed sediments; subtidal sands and gravels Annex I species: rossworm reef	Recommended	27.2
Beachy Head East (Roral Sovereign Shoals) (MCZ)	Annex I habitat: reefs (sandstone / chalk, subtidal chalk ledges, peat and clay exposures, littoral chalk communities) Important species: rossworm reef, sea squirt beds; ross coral; blue mussel beds; native oyster; blunt-snouted seahorse	Recommended	44.5
Wight-Barfleur Extension (MCZ)	Mixed coarse sediments	Recommended	51.6



Project:

Aquind UK - France Interconnector

Title:

Figure 5.2.1: Relevant Protected Areas

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM limit
- Exclusive Economic Zone (EEZ) boundary
- Eastney Beach Site of Importance for Nature Conservation (SINC)
- Ramsar

Marine Conservation Zone (MCZ)

- Designated
- Recommended

Special Area of Conservation (SAC)

- Designated
- Candidate

Bathymetry mLAT

-106	-45
-95	-35
-85	-25
-75	-15
-65	-5
-55	5
	15

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Coordinate System: WGS 84 UTM 30N

0 5 10 15 20 km

N

Date: 28-11-17	Prepared by: FM	Checked by: SL

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Benthic Habitats (EUNIS)

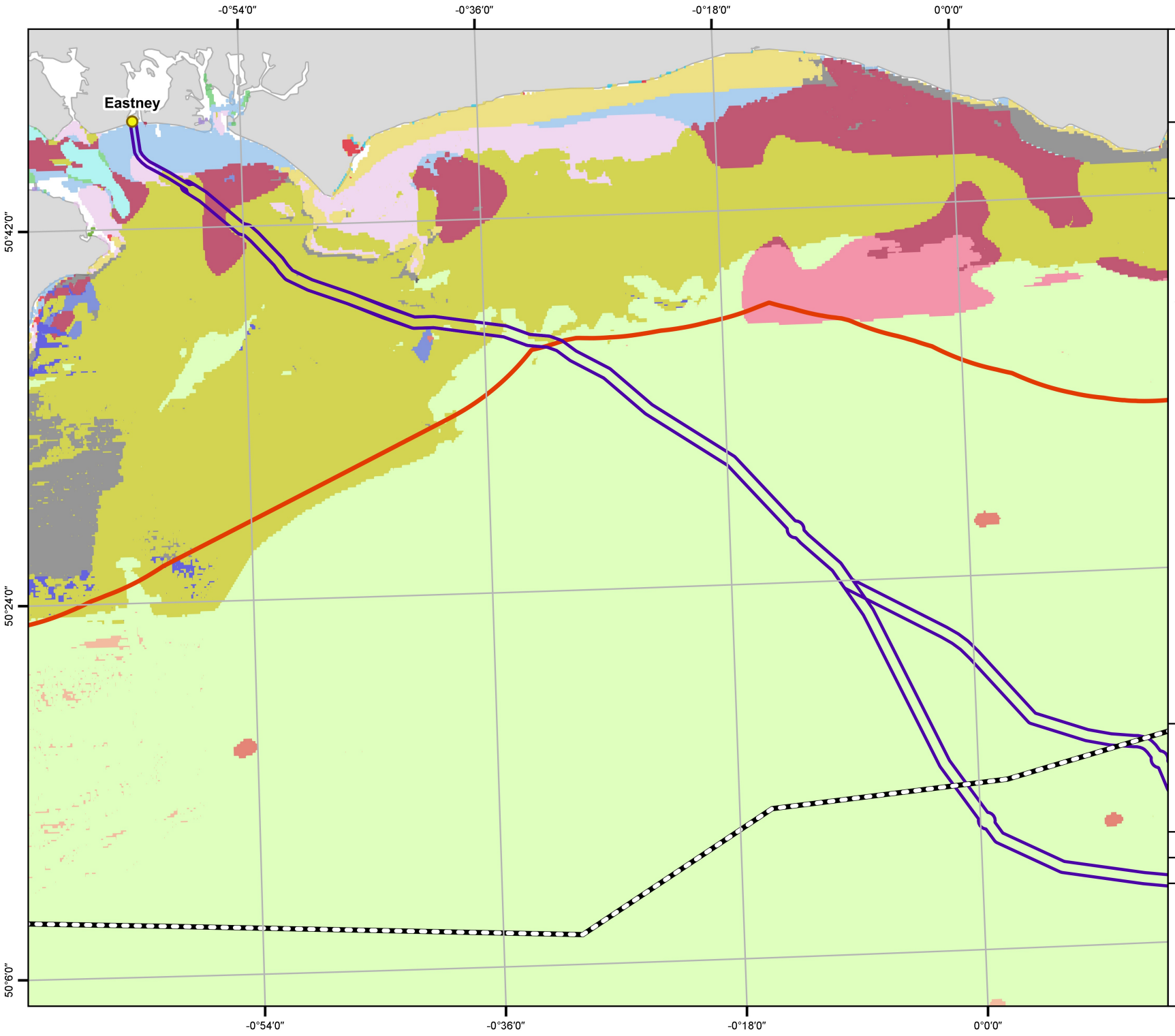
5.2.3 The majority of the seabed that the Proposed Development passes through is classified as sediment according the European Marine Observation and Data Network (EMODnet)[16]. There are two main seabed habitat types, classified as European Nature System (EUNIS) A5.14 (High energy shallow circalittoral coarse sediment) and A5.15 (Moderate energy deep circalittoral coarse sediment). Other habitat types intersecting with the Proposed Development are patches of A5.13 (High energy infralittoral coarse sediment), A5.23 or A5.24 (High energy infralittoral fine sand or infralittoral muddy sand) and A5.25 or A5.26 (High energy shallow circalittoral sand or circalittoral muddy sand (Table 5.2.2). These are predominantly located within 13 km of the shore, along the first 30 km of the cable route (Figure 5.2.2).

5.2.4 Additional habitat types found within the Proposed Development are patches of A3.1 (High energy infralittoral rock or other hard substrata), A4.1 (High energy Atlantic and Mediterranean shallow circalittoral rock or other hard substrata), and A5.44 (High energy shallow circalittoral mixed sediment). Sediments found adjacent to the Proposed Development include A5.33 (Moderate energy infralittoral sandy mud to muddy sand), A5.35 (low energy shallow circalittoral sandy mud to muddy sand) and A5.45 (Moderate energy deep circalittoral mixed sediment). With the exception of habitat type A5.45, these are located within 13 km of the shore, along the first 30 km of the Proposed Development (Figure 5.2.2).

Table 5.2.2: EUNIS habitat types located within the vicinity the Proposed Development

EUNIS Code	Description	Overlap cable route?
A5.13	High energy infralittoral coarse sediment	Yes
A5.14	High energy shallow circalittoral coarse sediment	Yes
A5.15	Moderate energy deep circalittoral coarse sediment	Yes
A5.23 or A5.24	High energy infralittoral fine sand or infralittoral muddy sand	Yes
A5.25 or A5.26	High energy shallow circalittoral sand or circalittoral muddy sand	Yes
A3.1	High energy infralittoral rock or other hard substrata	Yes
A4.1	High energy Atlantic and Mediterranean shallow circalittoral rock or other hard substrata	Yes
A4.27	Faunal communities on deep moderate energy circaliteral rock	Yes
A5.44	High energy shallow circalittoral mixed sediment	Yes
A5.33	Moderate energy infralittoral sandy mud to muddy sand	No
A5.35	Low energy shallow circalittoral sandy mud to muddy sand	No
A5.45	Moderate energy deep circalittoral mixed sediment	No

[16] http://www.emodnet.eu/geoviewer/



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Title:

Figure 5.2.2: EUNIS Habitat Types

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM Limit
- Exclusive Economic Zone (EEZ) boundary

EUNIS Habitat

- A3.1
- A3.2
- A3.3
- A4.1
- A4.12
- A4.2
- A4.27
- A5.13
- A5.14
- A5.15
- A5.23 or A5.24
- A5.25 or A5.26
- A5.27
- A5.33
- A5.33 or A5.34
- A5.34
- A5.35
- A5.35 or A5.36
- A5.37
- A5.43
- A5.44
- A5.45

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Coordinate System: WGS 84 UTM 30N

0 2.5 5 7.5 10 km

N

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Potential Impacts and Mitigation

5.2.5 With reference to the current benthic state and assessment of similar construction projects in the East Channel (see Section 4.9 for more information), the following potential impacts on benthic ecology during construction (and decommissioning) and operation of the Proposed Development have been identified:

- Installation (and decommissioning):
  - Seabed disturbance;
  - Deposition of sediment (smothering);
  - Temporary increase in suspended sediment concentrations;
  - Resuspension of contaminated sediment;
  - Introduction of invasive non-native species (INNS);
- Operation
  - Habitat loss;
  - Electro-magnetic field (EMF) emissions from HVDC cable;
  - Disturbance due to O&M activity

5.2.6 The decision on whether an impact should be further assessed within the EIA is based on whether potentially significant impacts may arise (Table 5.2.3.).

Table 5.2.3 Potential impacts on benthic environment and approach to EIA

Potential impact	Proposed approach	Reason	Proposed mitigation
Installation (and decommissioning)			
Seabed disturbance	Scope in	Activities undertaken will cause disturbance to the seabed, which can lead to the loss of biodiversity and habitat. Depending on the habitat type affected, potentially significant impacts may arise if sensitive habitats are affected.	Any required mitigation will be identified through the EIA process.
Deposition of sediment	Scope in	Sediment will be displaced during construction. This will result in adjacent habitats which are otherwise unaffected by direct works becoming buried or smothered to a certain degree. Impacts may be significant where sensitive habitats are present.	Any required mitigation will be identified through the EIA process.
Increase in suspended sediments	Scope in	Disturbance to the seabed will cause an increase in suspended sediments in the water column. Sediment suspension can impede the capacity for organisms to feed or respire, but also reduce light levels, which can affect photosynthetic organisms particularly in shallow water. Impacts may be significant where sensitive habitats are present.	Any required mitigation will be identified through the EIA process.
Suspension of contaminated sediment	Scope out	No significant impacts predicted.	

Potential impact	Proposed approach	Reason	Proposed mitigation
Introduction of invasive non-native species	Scope out	No significant impacts predicted.	Follow industry best practice, including producing a biosecurity plan to manage risk.
Operation			
Habitat loss	Scope in	Any secondary cable protection used along the route will result in loss of habitats. Depending on the habitat type affected and its location, potentially significant impacts may arise from habitat loss.	Any required mitigation will be identified through the EIA process.
Impacts from EMF emissions	Scope out	No significant impacts predicted.	Shielding and burial of cable.
Seabed disturbance due to O&M activity	Scope in	Activities undertaken will cause disturbance to the seabed, which can lead to the loss of biodiversity and habitat. Depending on the habitat type affected, potentially significant impacts may arise if sensitive habitats are affected.	Any required mitigation will be identified through the EIA process.

5.2.7 Where impacts are proposed to be scoped out, additional justification is provided in the following paragraphs.

Installation (and decommissioning) - Suspension of contaminated sediment

5.2.8 Although contamination levels in the area, as recorded by Merman (British Oceanographic data Centre, 2014[17]) show elevated measurements of metals, as well as some chlorophenols, pesticides and polycyclic hydrocarbons (PAHs), the location of these sampling stations are located very close to port and harbour areas where such contamination is typically elevated (i.e. the Southhampton Water Dockhead, and Salter's Quay, Langstone).

5.2.9 Information on contaminants in the area around the proposed cable route undertaken for the nearby IFA2 interconnector cable route, however, showed organotin, total hydrocarbon and metals to be generally below Cefas Action Level (AL) 1 at all stations. Although there were some elevated levels above Cefas AL1 of certain metals, such records were all located further west in the Solent towards Southampton Water (RSK Environment Ltd, 2016[18]). Therefore, it is considered that the risk of contaminated sediments being present in the proposed cable route is very low and that there is no potential for significant impacts to arise through their resuspension.

[17] British Oceanographic data Centre, 2014. Marine Environment Monitoring and Assessment National database (MERMAN). This document can be downloaded from: www.bodc.ac.uk/projects/data_management/uk/merman/assessments_and_data_access/csemp/

[18] RSK Environment Ltd, 2016. IFA2 UK Offshore Development Environmental Statement. Document No. IF2-ENV-STM-0024

Introduction of invasive non-native species

5.2.10 It is noted that several invasive non-native species (INNS) can already be found within the vicinity of the proposed works (Arenas *et al*., 2006[19]; Minchin *et al*., 2013[20]). Introduction of any further species (or transport of species already present) as a result of the proposed works will be managed by following best industry practices (including provision of a biosecurity plan), and as such no impacts resulting from the introduction of invasive non-native species are predicted.

Operation – Electro-Magnetic Field (EMF) emissions from HVDC cable

5.2.11 Modern power cables are shielded to prevent electric field (E) emissions. As such, it is only magnetic (B), and associated induced electric (iE) fields which arise when B fields interact with a moving medium/object that require consideration.

5.2.12 Although there is some evidence that benthic species can detect EMF, there is no evidence that they are particularly sensitive to it, and no evidence that it leads to any effects on benthic species (Andrulewicz *et al.* 2003[21]).

5.2.13 Modern cable design shields electrical field emissions. However magnetic fields will still exist outside of a shielded cable and these can induce electric fields in the water column within close proximity of the cable, although the strengths of these fields are generally below that of the background geomagnetic field. There are few studies that address electroreception specifically in invertebrates, however the studies that do exist conclude that invertebrates are not deemed to be particularly sensitive and no negative effects have been shown to date (Bergström *et al*., 2014[22]). Bochert and Zettler (2004)[23] exposed invertebrate species to a magnetic field for several weeks, and recorded no significant differences in survival between experimental and control animals. It is therefore concluded that there is no potential for significant effects to arise from EMF on benthic receptors.

Disturbance due to O&M activity

5.2.14 Any effects on benthic habitats caused by O&M activities will be less than those assessed as part of construction activities due to the reduced scope of any O&M activity compared to the construction phase.

[19] Arenas, F., Bishop, J.D.D., Carlton, J.T., Dyrynda, P.J., Farnham, W.F., Gonzalez, D.J., Jacobs, M.W., Lambert, C., Lambert, G., Nielsen, S.E., Pederson, J.A., Porter, J.S., Ward, S., Wood, C.A. 2006. Alien species and other notable records from a rapid assessment survey of marinas on the south coast of England. Journal of the Marine Biological Association of the UK. 86(06): 1329

[20] Minchin, D., Cook, E.J. and Clark, P.F. 2013. Alien species in British brackish and marine waters. Aquatic Invasions. 8(1): 3-19

[21] Andrulewicz, E.D., Napierska, D., and Otremba, Z. 2003. The environmental effects of the installation and functioning of the submarine SwePol Link HVDC transmission line: A case study of the Polish marine area of the Baltic Sea. Journal of Sea Research 49:337-345

[22] Bergström, L., Kautsky, L., Malm, T., Rosenberg, r., Wahlberg, M., Capetillo N. A., and Wilhelmsson, D. 2014. Effects of offshore wind farms on marine wildlife – a generalized impact assessment. Environmental Research Letters 9(3): 034012.

[23] Bochert R., and Zettler M. L. 2004. Longterm exposure of several marine benthic animals to static magnetic fields Bioelectromagnetics 25 498–502.

Scope of Assessment and Further Information

5.2.15 The impact assessment methodology proposed for benthic ecology will be that outlined by CIEEM for projects in marine and coastal environments (IEEM, 2010[24]) which can be summarised as follows:

- Describing the baseline within the zone of influence;
- Identifying potential receptors within the zone of influence;
- Identifying activities associated with the project that may result in effects on these receptors during installation, operation and maintenance and decommissioning;
- Describing these activities in terms of whether the effect is likely to be positive or negative, along with its magnitude, extent, duration, reversibility, timing and frequency;
- Characterising the effect, including the likelihood of its occurrence;
- Assessing whether the likely (pre-mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made;
- Providing details of proposed mitigation (if applicable);
- Assessing whether the residual (with mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made; and
- Assessing cumulative effects (with mitigation where applicable).

5.2.16 As the significance of any impacts will be heavily influenced by the exact nature of the habitats present, a benthic survey campaign will be undertaken along the proposed cable route. The objective of the benthic survey will be to collect data to allow the characterisation of the benthic (subtidal and intertidal) habitats and identify any protected species or habitats along the proposed cable route.

5.2.17 The data was collected in the summer 2017, and utilising Drop Down Video (DDV) and a benthic grab (grabs only to deployed in habitats identified as not sensitive by DDV) to obtain information on subtidal sediment and infaunal/epifaunal communities. The surveys will be stratified so that sampling stations are placed in representative habitats along the entire of the route. Sampling stations will also be located in potentially sensitive or protected habitats, such as potential Annex I habitats (e.g. sand banks or reef), or near designated sites such as SAC, or MCZ. Intertidal surveys will also be undertaken at the proposed landfall.

5.2.18 The offshore data will be supplemented by geophysical data (which will be collected in late 2017 – early 2018) which will be used to assist the designation of habitat types and map their extent.

[24] IEEM, 2010. Guidelines for ecological impact assessment in Britain and Ireland: Marine and Coastal. This document can be downloaded from www.cieem.net/ecia-guidelines-marine-

5.3 Biological Environment (Fish and Shellfish)

Baseline

5.3.1 This section will provide a description of the fish and shellfish baseline conditions within the UK offshore cable corridor.

5.3.2 The marine area of the Proposed Development supports a wide range of fish and shellfish species which are common throughout the English Channel, including:

- Marine fish;
- Shellfish;
- Elasmobranches; and
- Diadromous species.

5.3.3 The wider cable corridor supports both flat and round fish populations of commercial importance. These include species such as bass (*Dicentrarchus labrax*), lemon sole (*Microstomus kitt*), plaice (*Pleuronectes platessa*), cod (*Gadus morhua*), Dover sole (*Solea solea*), whiting (*Merlangius merlangus*), mackerel (*Scomber scombrus*), black bream (*Acanthopagrus butcheri*), grey gurnard (*Eutrigla gurnardu*) and tub gurnard (*Chelidonichthys lucerna*), (ICES, 2016[25]). In addition there are many fish of non-commercial importance, such as gobies (Gobiidae), dragonets (Callionymidae), rockling (Gadidae), pipefish (Syngnathidae) and sea horse (Hippocampus).

5.3.4 The eastern English Channel supports a range of elasmobranch species. This includes nationally important populations of the undulate ray *(Raja undulata*) and the thornback ray (*Raja clavata*).

5.3.5 The English Channel is also used by a range of diadromous species which will pass through inshore waters to migrate or spawn in fresh water both as adults and juveniles. These are likely to comprise Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), European eel (*Anguilla anguilla*), sea lamprey (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*). In addition, the area supports a variety of shellfish species which inhabit a range of water depths. These include cuttlefish (*Sepia officinalis*), lobster (*Homarus gammarus*), edible crab (*Cancer pagurus*), spider crab (*Maja squinado*) and scallops (*Pecten maximus*).

Spawning and nursery grounds

5.3.6 The cable corridor is a known spawning and nursery ground for a range of both pelagic and demersal fish species (Coull *et al.,* 1998[26] & Ellis *et al*., 2012[27]).

5.3.7 Black bream are demersal spawners and are known to nest in areas around the south coast of the UK. There are extensive nesting grounds off the West Sussex coast to the Isle of Wight

[25] http://www.ices.dk/marine-data/Pages/default.aspx

[26] Coull, K.A., Johnstone, R., and S.I. Rogers. 1998. Fisheries Sensitivity Maps in British Waters.Published and distributed by UKOOA Ltd.

[27] Ellis, J., Milligan, S. Readdy, L., Taylor, N and Brown, M. (2012) Spawning and Nursery Grounds of Selected Fish Species in UK Waters. Science Series Technical Report No. 147. CEFAS, lowestoft

and Dorset (Collins and Mallinson, 2012[28]). The eggs are laid in a nest excavated by the male as it creates a depression in a sandy gravel substrate. The nests are typically circular craters 1–2m wide and 5–30cm in depth. The nests are generally found in waters of about 10m depth and appear as circular craters on the seabed.

5.3.8 Other fish species that are reported to use the area of the wider cable corridor to spawn include, black bream, herring (*Clupea harengus),* sandeel (Ammodytidae), sole*,* horse mackerel *(Trachurus trachurus),* mackerel, cod, whiting, plaice and lemon sole (Coull *et al.,* 1998; Ellis *et al.,* 2012).

5.3.9 The wider cable corridor supports a number of nursery areas for fish including, mackerel, whiting, lemon sole, plaice, undulate ray, tope shark (*Galeorhinus galeus),* thornback ray, sandeel, cod and sole (Coull *et al.,* 1998; Ellis *et al.,* 2012).

Protected areas and species

5.3.10 The closest protected area is Bembridge recommended MCZ which lists native oyster (*Ostrea edulis*) beds as important species as does Fareham Creek rMCZ. The nearest designated MCZ for shellfish is Beachy Head West which lists both native oysters and blue mussel (*Mytilus edulis*) beds. The MCZ Beachy Head East also lists native oysters and blue mussel beds as important species.

5.3.11 The closest protected area for short snouted sea horse is Selsey Bill and the Hounds rMCZ. Kingsmere Reef MCZ is the closest designated MCZ that lists fish, specifically black bream, as an interest feature. The River Itchen SAC sites Atlantic salmon as an interest feature as does the River Avon SAC which also lists sea lamprey.

5.3.12 There are also a number of biodiversity action plan (BAP) fish species within the channel they include undulate ray, tope shark as well as sea lamprey, allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*) and Atlantic salmon.

5.3.13 UK protected sites within 50 km of the Proposed Development which cite fish and/or shell fish as interest features have been listed in Table 5.3.1.

Table 5.3.1 Protected areas (designated and recommended) with fish and shell fish features in UK waters on or near the Proposed Development

Name	**Criteria[29]**	**Status**	**Approx. closest Distance to Proposed Development (km)**
Bembridge (MCZ)	Important species: Short-snouted seahorse; long-snouted seahorse (*Hippocampus guttulatus*) and native oyster beds	Recommended	3.3
Selsey Bill and the Hounds (MCZ)	Important species: Short-snouted seahorse (*Hippocampus hippocampus*)	Recommended	4.2

[28] Collins, K.J. and Mallinson, J.J. (2012) Surveying black bream, *Spondyliosoma cantharus* (L.), nesting sites using sidescan sonar. *Underwater Technology*, 30, 183–188.

[29] Information available from JNCC website (jncc.defra.gov.uk), Government Website (gov.uk) and the Wildlife Trusts (wildlifetrusts.org).

Name	Criteria[29]	Status	Approx. closest Distance to Proposed Development (km)
Fareham Creek (MCZ)	Important species: Native oysters	Recommended	7.6
Kingmere Reef (MCZ)	Designed for: Black bream nesting site	Designated	10.5
River Itchen (SAC)	Designed for: Atlantic salmon	Designated	27.5
Beachy Head West (MCZ)	Important species: Blue mussel beds; native oyster and short-snouted seahorse	Designated	34.5
Beachy Head East (MCZ)	Important species: Blue mussel beds; native oyster and short-snouted seahorse	Recommended	44.5
River Avon SAC	Designed for: Sea lamprey and Atlantic salmon	Designated	46.7
Wight-Barfleur Extension (MCZ)	Important species: Mackerel nursery ground; ray and Shark	Recommended	51.6

Potential Impacts and Mitigation

5.3.14 The potential impacts of the construction, operational and decommissioning phases of the Proposed Development on fish and shellfish in UK waters may include:

- Installation (and decommissioning):
  - Temporary habitat disturbance;
  - Major works near a river mouth;
  - Temporary increase in suspended sediments; and
  - Noise and vibration.
- Operation:
  - Electro-magnetic field effects.

5.3.15 The potential impacts on fish and shellfish from the installation and decommissioning of the Proposed Development and proposed mitigation are illustrated in Table 5.3.2.

Table 5.3.2: Potential impacts on fish and shellfish and approach to EIA

Potential impact	Potential effects	Proposed approach	Reason	Proposed mitigation
Installation (and Decommissioning)				
Temporary habitat disturbance	Direct damage/disturbance to eggs, nests and shellfish from cable installation	Scope in	Cable laying activities require the construction of a trench causing disturbance to the seabed and any habitats which may be present. One potential impact of disturbance is the loss of habitat. This habitat loss can temporary or permanent	Any required mitigation will be identified through the EIA process.

Potential impact	Potential effects	Proposed approach	Reason	Proposed mitigation
Major works near a river mouth	Temporary migration barrier	Scope in	Cable burial by produce sediment plumes and noise. This may create a temporary barrier to migration fish species	Any required mitigation will be identified through the EIA process.
Temporary increase in suspended sediments	Possible damage/disturbance to eggs and nests from smothering and potential temporary migration barrier from suspended sediment	Scope in	Cable burial and associated works may cause an increase to suspended sediment concentrations. This may result in smothering or eggs and nests and temporary barrier to migration	Any required mitigation will be identified through the EIA process.
Noise and Vibration	Potential increased subsea acoustic noise installation equipment	Scope in	Increased survey noise from vessels may displace fish species	Any required mitigation will be identified through the EIA process.
Operation				
Electro-magnetic field effects	Possible behavioural effects from electromagnetic fields on electro sensitive fish species	Scope in	Elasmobranch, salmonids and shell fish may be effected by electromagnetic fields produced by the cable	Likely depth of sediment cover of 0.6 m in a cable trench depth $\geq$ 0.9 m

Scope of Assessment and Further Information

5.3.16 The impact assessment methodology used for fish and shellfish will follow that recommended by CIEEM (Chartered Institute of Ecology and Environmental Management) for marine and coastal developments (IEEM, 2010[30]). These guidelines set out the process for assessment through the following stages:

- Describing the baseline within the zone of influence;
- Identifying potential receptors within the zone of influence;
- Identifying activities associated with the project that may result in effects on these receptors during installation, operation, maintenance and decommissioning;
- Describing these activities in terms of whether the effect is likely to be positive or negative, along with its magnitude, extent, duration, reversibility, timing and frequency;
- Characterising the effect, including the likelihood of its occurrence;
- Assessing whether the likely (pre-mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made;
- Providing details of proposed mitigation (if applicable);

[30] IEEM, 2010. Guidelines for ecological impact assessment in Britain and Ireland: Marine and Coastal.

- Assessing whether the residual (with mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made; and
- Assessing cumulative effects (with mitigation where applicable).

5.3.17 Baseline conditions will be established by undertaking a desktop review of published information and through consultation with relevant bodies. No offshore surveys are proposed. The data sources used to inform the baseline description and assessment will include (but will not be limited to) the following:

- International Council for the Exploration of the Seas (ICES)/MMO landing data;
- Inshore Fisheries and Conservation Authority (IFCA) reports;
- Studies undertaken for other developments (e.g. Rampion Offshore Wind Farm, IFA2); and
- Published data.

5.3.18 The most up to date information on aspects of fish and shellfish will be collated to determine the likely key species within the Proposed Development's cable corridor requiring assessment.

5.4 Biological Environment (Intertidal and Offshore Ornithology)

5.4.1 This section covers UK ornithological interests present seaward of the MHWS, with onshore ornithology (landward of the MHWS mark) considered in a separate UK onshore scoping report. However, to ensure that the intertidal area is captured during the scoping process, excerpts from the onshore scoping report are considered here for completeness.

Baseline

Offshore Ornithology

5.4.2 A further detailed baseline will be established by undertaking a desktop review of published information and through consultation with relevant bodies.

5.4.3 The most up to date information on aspects of seabird and migratory species ecology (such as foraging ranges and behaviour) will be collated to determine the likely key species within the cable corridor requiring assessment.

UK Statutory Sites of International Importance

5.4.4 Breeding seabird populations in the UK and Channel Islands that could use the offshore cable corridor within UK waters have been determined using an initial search area of 100 km. However, more distant sites may be considered if a clear ecological link between birds using the offshore cable corridor and an internationally important SPA or Ramsar site can be established e.g. by foraging distance for designated species. Maximum foraging ranges have been used as a worst case scenario, using the values published in Thaxter *et al*. (2012)[31]. The offshore cable corridor within UK waters may also be used by breeding seabirds from

[31] Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. and Burton, N.H.K. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. Biological Conservation.

SPA colonies in France. These colonies are covered separately in the French scoping document submitted to the French authorities.

5.4.5 The UK SPAs designated for breeding seabirds within the search area are listed in Table 5.4.1 and illustrated in Figure 5.4.1. The Proposed Development does not lie within the foraging range of any other UK designated seabird colonies, or any other UK SPA/Ramsar designated for marine wintering waterfowl.

Table 5.4.1: UK SPAs and Ramsars designated for breeding seabirds

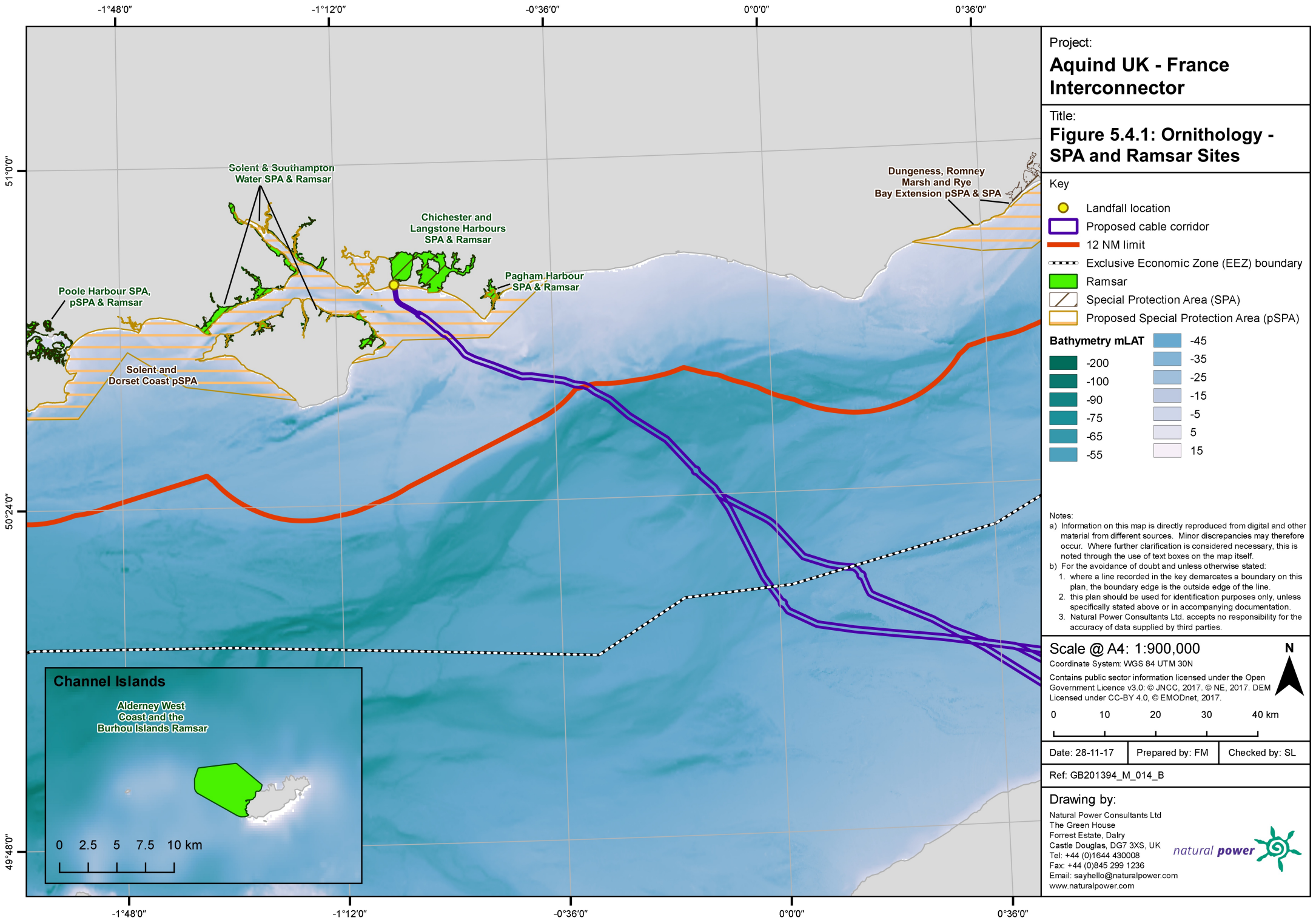
SPA/Ramsar	Distance from Proposed Development (minimum)	Species	Population (number of breeding pairs)	Max. foraging range	Proposed Development within max foraging range?
Chichester and Langstone Harbours	0.1 km	Little tern (*Sternula albifrons*)	100	11 km	Yes
		Sandwich tern (*Sterna sandvicensis*)	158	54 km	Yes
Solent and Southampton Water	6.6 km	Little tern	49	11 km	Yes
		Sandwich tern	231	54 km	Yes
		Common tern (*Sterna hirundo*)	267	30 km	Yes
		Roseate tern* (*Sterna dougallii*)	2	30 km	Yes
		Mediterranean gull (*Larus melanocephalus*)	2	20 km	Yes
Pagham Harbour	9.3 km	Little tern	12	11 km	Yes
Poole Harbour	63.7 km	Common tern	155	30 km	No
		Mediterranean gull	5	20 km	No
Dungeness, Romney Marsh and Rye Bay	80.7 km	Little tern	35	11 km	No
		Sandwich tern	350	54 km	No
		Common tern	273	30 km	No
		Mediterranean gull	56	20 km	No
Alderney West Coast and Burhou Islands	167.0 km	Gannet (*Morus bassanus*)	5,950	590 km	Yes
		European storm petrel (*Hydrobates pelagicus*)	100	>65 km	Yes
		Cormorant (*Phalacrocorax carbo*)	1	35 km	No
		Shag (*Phalacrocorax aristotelis*)	44	17 km	No
		Kittiwake (*Rissa tridactyla*)	16	120 km	No
		Lesser black-backed gull (*Larus fuscus*)	273	181 km	Yes
		Herring gull (*Larus argentatus*)	105	98 km	No
		Great black-backed gull (*Larus marinus*)	32	98 km**	
		Guillemot (*Uria aalge*)	105	135 km	No
		Razorbill (*Alca torda*)	17	95 km	No

		Puffin (*Fratercula arctica*)	180	200 km	Yes
*Roseate tern no longer breed in this SPA (Holling *et al*. 2015[32]) ** Great black-backed gull foraging range is not available from Thaxter *et al*. (2012). Therefore, foraging range is based on the maximum foraging range cited for herring gull. This was considered the most suitable model species as lesser black-backed gull is a long distant migrant (unlike great black-backed gull and herring gull).					

5.4.6 In addition to those SPA/Ramsar sites outlined in Table 5.4.1, the Solent and Dorset Coast pSPA also overlaps with the offshore cable corridor. This pSPA covers the offshore foraging area of little terns, Sandwich terns and common terns breeding within four SPAs within the Greater Solent: Chichester & Langstone Harbours SPA, Solent & Southampton Water SPA, Pagham Harbour SPA and Poole Harbour SPA. An extension to Poole Harbour SPA is also proposed to cover the subtidal feeding areas of Sandwich tern. Furthermore, it is proposed that the existing Dungeness, Romney Marsh and Rye Bay SPA be extended to include the offshore foraging areas used by little terns, common terns and Sandwich terns breeding within the existing SPA. The Dungeness, Romney Marsh and Rye Bay pSPA is located 60.9 km from the Proposed Development and is therefore outwith the maximum foraging range of Sandwich terns.

5.4.7 There are six statutory sites designated for ornithological features with potential connectivity to the Proposed Development: Solent and Dorset Coast pSPA, Chichester & Langstone Harbours SPA, Solent & Southampton Water SPA, Pagham Harbour SPA and Alderney West Coast and Burhou Islands Ramsar. As such, screening for Appropriate Assessment will be undertaken alongside the Ecological Impact Assessment (EcIA) to determine the likelihood of an adverse effect on the integrity of these SPAs.

[32] Holling, M. et al. (2015) Rare breeding birds in the United Kingdom in 2013. *British Birds*, 108, 373-422.



Project:

Aquind UK - France Interconnector

Title:

Figure 5.4.1: Ornithology - SPA and Ramsar Sites

Key

- Landfall location
- Proposed cable corridor
- 12 NM limit
- Exclusive Economic Zone (EEZ) boundary
- Ramsar
- Special Protection Area (SPA)
- Proposed Special Protection Area (pSPA)

Bathymetry mLAT

-200	-45
-100	-35
-90	-25
-75	-15
-65	-5
-55	5
	15

Notes:

a) Information on this map is directly reproduced from digital and other material from different sources. Minor discrepancies may therefore occur. Where further clarification is considered necessary, this is noted through the use of text boxes on the map itself.

b) For the avoidance of doubt and unless otherwise stated:

1. where a line recorded in the key demarcates a boundary on this plan, the boundary edge is the outside edge of the line.
2. this plan should be used for identification purposes only, unless specifically stated above or in accompanying documentation.
3. Natural Power Consultants Ltd. accepts no responsibility for the accuracy of data supplied by third parties.

Scale @ A4: 1:900,000

N

Coordinate System: WGS 84 UTM 30N

0 10 20 30 40 km

Date: 28-11-17	Prepared by: FM	Checked by: SL

Ref: GB201394_M_014_B

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UK Statutory Sites of National Importance

5.4.8 Sites of Special Scientific Interest (SSSI) within the UK and Channel Islands notified for breeding seabirds within the search area are listed in Table 5.4.2 and illustrated in Figure 5.4.2. The Proposed Development does not lie within the foraging range of any other UK notified seabird colonies, or any other UK SPA/Ramsar notified for marine wintering waterfowl. The Proposed Development within UK waters may also be used by breeding seabirds from nationally important colonies in France. These colonies are covered separately in the French scoping document submitted to the French authorities.

5.4.9 Whilst not a notified feature of this SSSI, Barne *et al*. (1998) identified Pagham Harbour as supporting a nationally important population (20-25 individuals) of wintering Slavonian grebe (*Podiceps auritus*). Chichester, Langstone and Poole Harbours were also identified as supporting nationally important populations of marine waterfowl, including Slavonian grebe, black-necked grebe (*Podiceps nigricollis*), red-breasted merganser (*Mergus serrator*) and cormorant (Barne *et al*. 1996).

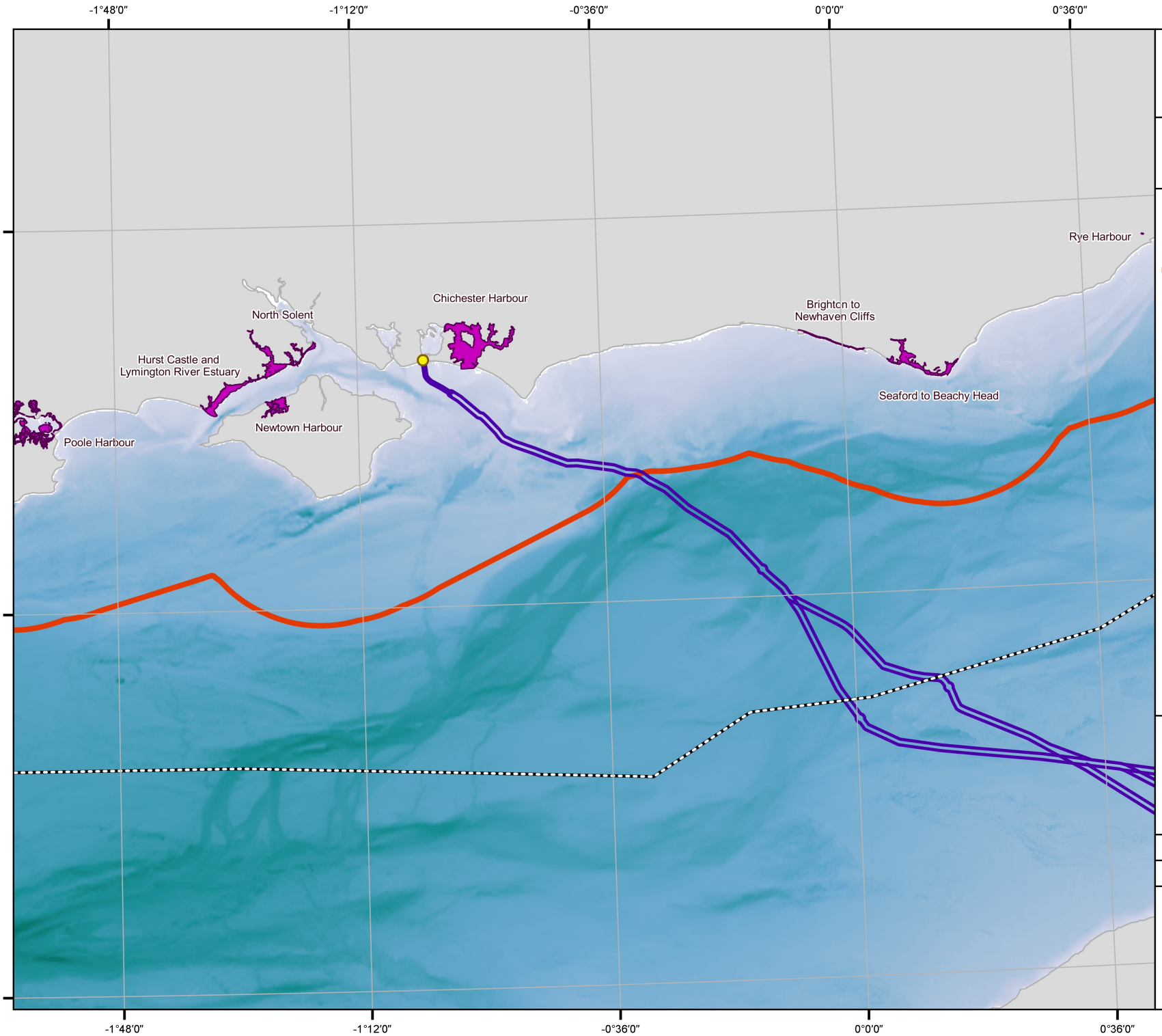
Table 5.4.2: UK SSSIs designated for breeding seabirds

SSSI	Distance from Proposed Development (minimum)	Species	Max. foraging range	Proposed Development within max foraging range?
Chichester Harbour	4.1 km*	Little tern	11 km	Yes
		Sandwich tern	54 km	Yes
North Solent	18.7 km	Little tern	11 km	No
		Sandwich tern	54 km	Yes
		Common tern	30 km	Yes
		Black-headed gull (*Chroicocephalus ridibundus*)	40 km	Yes
Newtown Harbour	24.1 km	Little tern	11 km	No
		Sandwich tern	54 km	Yes
		Common tern	30 km	Yes
		Black-headed gull	40 km	Yes
Hurst Castle to Lymington River Estuary	29.2 km	Little tern	11 km	No
		Sandwich tern	54 km	Yes
		Common tern	30 km	Yes
		Black-headed gull	40 km	Yes
Brighton to Newhaven Cliffs	35.5 km	Kittiwake	120 km	Yes
		Fulmar (*Fulmarus glacialis*)	580 km	Yes
		Herring gull	92 km	Yes
Seaford to Beachy Head	40.5 km	Fulmar	580 km	Yes
Poole Harbour	63.7 km	Sandwich tern	54 km	No
		Common tern	30 km	No

SSSI	Distance from Proposed Development (minimum)	Species	Max. foraging range	Proposed Development within max foraging range?
		Black-headed gull	40 km	No
		Mediterranean gull	20 km	No
Rye Harbour	84.4 km	Little tern	11 km	No
		Common tern	30 km	No

5.4.10 MCZs were created under the Marine and Coastal Access Act 2009. Their purpose is to protect the full range of nationally important biodiversity in UK waters, as well as certain rare and threatened species and habitats.

5.4.11 Two rMCZs with ornithological features are present within the search area: Beachy Head East rMCZ and Selsey Bill and the Hounds rMCZ. The Government will consult on these rMCZs in 2017. Their status will be closely monitored and any forthcoming information will be used to inform assessment.



Project:

Aquind UK - France Interconnector

Title:

Figure 5.4.2: Ornithology SSSI Designated Sites

Key

- Landfall location
- Proposed cable corridor
- UK 12 NM limit
- Exclusive Economic Zone (EEZ) boundary
- Sites of Special Scientific Interest (SSSI)

Bathymetry mLAT

-200	-45
-100	-35
-90	-25
-75	-15
-65	-5
-55	5
	15

Notes:

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Scale @ A4: 1:900,000

Coordinate System: WGS 84 UTM 30N

N

0 10 20 30 40 km

Date: 28-11-17	Prepared by: FM	Checked by: SL

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Intertidal Ornithology

UK Statutory Sites of International Importance

5.4.12 The Proposed Development passes through Chichester and Langstone Harbour SPA and Ramsar. This SPA is designated for the following species during the non-breeding season and on passage:

- Dark-bellied brent goose (*Branta bernicla bernicla*);
- Little egret (Egretta garzetta);
- Grey plover (*Pluvialis squatarola*);
- Ringed plover (*Charadrius hiaticula*);
- Black-tailed godwit (*Limosa limosa*);
- Bar-tailed godwit (*Limosa lapponica*);
- Dunlin (*Calidris alpina*);
- Redshank (*Tringa totanus*); and
- A wintering waterfowl assemblage of international importance.

5.4.13 More distant sites may be considered if a clear ecological link between birds using the cable corridor and an internationally important SPA and/or Ramsar site can be established e.g. by foraging distance for designated species. Further details are provided in the UK onshore scoping report and in the Preliminary Ecological Appraisal (PEA) prepared by WSP (WSP, 2017[33]).

UK Statutory Sites of National Importance

5.4.14 The Proposed Development passes through Chichester Harbour SSSI. The extensive intertidal mudflats provide feeding grounds for the following notified features during the non-breeding season:

- Dark-bellied brent goose;
- Shelduck (*Tadorna tadorna*);
- Teal (*Anas crecca*);
- Grey plover;
- Ringed plover;
- Curlew (*Numenius arquata*);
- Black-tailed godwit;
- Bar-tailed godwit;
- Sanderling (*Calidris alba*);
- Dunlin;
- Greenshank (*Tringa nebularia*); and

[33] WSP (2017) Preliminary Ecological Appraisal, Route 3D. Aquind Interconnector. AQUIND Ltd.

- Redshank.

5.4.15 As for statutory sites of international importance, more distant sites may be considered if a clear ecological link between birds using the cable corridor and a SSSI can be established. Further details are provided in the UK onshore scoping report and in the PEA prepared by WSP (WSP, 2017)

Potential Impacts and Mitigation

Offshore Ornithology

5.4.16 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on offshore ornithological interests in UK waters may include:

- Installation (and decommissioning):
  - Disturbance and displacement from installation plant and support vessels;
  - Indirect effects as a consequence of prey and/or habitat loss.;
  - Exposure to surface hydrocarbons or chemicals due to accidental spills
  - Barrier effects; and
  - Collision risk.
- Operation
  - Disturbance and displacement from installation plant and support vessels;
  - Indirect effects as a consequence of prey and/or habitat loss.;
  - Exposure to surface hydrocarbons or chemicals due to accidental spills
  - Barrier effects; and
  - Collision risk.

5.4.17 Table 5.4.3 below presents a summary of potential impacts on offshore ornithology features during installation, operation, maintenance and decommissioning of the Proposed Development.

Table 5.4.3: Potential impacts on offshore ornithology and approach to EIA

Potential impact	Proposed approach	Reason	Proposed mitigation
Installation, Operation (and decommissioning)			
Disturbance and displacement from installation plant and support vessels	Scope in	Disturbance effects can manifest through the deterrence of birds from using suitable or preferred habitat. During installation, disturbance has the potential to arise as a result of the presence of vessels and installation activity.	Any required mitigation will be identified through the EIA process.
Indirect effects as a consequence of prey disturbance and/or habitat loss	Scope in	Potential effects of installation on habitats, benthic organisms and fish species. The physical presence of cable components during operation, in addition to ongoing maintenance activities may affect the availability of prey species.	Any required mitigation will be identified through the EIA process.

Potential impact	Proposed approach	Reason	Proposed mitigation
Exposure to surface hydrocarbons or chemicals due to accidental spills	Scope in	In the event of an unplanned release of hydrocarbon fuel from vessels, seabirds on the water may become contaminated with hydrocarbons.	Any required mitigation will be identified through the EIA process.
Barrier effects	Scope out	Potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.	
Collision risk	Scope out	Potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.	

Installation

5.4.18 Habitat loss due to installation of infrastructure and changes to physical process may lead to changes in habitat available for birds and their prey species. Potential effects of installation on habitats, benthic organisms and fish species are presented in Sections 5.2 and 5.3. The conclusions of the assessments of impacts on these receptors will be used to assess the potential (indirect) effects upon the foraging behaviour of bird species.

5.4.19 Disturbance effects can manifest through the deterrence of birds from using suitable or preferred habitat. During installation, disturbance has the potential to arise as a result of the presence of vessels and installation activity. Different species show differing sensitivities to disturbance. Assessment of disturbance sensitivity will be based upon: species abundance within the cable corridor, the estimated proportion of colony-population within the area, their estimated sensitivities to vessel presence (Garthe & Hüppop 2004[34]; Furness & Wade 2012[35]; Wade *et al*. 2016[36]), whether their distribution over the wider area is localised or widespread, their reliance on specific habitat types and any published information on habituation.

5.4.20 In the event of an unplanned release of hydrocarbon fuel from project vessels, seabirds on the water may become contaminated with hydrocarbons. Data showing the probability of a hydrocarbon or chemical release specifically from cable installation and maintenance vessels are not available. Assessment of accidental spills on ornithological features will therefore be made using data available from the Advisory Committee on Protection of the Sea (ACOPS) Annual Survey of Reported Discharges within the United Kingdom Pollution Control Zone (UKPCZ) (ACOPS 2014[37]), together with information on species abundance within the cable corridor, the estimated proportion of colony-population within the area, and whether their distribution is localised or widespread.

5.4.21 Potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.

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[34] Garthe, S., and Hüppop, O. (2004). Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology 41:724-734

[35] Furness, B., and Wade, H. (2012). Vulnerability of Scottish Seabirds to Offshore Wind Turbines. Macarthur Green report to Marine Scotland.

[36] Wade, H.M., Masden, E.A, Jackson, A.C., and Furness, R.W. (2016). Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy 70: 108-113.

[37] ACOPS (2014). Advisory Committee on Protection of the Sea. Trustees' Report for the year ended 31st March 2014. [Online] Available at: http://www.acops.org.uk/annual-reports/. (Accessed June 2017).

Operation and Maintenance

5.4.22 The physical presence of cable components during operation, in addition to ongoing maintenance activities may affect the availability of prey species. Potential effects of operation and maintenance on habitats, benthic organisms and fish species are presented in Sections 5.2 and 5.3. Again, the conclusions of the assessments of impacts on these receptors will be used to assess the potential (indirect) effects upon the foraging behaviour of bird species.

5.4.23 Disturbance during operation may be initiated by vessel presence and other maintenance activities to the cable components. Bird species density, distribution and behavioural data will be collated to inform likely population densities across the cable corridor in different seasons.

5.4.24 Assessment of accidental hydrocarbon spills during operation and maintenance will follow the method outlined for assessing the potential effect of exposure to spills on offshore ornithology during installation.

5.4.25 As for installation, potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.

Decommissioning

5.4.26 Potential effects during decommissioning are expected to be similar (although likely lower) to those predicted for installation.

Potential Mitigation Measures

5.4.27 Potential mitigation measures will be considered and proposed where deemed relevant during impact assessment in order to reduce predicted effects on ornithological features. These may include:

- Micro-siting of the cable to avoid sensitive habitats; and
- Use of standard vessel routes and procedures.

Intertidal Ornithology

5.4.28 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on intertidal ornithological interests in UK waters may include:

- Installation (and decommissioning):
  - Disturbance and displacement from installation plant and support vessels;
  - Indirect effects as a consequence of prey and/or habitat loss;
  - Exposure to surface hydrocarbons or chemicals due to accidental spills
  - Barrier effects; and
  - Collision risk.
- Operation
  - Disturbance and displacement from installation plant and support vessels;
  - Indirect effects as a consequence of prey and/or habitat loss;
  - Exposure to surface hydrocarbons or chemicals due to accidental spills
  - Barrier effects; and

- Collision risk.

5.4.29 Table 5.4.4 below presents a summary of potential impacts on intertidal ornithology during installation, operation, maintenance and decommissioning of the Proposed Development.

Table 5.4.4: Potential impacts on intertidal ornithology and approach to EIA

Potential impact	Proposed approach	Justification	Proposed mitigation
Installation, Operation (and decommissioning)			
Disturbance and displacement from installation plant and support vessels	Scope in	Disturbance effects can manifest through the deterrence of birds from using suitable or preferred habitat. During installation, disturbance has the potential to arise as a result of the presence of vessels and installation activity.	Any required mitigation will be identified through the EIA process.
Indirect effects as a consequence of prey disturbance and/or habitat loss	Scope in	Potential effects of installation on habitats, benthic organisms and fish species. The physical presence of cable components during operation, in addition to ongoing maintenance activities may affect the availability of prey species.	Any required mitigation will be identified through the EIA process.
Exposure to surface hydrocarbons or chemicals due to accidental spills	Scope in	In the event of an unplanned release of hydrocarbon fuel from vessels, seabirds on the water may become contaminated with hydrocarbons.	Any required mitigation will be identified through the EIA process.
Barrier effects	Scope out	Potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.	
Collision risk	Scope out	Potential collision risk and barrier effects to seabirds are not relevant to subsea cables and are therefore scoped out.	

5.4.30 Further details regarding potential effects on intertidal ornithology are provided in the UK onshore scoping report and in the PEA prepared by WSP (WSP, 2017[33])

Potential Mitigation Measures

5.4.31 Potential mitigation measures will be considered and proposed where deemed relevant during impact assessment in order to reduce predicted effects on ornithological features. These may include:

- Micro-siting of the cable to avoid sensitive habitats;
- Scheduling works to avoid sensitive time periods; and
- Use of standard vessel routes and procedures.

Scope of Assessment and Further Information

5.4.32 It is considered that given the nature of the project and installation works, that a proportionate assessment be undertaken which can be based on the marine surveys already described and through the use of existing datasets. As such, the Applicant does not propose to undertake any offshore surveys for further data collection or modelling for ornithology, but are confident that a robust assessment can be made using the data from existing projects and resources.

5.4.33 The data sources used to inform the baseline description and assessment will include (but will not be limited to) the following:

- Seabird 2000 national seabird census project (Mitchell *et al*. 2004[38]);
- Alderney Renewable Energy Regional Environmental Assessment (ABPmer 2014[39]);
- JNCC European Seabirds at Sea (ESAS) Database (Stone *et al*. 1995[40]);
- JNCC Reports No. 431 and No. 461 (Kober *et al*. 2010[41]; Kober *et al*. 2012[42]);
- Aerial surveys of water birds in UK inshore waters (Dean *et al*. 2003[43]; DTI 2006[44]; Söhle *et al*. 2006[45]; Lewis *et al*. 2009[46]);
- The Migration Atlas Movements of the Birds of Britain and Ireland (Wernham *et al*. 2002[47]);
- Wetland Bird Survey (WeBS) peak count data for the Portsmouth region (Frost *et al*. 2017[48]);

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[38] Mitchell, P. I., Newton, S.F., Ratcliffe, N. and Dunn, T.E. (2004). Seabird populations of Britain and Ireland - Results of the seabird 2000 census (1998-2002). T. and A.D. Poyser, London.

[39] ABPmer (2014) Alderney Regional Environmental Assessment of Renewable Energy: Alderney Commission for Renewable Energy. Environmental Report.

[40] Stone, C.J., Webb, A., Barton, C., Ratcliffe, N., Reed, T.C., Tasker, M.L., Camphuysen, C.J. and Pienkowski, M.W. (1995). An atlas of seabird distribution in north-west European waters. JNCC.

[41] Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S.H., Wilson, L.J., and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs. JNCC Report.

[42] Kober, K., Wilson, L.J., Black, J., O'Brien, S.H., Allen, S, Win, I., Bingham, C., and Reid, J.B. (2012). The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1-1.4 of the SPA selection guidelines. JNCC Report.

[43] Dean, B.J., Webb, A., McSorley, C.A. and Reid, J.B. (2003). Aerial surveys of UK inshore areas for wintering seaduck, divers and grebes: 2000/01 and 2001/02. JNCC Report No. 333, pp. 107pp.

[44] DTI 2006. Aerial Surveys of Waterbirds in Strategic Wind Farm Areas: 2004/05 Final Report. Department of Trade and Industry, London

[45] Söhle, I., Wilson, L.J., Dean, B.J., O'Brien, S.H., Webbs, A. & Reid, J.B. (2006). Surveillance of wintering seaducks, divers and grebes in UK inshore areas: Aerial surveys and shore based counts 2005/06. JNCC Report No. 329, Peterborough, UK.

[46] Lewis, M., Wilson, L.J., Söhle, I., Dean, B.J., Webb, A. and Reid, J.B. (2009). Aerial surveys of aggregations of seaducks, divers and grebes in UK inshore areas outside the breeding season in 2007/08, JNCC Report, No. 434.

[47] Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. and Baillie, S.R. (2002). The Migration Atlas: movements of the birds of Britain and Ireland. T. and A.D. Poyser, London.

[48] Frost, T.M., Austin, G.E., Calbrade, N.A., Mellan, H.J., Hall, C., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Balmer, D.E. (2017) Waterbirds in the UK 2015/16: The Wetland Bird Survey. BTO, RSPB and JNCC, in association with WWT. British Trust for Ornithology, Thetford.

- JNCC Coastal Directories Project: Region 8 Sussex: Rye Bay to Chichester Harbour (Barne *et al*. 1998[49]) and Region 9: Southern England: Hayling Island to Lyme Regis (Barne *et al*. 1996[50]); and
- Websites e.g. Seabird Monitoring Programme (SMP), Natural England, JNCC.

5.4.34 Whilst no offshore bird surveys are proposed, a programme of intertidal baseline ornithology surveys has been designed by WSP and will be undertaken during winter 2017/18 in order to assess the importance of the Eastney Beach landfall site. A survey area covering the landfall location and an assumed 30 m working width around the cable route will be covered, together with an additional 500 m buffer.

5.4.35 Monthly visits will be undertaken between October 2017 and March 2018, covering a range of falling and rising tides throughout the wintering season. Each survey will be a minimum of six hours in duration, extending from either high tide or low tide. Surveys will utilise the BTO Wetland Bird Survey (WeBS) method[51] to count birds within sections of the survey area visible from a number of Vantage Point (VP) locations. These VP locations will be repeated in rotation for the duration of each survey. Bird and/or flock locations will be mapped and activity recorded (e.g. foraging, loafing, roosting etc.). In addition, observed and potential disturbance events will be recorded.

5.4.36 WSP have also designed a series of terrestrial ornithology surveys which will be undertaken during winter 2017/18. Further details of these are provided in the UK onshore scoping report.

5.4.37 The impact assessment methodology used for offshore and intertidal ornithology will follow that recommended by CIEEM for marine and coastal developments (IEEM, 2010[52]; CIEEM, 2016[53]). These guidelines set out the process for assessment through the following stages:

- Describing the ornithological baseline within the zone of influence;
- Identifying potential ornithological receptors within the zone of influence;
- Identifying activities associated with the project that may result in effects on these ornithological receptors during installation, operation, maintenance and decommissioning;
- Describing these activities in terms of whether the effect is likely to be positive or negative, along with its magnitude, extent, duration, reversibility, timing and frequency;
- Characterising the effect, including the likelihood of its occurrence;
- Assessing whether the likely (pre-mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made;

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[49] Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. and Buck, A.L. (1998). Coasts and seas of the United Kingdom: Region 8, Sussex. Joint Nature Conservation Committee, Peterborough.

[50] Barne, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., Davidson, N.C. and Buck, A.L. (1996). Coasts and seas of the United Kingdom: Region 9, Southern England. Joint Nature Conservation Committee, Peterborough.

[51] Pollit, M.S., Hall, C., Holloway, S.J., Hearn, R.D., Marshall, P.E., Robinson, J.A., Musgrove, A., Robinson, J. and Cranswick, P.A. (2003). The Wetland Bird Survey 2000-2001: Wildfowl and Wader Counts. Slimbridge.

[52] IEEM. 2010. Guidelines for ecological impact assessment in Britain and Ireland: Marine and Coastal. This document can be downloaded from https://www.cieem.net/ecia-guidelines-marine-

[53] CIEEM. 2016. Guidelines for ecological impact assessment in the UK and Ireland. This document can be downloaded from https://www.cieem.net/data/files/Publications/

- Providing details of proposed mitigation (if applicable);
- Assessing whether the residual (with mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made; and
- Assessing cumulative effects (with mitigation where applicable).

5.5 Biological Environment (Marine Mammals)

Baseline

5.5.1 Information from the following sources has been used to inform Table 5.5.1, which shows the main marine mammal species which occur in the Channel:

- SCANS III (Hammond *et al*., 2017[54]);
- JNCC Atlas (Reid *et al*., 2003[55]);
- SMRU seal usage maps (Jones *et al*., 2013[56]); and
- Vincent *et al*. (2017)[57].

Table 5.5.1: The key marine mammal species which occur in the Channel

Common name	Latin name
Minke whale	*Balaenoptera acutorostrata*
Long-finned pilot whale	*Globicephala melas*
Bottlenose dolphin	*Tursiops truncatus*
Short-beaked common dolphin	*Delphinus delphis*
Harbour porpoise	*Phocoena phocoena*
Grey seal	*Halichoerus grypus*
Harbour seal (also known as common seal)	*Phoca vitulina*

5.5.2 The information presented above will form the basis of the detailed baseline, along with information from other studies and consultation with the relevant bodies (including the MMO, Joint Nature Conservation Committee (JNCC) and Natural England). Reference populations

[54] Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J. and Øien, N. 2017. Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. This document can be downloaded from https://synergy.st-andrews.ac.uk/scans3/2017/05/01/first-results-are-in/

[55] Reid, J.B., Evans, P.G.H. and Northridge, S.P. 2003. Atlas of cetacean distribution in north-west European waters. JNCC, Peterborough. ISBN 1 86107 550 2. This document can be downloaded from http://jncc.defra.gov.uk/page-2713

[56] Jones, E., McConnell, B., Sparling, C. and Matthiopoulos, J. 2013. Grey and harbour seal density maps. SMRU report to the Scottish Government. These maps can be downloaded from http://www.smru.st-andrews.ac.uk/smrudownloader/uk_seal_usage_of_the_sea

[57] Vincent, C., Huon, M., Caurant, F., Dabin, W., Deniau, A., Dixneuf, S., Dupuis, L., Elder, J-F., Fremau, M-H., Hassani, S., Hemon, A., Karpouzopoulos, J., Lefeuvre, C., McConnell, B.J., Moss, S.E.W., Provost, P., Spitz, J., Turpin, Y. and Ridoux, V. 2017. Grey and harbour seals in France: Distribution at sea, connectivity and trends in abundance at haulout sites. Deep Sea Research Part II: Topical Studies in Oceanography 141: 294-305.

will be as defined by the Inter-Agency Marine Mammal Working Group (IAMMWG, 2013[58]; IAMMWG, 2015[59]). No surveys are proposed.

5.5.3 Although any assessment will focus on the main species, any resulting mitigation is also considered to be appropriate for other, less commonly occurring, marine mammal species.

5.5.4 Although harbour seal is associated with the Solent Maritime SAC (which is shown in Figure 5.2.1), it is not a qualifying feature. Therefore this Natura 2000 site is not considered to be relevant to Habitats Regulations Assessment (for marine mammals). There are no designated sites which have marine mammals as a qualifying feature within likely foraging range of the Proposed Development therefore the potential for connectivity is considered to be negligible.

Potential Impacts and Mitigation

5.5.5 The following potential impacts on marine mammals during installation (and potentially decommissioning) of the Proposed Development have been identified:

- Installation (and decommissioning):
  - Collision with vessels;
  - Increased vessel noise;
  - Increased anthropogenic noise from geophysical survey and positioning equipment (used during installation and decommissioning) which emits sound; and
  - Increased anthropogenic noise from the following installation activities:
    - Geotechnical investigations;
    - Seabed preparation (which may include mass flow excavation, rock placement, boulder removal, UXO removal);
    - Route clearance; and
    - Cable lay and burial (which may include ploughing and/or trenching).

5.5.6 There are no predicted potential impacts on marine mammals during operation of the Proposed Development except for a potential need to repair the cable as a result of a fault or physical damage. In such instances, the impact will be similar in nature to the installation of the cable.

5.5.7 Table 5.5.2 below identifies the potential effects of the Proposed Development and proposes whether or not potential impacts can be scoped out of further assessment or not. It is proposed that 'Increased anthropogenic noise from geophysical survey and positioning equipment which emits sound' and 'UXO removal' (if in situ detonations are required) are taken forward for assessment (scoped in).

[58] IAMMWG. 2013. Management Units for marine mammals in UK waters (June 2013). Cover note prepared by the UK Statutory Nature Conservation Bodies (SNCBs).

[59] IAMMWG. 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough.

Table 5.5.2: Potential impacts on marine mammals and approach to EIA

Potential impact	Potential effects	Proposed approach	Reason	Proposed mitigation
Collision with vessels	Lethal effects Physical injury (and subsequent risk of infection)	Scope out	Vessels will be following pre-defined linear routes when working. Working speeds will be low to moderate. It is considered that the additional, vessels associated with the Proposed Development will not significantly increase the amount of vessel traffic which uses the Channel, and therefore not present a more significant risk of collision than animals experience on a daily basis.	None
Increased vessel noise	Behavioural response Masking Indirect effects due to potential impacts on prey	Scope out	Maximum impact ranges are likely to be very small even for large vessels (<1-22 m[60]). Sound from vessels associated with the Proposed Development is unlikely to significantly add to existing noise levels from vessels in the Channel.	None
Increased anthropogenic noise from geophysical survey and positioning equipment which emits sound e.g. sonars, sub-bottom profilers, USBL positioning systems and transponder beacons	Physical injury at very close range Auditory injury at close range Temporary behavioural response (if the sound emitted falls within the hearing range of marine mammals)	Scope in	Potential for physical and/or auditory injury.	Use of geophysical survey and positioning equipment which emits sound will be carried out in accordance with the relevant JNCC guidelines[61]. This will reduce the potential for harm to acceptable (not significant) levels.

[60] ICOL. 2013. Underwater noise chapter of the Inch Cape Offshore Wind Farm Environmental Statement. This document can be downloaded from http://www.inchcapewind.com/publications/environmental-statement/introduction

[61] At the time of writing: JNCC. 2017. JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys. This document can be downloaded from http://jncc.defra.gov.uk/marine/seismic_survey

Potential impact	**Potential effects**	**Proposed approach**	**Reason**	**Proposed mitigation**
Increased anthropogenic noise from geotechnical investigations, seabed preparation, route clearance, cable lay and burial	Temporary behavioural response	Scope out	Maximum impact ranges are likely to be small (< 30 m for drilling, suction dredging and cable laying; ≤140 m for trenching; <100 m for rock placement[70]).	None
UXO removal (if in situ detonations are required)	Lethal effects and physical injury Auditory injury Temporary behavioural response	Scope in	Potential for lethal effects and/or physical injury and/or auditory injury.	UXO removal (if in situ detonations are required) will be carried out in accordance with the relevant JNCC guidelines[62]. This will reduce the potential for harm to acceptable (not significant) levels.

5.5.8 With mitigation (e.g. based on those measures described in the JNCC guidelines for the appropriate activity), it is considered likely that the potential effects of the potential impacts taken forward for assessment will be reduced to negligible levels. If that is the case, a cumulative impact assessment may not be required (for marine mammals).

Scope of Assessment and Further Information

5.5.9 A detailed baseline will be established by undertaking a desktop review of published information and through consultation with relevant bodies. It is considered, given the nature of the project and installation works, that a proportionate assessment be undertaken which can be based on the marine surveys already described and through the use of existing datasets. As such, it is not proposed to undertake any offshore surveys for further data collection for marine mammals. A robust assessment can be made using the data from existing projects and resources.

[62] At the time of writing: JNCC. 2010. JNCC guidelines for minimising the risk of injury to marine mammals from using explosives. This document can be downloaded from http://jncc.defra.gov.uk/page-4900

5.5.10 As with ornithology (Section 5.4), the impact assessment methodology proposed for marine mammals will be that outlined by CIEEM for projects in marine and coastal environments (IEEM, 2010[63]) which can be summarised as follows:

- Describing the baseline within the zone of influence;
- Identifying potential receptors within the zone of influence;
- Identifying activities associated with the project that may result in effects on these receptors during installation, operation and maintenance and decommissioning;
- Describing these activities in terms of whether the effect is likely to be positive or negative, along with its magnitude, extent, duration, reversibility, timing and frequency;
- Characterising the effect, including the likelihood of its occurrence;
- Assessing whether the likely (pre-mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made;
- Providing details of proposed mitigation (if applicable);
- Assessing whether the residual (with mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made; and
- Assessing cumulative effects (with mitigation where applicable) if required.

5.6 Human Environment (Commercial Fisheries)

Baseline

5.6.1 The English Channel in the area of the Proposed Development is used by a variety of commercial fishing vessels with a wide diversity of fishing gear types. Target species include both fish and shellfish, with strong seasonal and spatial sensitivities.

5.6.2 Within UK offshore waters, surveillance sightings have identified French, Belgian and UK vessels (ICES rectangle 29F0) with the majority being otter trawlers, beam trawlers and scallop dredgers (Figure 5.6.1) (Brown & May Marine, 2017[64]). UK inshore waters (30F0 and 30E9) are mostly used by UK registered vessels operating pots, gill nets and unspecified trawl gear although few vessels apply a single method (Brown & May Marine, 2017).

[63] IEEM. 2010. Guidelines for ecological impact assessment in Britain and Ireland: Marine and Coastal. This document can be downloaded from https://www.cieem.net/ecia-guidelines-marine-

[64] Brown & May Marine Ltd 2017 Aquind Interconnector commercial fisheries study.

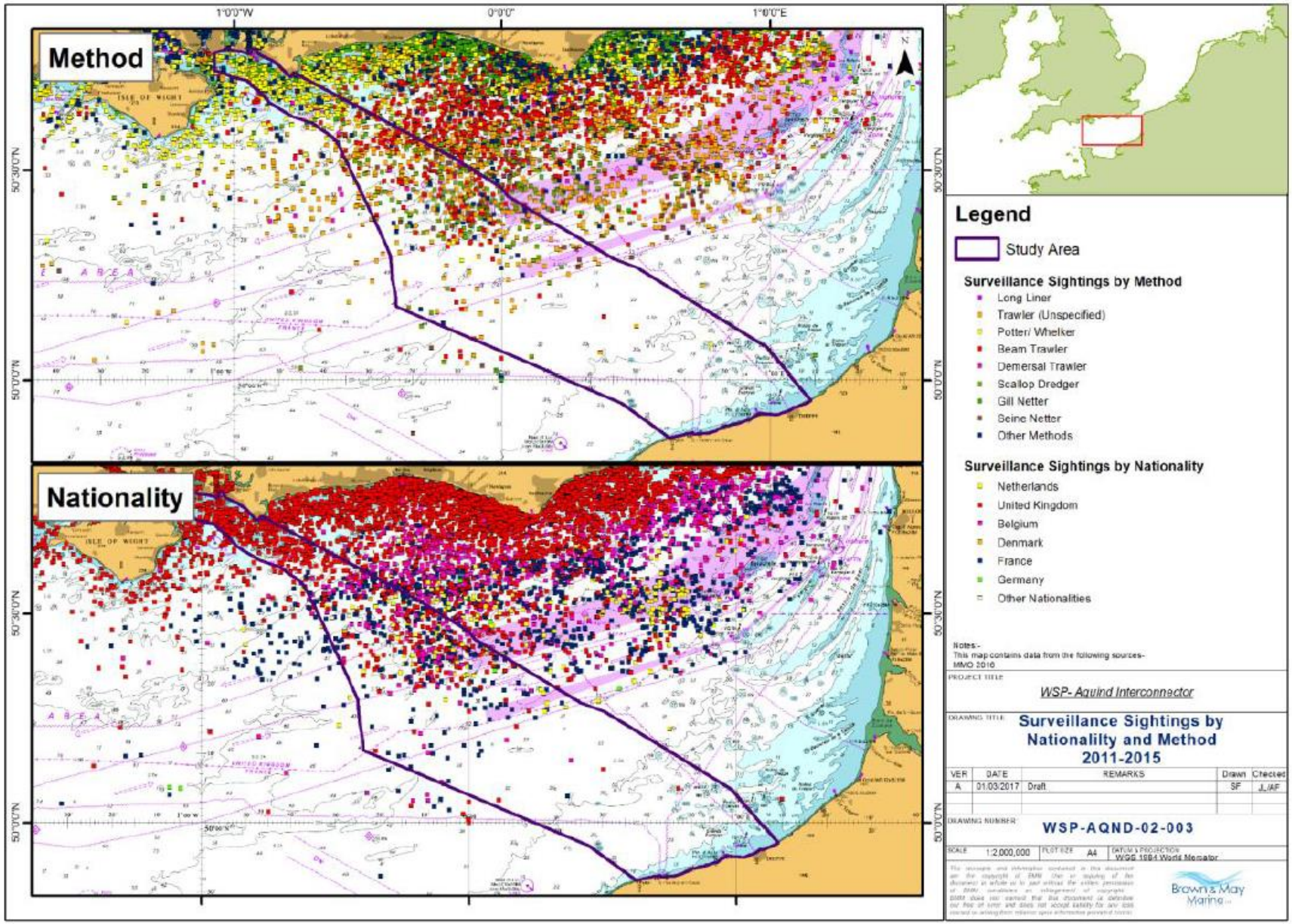

Figure 5.6.1 Surveillance sightings recorded in the vicinity of the offshore UK section of the cable by nationality and method (2011-2015). Brown and May 2017

5.6.3 The Vessel Monitoring System (VMS) satellite data for vessels over 15 m in length indicates that scallop dredging records the highest levels of effort within the UK fleet with UK demersal trawlers and seine netters recording moderate levels of effort within the proposed offshore cable route (Brown & May Marine, 2017). UK over 15 m potters show very little activity within the study area (Brown & May Marine, 2017).

5.6.4 VMS data is only representative of activity by the over 15 m fleet, as vessels shorter than 15 m are not tracked by VMS. A significant proportion of activity within the area is conducted by vessels smaller than 10 m (RSK Environment Ltd. 2010[65]) which highlights the importance of consultation with local fisherman to gain data and information on this fleet.

5.6.5 The average landings values of UK vessels highlights that the ICES rectangle 30E9 is the most profitable on the proposed cable route with £6,171,633 recorded on average. This is across a range of gear types with nearly a third of values originating from the under 10 m potting fleet (Brown & May Marine, 2017). The main species targeted by potters in inshore areas are whelk, lobster and to a lesser extent edible crab (Brown & May Marine, 2017). Whereas the offshore section (29E9 and 29F0) is dominated by mechanical dredging targeting scallops.

5.6.6 The annual landing data is used to highlight the values of each fishing method within a particular area and is illustrated in Figure 5.6.2.

[65] RSK Environment Ltd, 2010. Rampion Offshore Wind Farm - Scoping Report. Rev02-Final

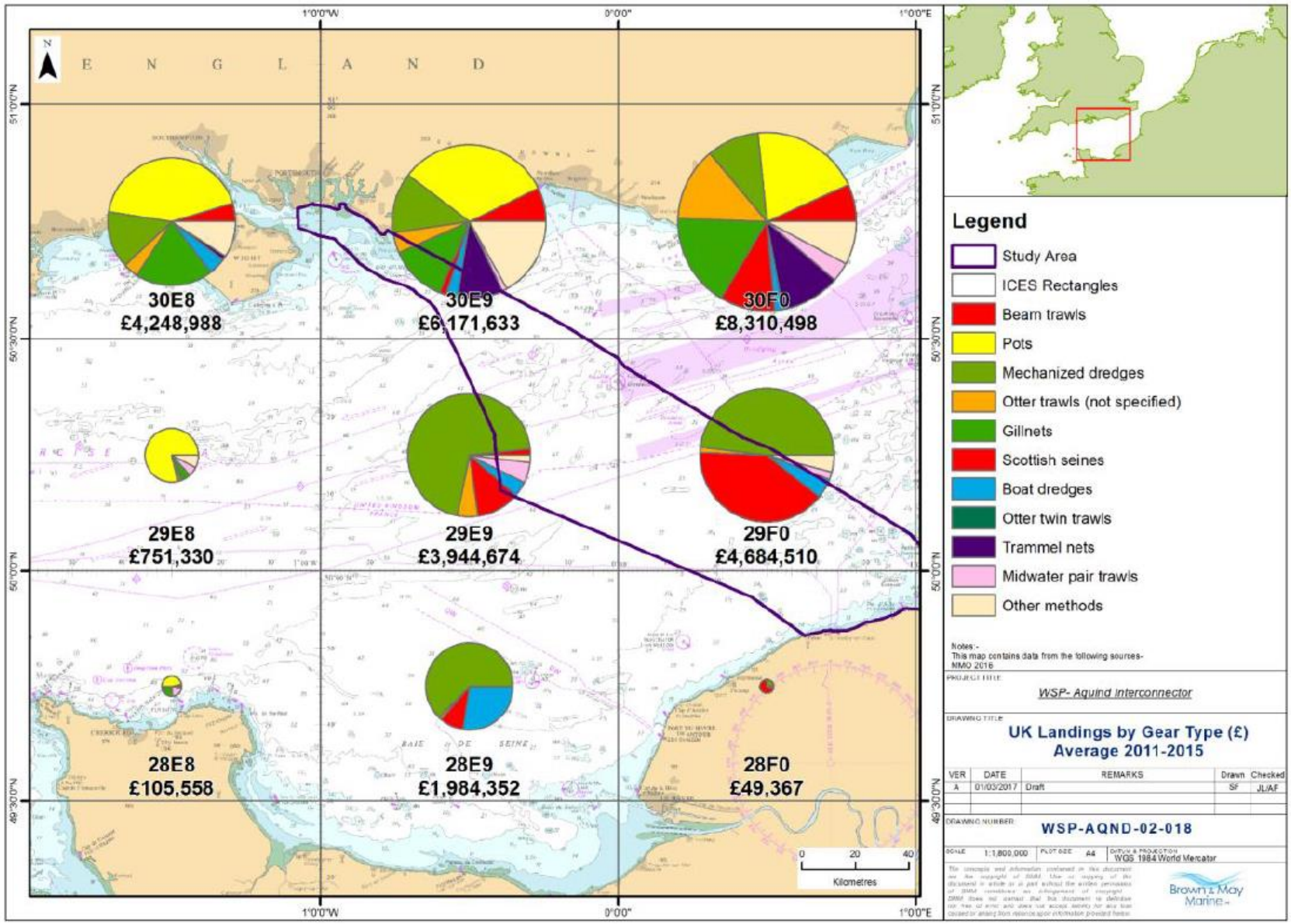

Figure 5.6.2 UK landings values by gear type (2011-2015). Brown and May 2017

Potential Impacts and Mitigation

5.6.7 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on commercial fisheries in UK waters may include:

- Installation (and decommissioning):
    - Temporary loss or restricted access to established fishing grounds;
    - Temporary displacement of fishing activity into other areas;
    - Interference to normal fishing activities;
    - Safety issues for fishing vessels;
    - Temporary increases in steaming times; and
    - Obstacles on the seabed after installation.

- Operation:
    - Temporary loss or restricted access to established fishing grounds;
    - Temporary displacement of fishing activity into other areas;
    - Interference to normal fishing activities;
    - Safety issues for fishing vessels;
    - Increased steaming times; and
    - Obstacles on the seabed after installation.

5.6.8 There is the potential for the installation and operation phases of the Proposed Development to have effects on commercially harvested fish and shellfish populations. This may result in behavioural changes or declines in abundance, which could indirectly affect the productivity of the fishery. While this is acknowledged in the commercial fish section, the potential for such effects will be assessed in the Fish and Shellfish chapter and any significant impacts discussed in the commercial fish chapter of the ES.

5.6.9 The potential impacts on commercial fish from the installation and decommissioning of the Proposed Development and proposed mitigation are illustrated in Table 5.6.1.

Table 5.6.1: Potential impacts on commercial fish and approach to EIA

Potential impact	Potential effects	Proposed approach	Reason	Proposed mitigation
Installation (and Decommissioning)				
Temporary loss or restricted access to established fishing grounds.	Loss of or restricted access to fishing grounds.	Scoped in	Temporary safety zones around installation activities, installed or partially installed unattended infrastructure, advisory exclusion zones along vulnerable exposed sections of cables are all required to ensure the safety of other sea users. This will result in temporary restriction of access to fishing grounds.	Establishment of a Fisheries Working Group with key fisheries stakeholders to provide a forum for ongoing engagement with the fishing industry Production of a Construction Management Plan Consideration of the use of local fishing vessels to enforce safety zones A Fisheries Liaison Officer (FLO) will be appointed to disseminate installation (and decommissioning) schedule and associated safety risks will be shared through notices to all potential stakeholders.
Temporary displacement of fishing activity into other areas	Increased competition for alternative fishing grounds. Potential conflict between competing vessels. Potential conflict between different fishing methods	Scoped in	Temporary safety zones around installation activities, installed or partially installed unattended infrastructure, advisory exclusion zones along vulnerable exposed sections of cables are all required to ensure the safety of other sea users. This will result in temporary restriction of access to fishing grounds, which will displace fishing activity into other areas.	Establishment of a Fisheries Working Group with key fisheries stakeholders to provide a forum for ongoing engagement with the fishing industry
Interference to normal fishing activities	The propellers, rudders or towed survey equipment of survey and installation vessels have the potential to foul fishing buoys and lines.	Scoped in	Survey and installation vessels are required for surveying and installation/burial of the cable, which may cause interference to fishing activity.	Liaison with fishermen. Works vessels will fully comply with the International Regulations for Preventing Collisions at Sea (COLREGS).

Potential impact	**Potential effects**	**Proposed approach**	**Reason**	**Proposed mitigation**
Safety issues for fishing vessels	Collisions with installation vessels. Interaction with cables and infrastructure.	Scoped in	Unsafe areas such as installation activities will be made safe by using exclusion zones to prevent access and subsequent safety risks to fishing vessels.	Standard temporary exclusion zones around offshore installation activities. Advisory exclusion zones around offshore installation activities. Partially installed cable and associated infrastructure that is not fully installed would be marked, possibly guarded and advisory exclusion zones implemented. Liaison with fishermen.
Temporary increases in steaming times	Short term increases in steaming distances and times due to implementation of temporary safety zones and advisory exclusion zones	Scoped in	Temporary safety zones around installation activities, installed or partially installed unattended infrastructure and advisory exclusion zones along vulnerable exposed sections of cables are required to ensure safety to other sea users.	Safety and exclusion zones will be in place for a short duration and encompass a small area.
Obstacles on the seabed after installation.	Safety issue. Damage to or complete loss of fishing gear	Scoped in	Obstacles on the seabed as a result of the cable installation are an unavoidable occurrence of any installation activity.	Compliance to obligatory standards. Any significant risk to navigational safety will be identified and appropriate rectification measures undertaken before removal of safety zones.
Operation:				
Temporary loss or restricted access to established fishing grounds.	Loss or restricted access to fishing grounds Increased competition for grounds outside the cable route due to displacement.	Scoped in	The cable will be buried in the seabed as part of the installation process. It is ultimately the choice of the vessel owner/skipper to choose to fish over the buried cable.	Likely target depth of lowering of 0.6 m in a target trench depth of 0.9 m
Temporary displacement of fishing activity into other areas.	Displacement due to cable protection Concerns of fishing over subsea cables Safety concerns.	Scoped in	Temporary safety zones in place around maintenance/repair vessels are required to ensure the safety of other sea users.	Discussions with relevant vessel owners to determine appropriate mitigation. Safety zones occurring as a result of maintenance activities would represent a very small proportion of total grounds available.

Potential impact	Potential effects	Proposed approach	Reason	Proposed mitigation
Interference to normal fishing activities.	Collison risk Interactions with fishing gear.	Scoped in	Maintenance and operation vessels are required to ensure the ongoing operation of the cable.	Codes of conduct between works vessels and fishing vessels should be well established post installation Comply with international Regulations for preventing Collisions at Sea (COLREGS).
Safety issues for fishing vessels.	Interactions with cables and cable protection.	Scoped in	Obstacles on the seabed as a result of the cable installation are an unavoidable occurrence of any installation activity.	Likely target depth of lowering of 0.6 m in a target trench depth of 0.9 m. Post installation surveys will be undertaken to assess seabed status. Temporary safety zones and advisory exclusion zones used.
Increase steaming times	Short term increases in steaming distances and times due to temporary safety zones.	Scoped in	Maintenance activities may be required and temporary safety zones needed to ensure the safety of other sea users.	Temporary safety zones in place for a short duration and will encompass a small area.
Obstacles on the seabed after maintenance	Safety issue Damage to or complete loss of fishing gear.	Scoped in	Obstacles on the seabed as a result of the cable maintenance are an unavoidable occurrence of any installation activity.	Compliance to obligatory standards. Post maintenance surveys Accidently dropped objects and/or debris will be removed.

Scope of Assessment and Further Information

5.6.10 The impact assessment methodology proposed for commercial fish will be that outlined by CIEEM for projects in marine and coastal environments (IEEM, 2010[66]) which can be summarised as follows:

- Describing the baseline within the zone of influence;
- Identifying potential receptors within the zone of influence;
- Identifying activities associated with the project that may result in effects on these receptors during installation, operation and maintenance and decommissioning;
- Describing these activities in terms of whether the effect is likely to be positive or negative, along with its magnitude, extent, duration, reversibility, timing and frequency;
- Characterising the effect, including the likelihood of its occurrence;
- Assessing whether the likely (pre-mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made;

[66] IEEM. (2010). Guidelines for ecological impact assessment in Britain and Ireland: Marine and Coastal. This document can be downloaded from https://www.cieem.net/ecia-guidelines-marine-

- Providing details of proposed mitigation (if applicable);
- Assessing whether the residual (with mitigation) effects are ecologically significant and the geographical scale at which they are predicted to occur, including an indication of certainty in the predictions made, and
- Assessing cumulative effects (with mitigation where applicable).

5.6.11 In order to provide a robust fisheries baseline, data will be collected from a combination of data gathering from publically available sources as well as consultation with fishermen. The baseline will be based on the last five years' worth of available fisheries data for the UK, French and any other nationality that may fish within the corridor, for all species and commercial fishing methods.

- Landings (tonnage and value);
- Location of fishing activities; and
- Operating patterns and practices.

5.6.12 A more detailed description of the fishing activity occurring in the vicinity of the study area will be provided using the most up-to-date datasets available. The principal data and information sources to be used are summarised as follows:

- ICES
- MMO - Fisheries Statistics Unit and Data & Communications Team
- EU Fisheries Committee publications and data sets (Europa & Eurolex)
- Cefas Laboratory – Lowestoft
- SeaFish
- UK Oil & Gas
- Publications from the SIH (Système d'Information Halieutique) for relevant ICES rectangles;
- Publications from the UMR AMURE (University of Brest);
- Publicly available data sets from the DIRM (Direction Interrégionale de la mer Manche Mer du Nord) ;
- Non-UK fleet catch and effort data.

5.6.13 There is currently no single data set or model which can accurately quantify the precise levels or values of commercial fishing within discrete sea areas such as an offshore cable route. As such, data and information will be acquired from a number of sources. Data will be collected using the data sources described below:

5.6.14 **Fisheries Statistics** - ICES statistical rectangles are currently the smallest spatial unit used for the collation of fisheries data by the EU and ICES. The following data from the years 2011 to 2015 will be presented and analysed by ICES rectangles, this includes information on the following:

- Landings values;
- Effort data (days fished per year);

- Nationality;
- Weight of catch;
- Species caught;
- Methods used;
- Landing ports;
- Annual variations;
- Monthly variations (seasonality); and
- Vessel category (under-10m, 10m to 15m, over-15m and non-UK).

5.6.15 Data will be collected for UK, French, Belgium, Dutch and Danish and German landing statistics.

5.6.16 **Satellite Tracking (VMS) -** Satellite tracking data is for over-15m UK registered vessels, obtained from the MMO, and will be assessed and GIS plotted for the years 2010 to 2015 by average annual value within the study areas. Vessels under-15m in length are not currently tracked. For the French activity in UK waters a data, request will be made to IFREMER (Institut français de recherche pour l'exploitation de la mer) in order to obtain more recent VMS data on a 5 years' time series (2011-2015) with a breakdown by gear type. For non-UK vessels, the desktop study will rely on the most relevant VMS data sets.

5.6.17 **Fisheries Surveillance -** Fisheries over-flight and surface vessel surveillance sightings for the years 2011 to 2015 will be analysed by vessel nationality and gear type.

5.6.18 **Consultation with fishermen to establish fishing patterns of non VMS fitted fleet** - In the UK, fishing vessels under 15m are currently not fitted with VMS. As a consequence, consultation with relevant fishing interests will ensure coverage of the small-scale fleet fishing of the inshore section of the Proposed Development. For the French under 15m fleet, Brown and May will liaise with the CRPMEM (Comité Régional des Pêches Maritimes et des Elevages Marins de Bretagne) of Normandy to obtain the VALPENA (l'éVALuation des Pratiques de PEches au regard des Nouvelles Activités) data which provides a mapping of the fishing activity by French vessels regardless of their size. Consultation will also be undertaken with the non-professional French fishing fleet through workshops and meetings.

5.7 Human Environment (Shipping and Navigation)

Baseline

5.7.1 A preliminary baseline study for this scoping report has been provided by Anatec Ltd. It is important to note that this scoping document is focussed on the landfall and offshore elements for the UK part of the Proposed Development only.

5.7.2 This topic in relation to French waters will be outlined in greater detail in the equivalent French scoping and EIA assessment process submitted separately to French authorities.

5.7.3 Data obtained for the UK waters is considered to provide ample coverage of the area to inform the shipping and navigation baseline at this current stage.

Navigational Features

5.7.4 This section identifies the key navigational features in the vicinity of the Proposed Development.

5.7.5 The Proposed Development crosses the English Channel. One section of the corridor lies approximately three nautical miles (nm; at its closest point) to the west of the Dover Strait Traffic Separation Scheme (TSS) which is one of the busiest shipping lanes in the world. The easternmost section of the proposed corridor mid channel crosses the entrance of the eastbound shipping lane of the TSS.

5.7.6 There is a maintained depth channel (Nab Channel) located approximately 0.7 nm south of the cable corridor. The Nab Channel, associated with the eastern approach to Portsmouth and the Solent, is approximately 5 nm in length and is intended for deeply-laden inward-bound tankers, large container vessels and other vessels constrained by their draught. Accordingly, other vessels should keep clear of the Nab Channel and not impede the safety of deep-draught vessels navigating in the area.

5.7.7 There are numerous anchorages in close proximity to the cable corridor (none located inside), the largest of which is the Nab anchorage berths located approximately 5 nm to the south west of the Eastney landfall. This anchorage contains anchor berths and swinging circles. Mariners are advised that, in strong winds, the nature of the holding ground in the area of the Nab Anchorages is such that vessels may be liable to drag anchor.

5.7.8 The navigational features in UK waters are presented in Figure 5.7.1.

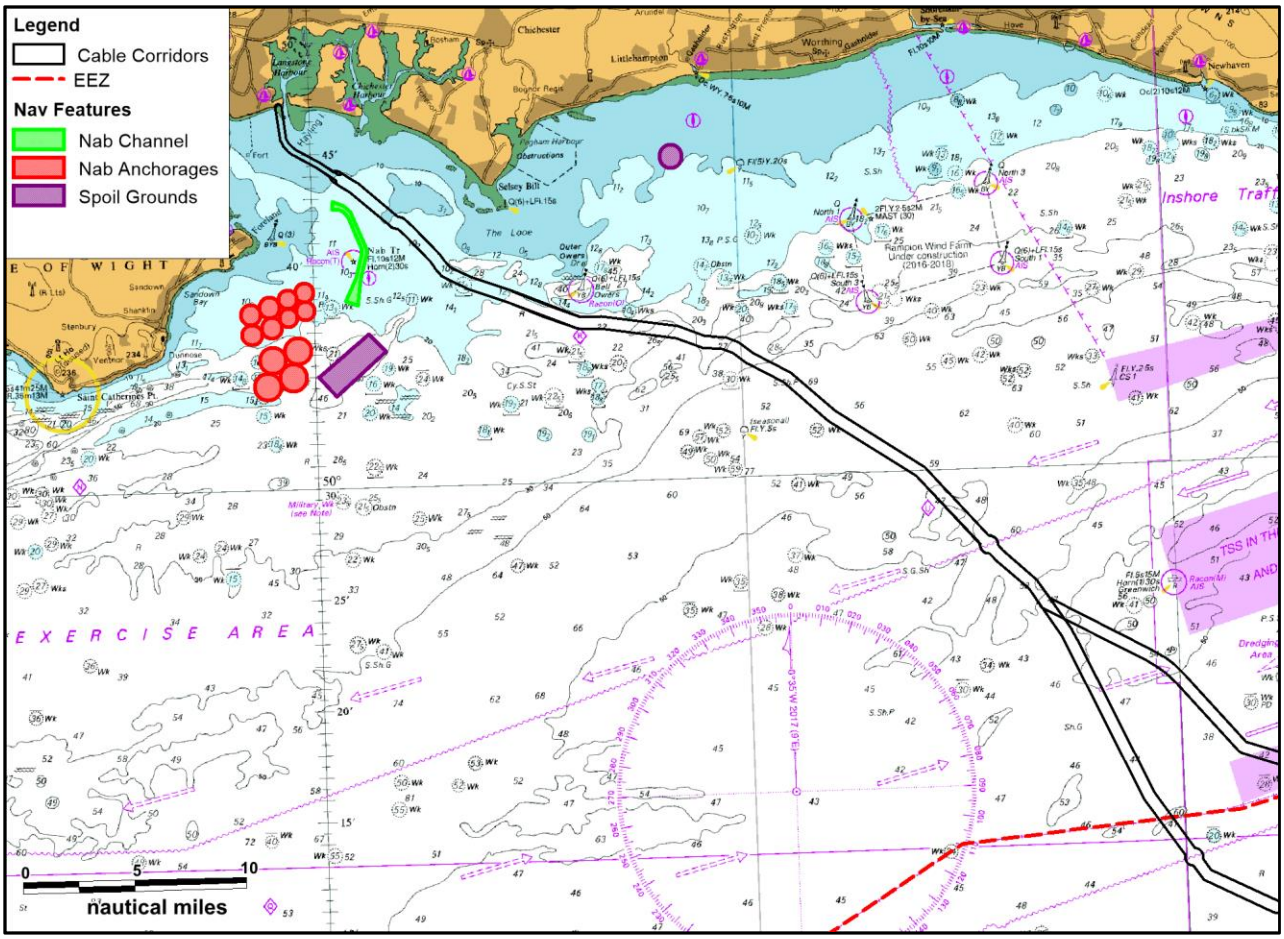

Figure 5.7.1 Navigational features in UK waters (Anatec 2017)

Automatic Identification System (AIS) Analysis

5.7.9 A total of two months AIS receiver data from 2016, one month in summer (July – August 2016) and one month in winter (December 2016), was analysed. In addition, one month of auxiliary satellite AIS data from 2015 (July – August 2015) has also been included in the analysis for validation. The combined data set was analysed for a study area, defined to encompass an area of 2.5 nm around the Proposed Development.

Commercial Shipping

5.7.10 An overview plot of the vessel tracks, colour-coded by vessel type, recorded within the study area for the three months of AIS data are provided in Figure 5.7.2.

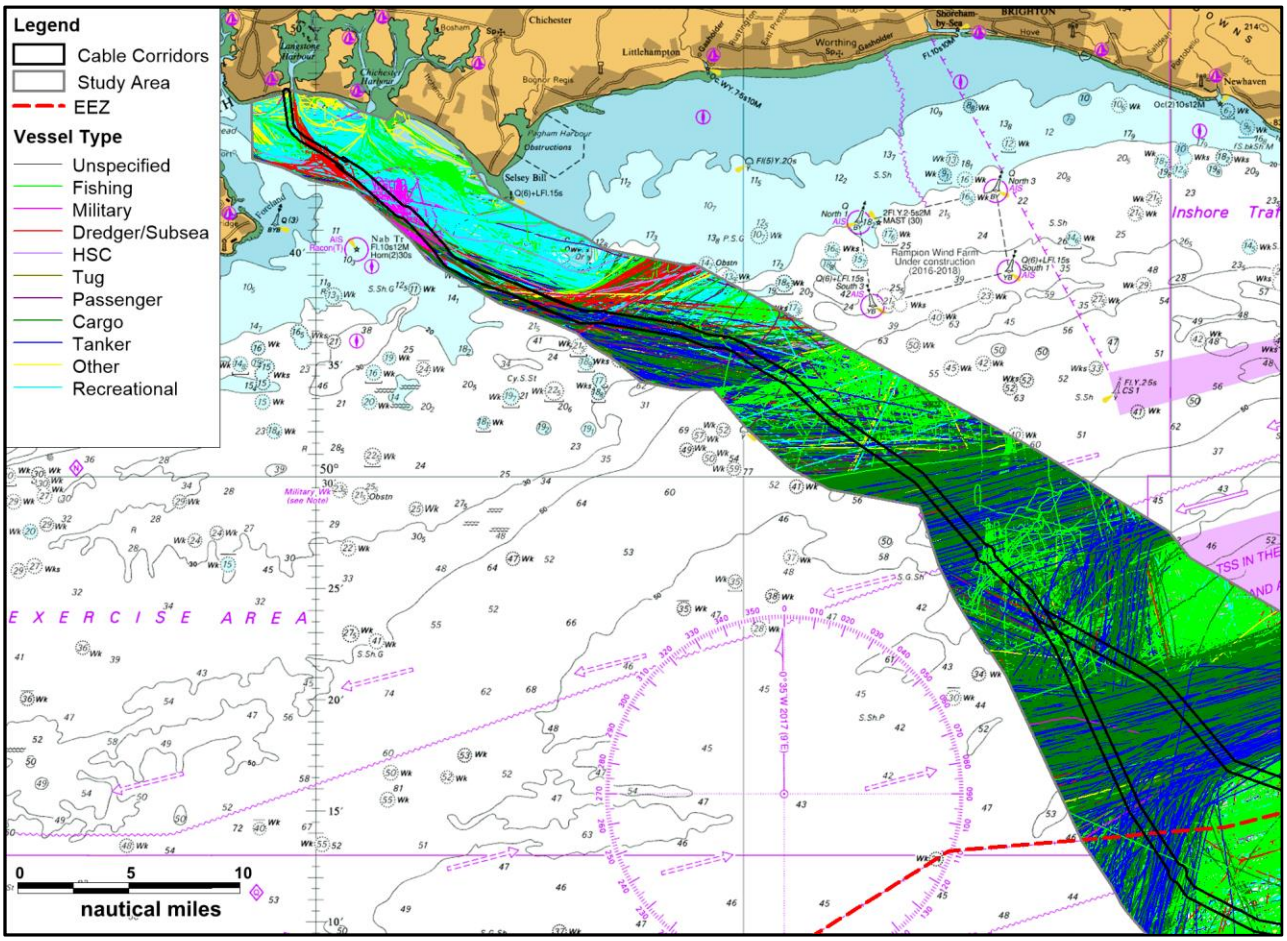

Figure 5.7.2 AIS tracks by vessel type (Anatec 2017)

5.7.11 Figure 5.7.3 shows the type distributions (excluding < 1% unspecified) for vessels passing within the study area during the three month study period.

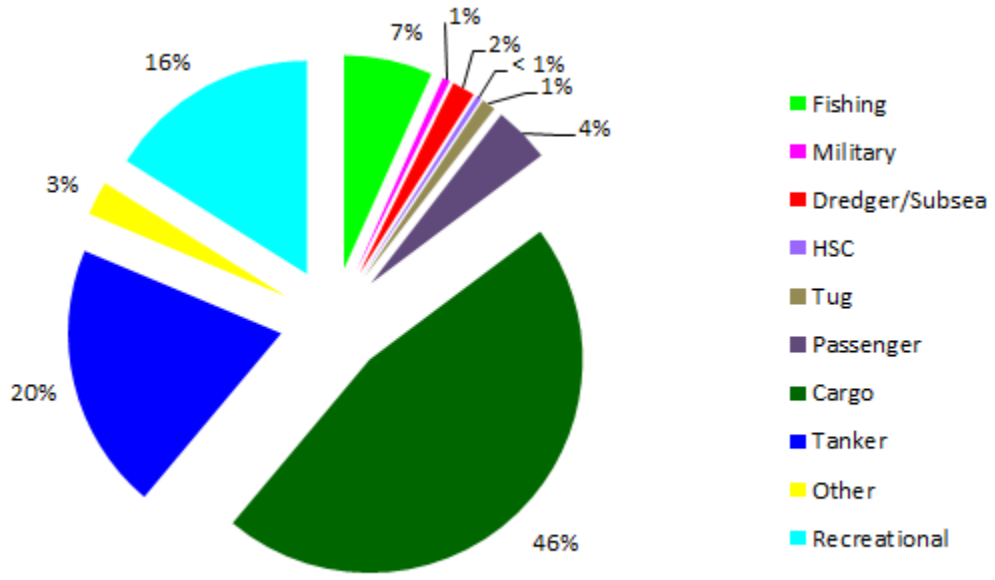

Figure 5.7.3 Vessel type distribution (excluding unspecified). Anatec 2017

5.7.12 In summer 2015, there was an average of 304 unique vessels per day recorded within the study area and an average of 237 intersecting the cable corridor. During the one month of summer 2016 AIS data (July – August), there was an average of 265 unique vessels per day passing through the study area and an average of 214 intersecting the cable corridor. The most common vessel types in the two summer periods were cargo vessels (43%), tankers (20%) and recreational vessels (22%).

5.7.13 During the one month of winter AIS data (December 2016), there was an average of 242 unique vessels per day passing through the study area and an average of 202 intersecting the cable corridor. The most common vessel types in winter were cargo vessels (55%), tankers (23%) and fishing vessels (11%).

5.7.14 The majority of vessels passing through the study area, during the combined study periods, were commercial vessels including cargo and tankers. The average length of vessels passing through the study area was 119 m in the summer periods and 168 m in the winter period. For vessels intersecting the cable corridor only, the average recorded lengths were 129 m in the summer periods and 147 m in the winter period. Recreational vessels were found to operate closer to the coast, particularly during summer, whilst the majority of fishing vessels were found close to the Dover Strait TSS lanes in the winter period. Passenger cruise and ferry vessels were frequently recorded transiting to and from the Port of Portsmouth due to its international connections with Spain, France and the Channel Islands.

5.7.15 The highest areas of density were due to traffic utilising the lanes associated with the Dover Strait TSS. High density was also seen in UK coastal waters in summer, particularly due to recreational traffic and vessels entering / exiting ports such as Portsmouth and Southampton.

5.7.16 Ship density for the summer and winter periods are shown in Figure 5.7.4 to Figure 5.7.6. The vessel density values presented on the figures are based on the number of track intersects per cell of a 500 m x 500 m grid.

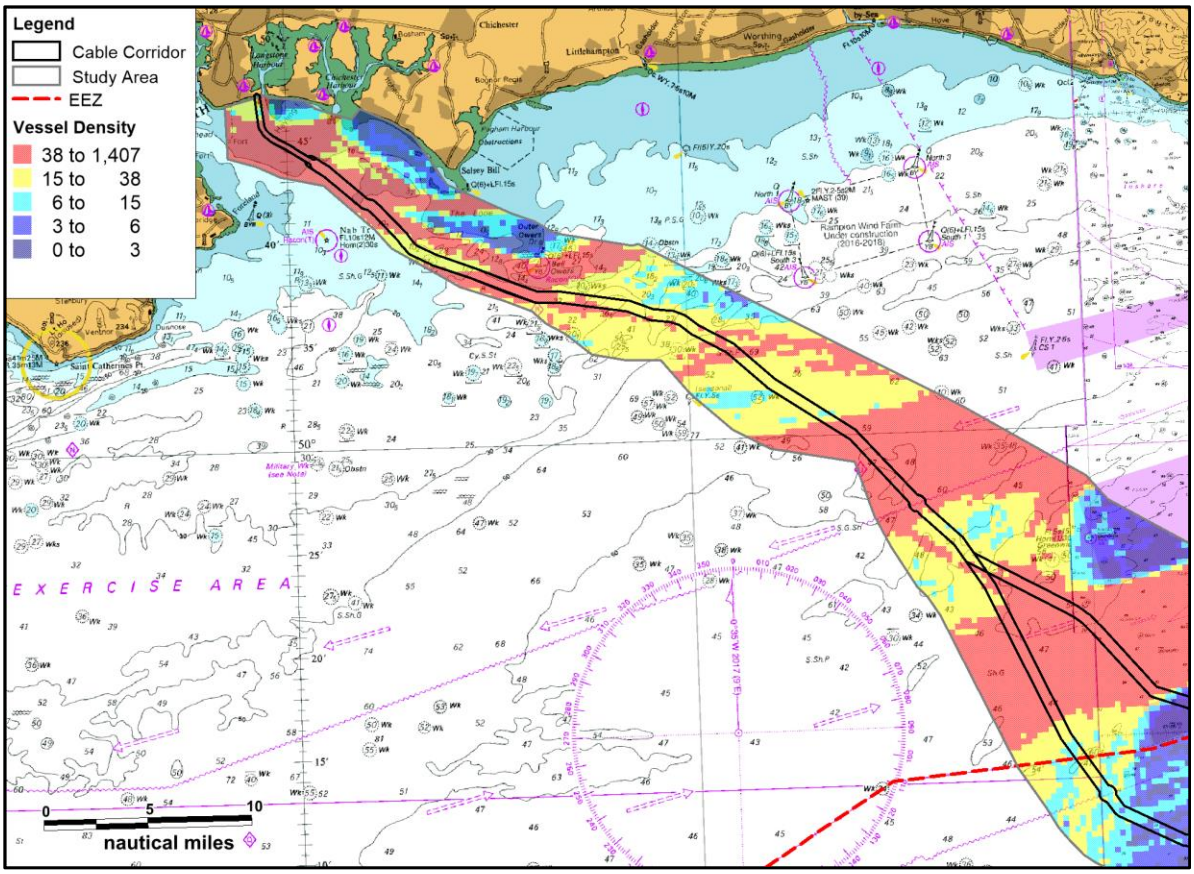

Figure 5.7.4: Vessel Density – Summer 2015 (Anatec 2017)

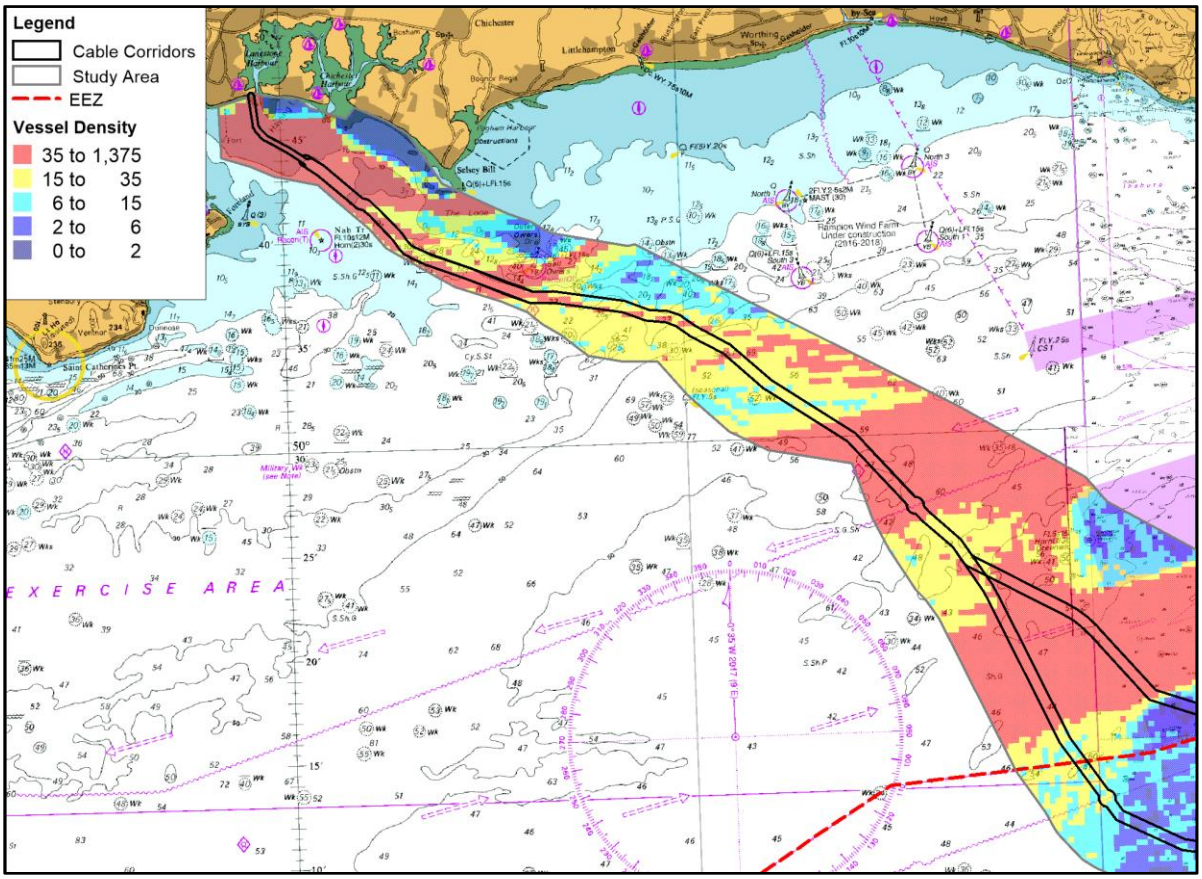

Figure 5.7.5: Vessel density – Summer 2016 (Anatec 2017)

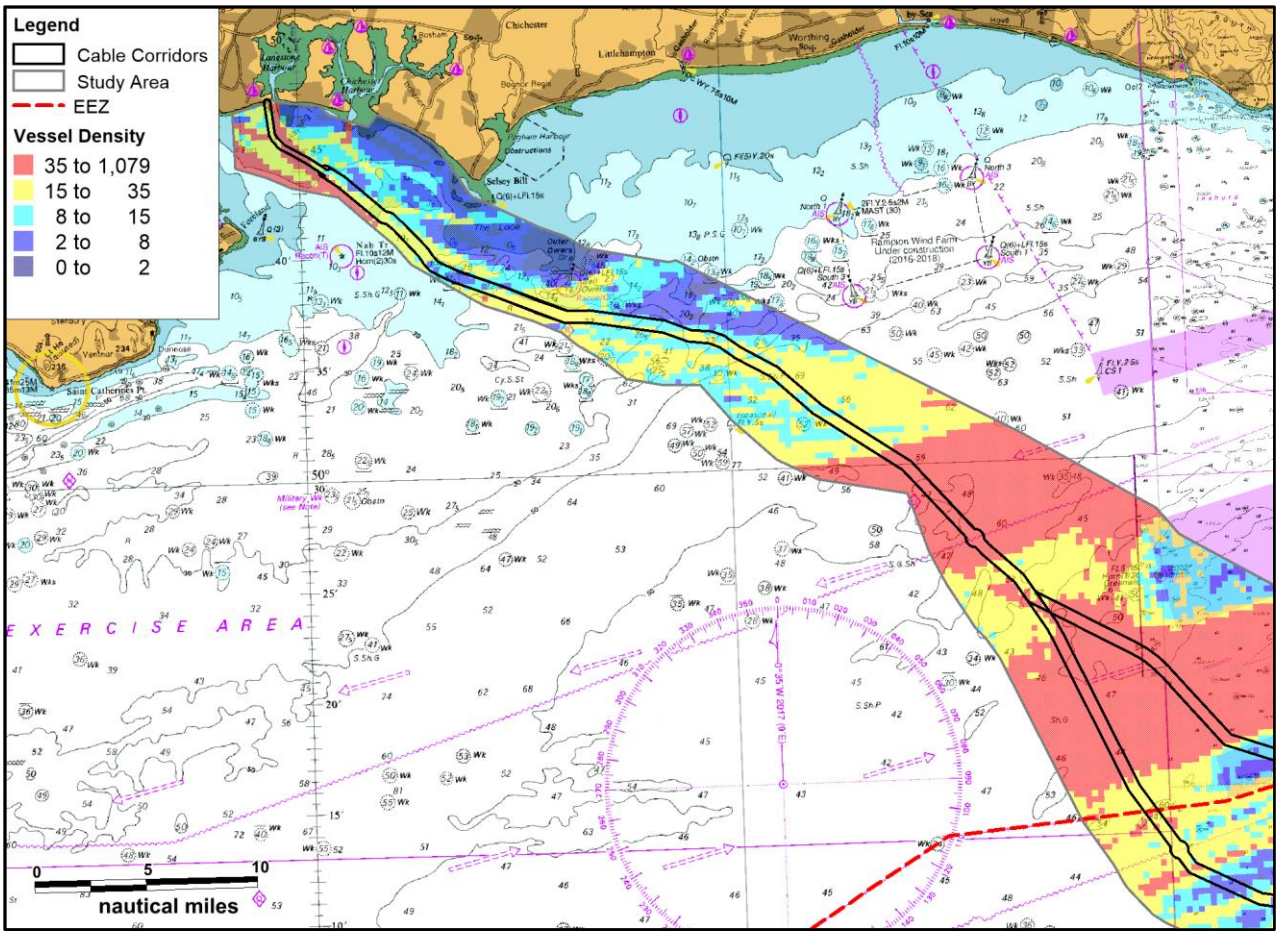

Figure 5.7.6: Vessel Density – Winter 2016 (Anatec 2017)

Fishing Vessels

5.7.17 Based on the three months of AIS data, there are high levels of fishing within the study area. The AIS tracks recorded from fishing vessels during the combined three month study periods are presented in Figure 5.7.7.

5.7.18 It should be noted that fishing vessels below 15 m in length are not required to broadcast via AIS and thus may be under-represented in the above figure. Therefore, additional satellite data VMS will be used in the Navigational Risk Assessment (NRA) to be undertaken as part of the EIA to further validate the findings of the AIS data.

Anchoring Analysis

5.7.19 Vessels recorded at anchor within the study area, for the combined three month survey period, have been identified through the vessels' navigation status (transmitted via AIS). In addition to this, Anatec's Speed Analysis model was used to identify any anchored vessels transmitting a navigation status other than 'At Anchor' to account for inaccuracies. Figure 5.7.8 presents the vessels recorded at anchor in the study area for the three month study period, colour-coded by vessel type.

5.7.20 The majority of vessels deemed to be at anchor were found close to shore with the most significant activity occurring close to Langstone Harbour. Significant anchoring activity from dredgers was observed within the vicinity of the Proposed Development, particularly close to the Eastney landfall site approximately 3-4 nm off the UK coast.

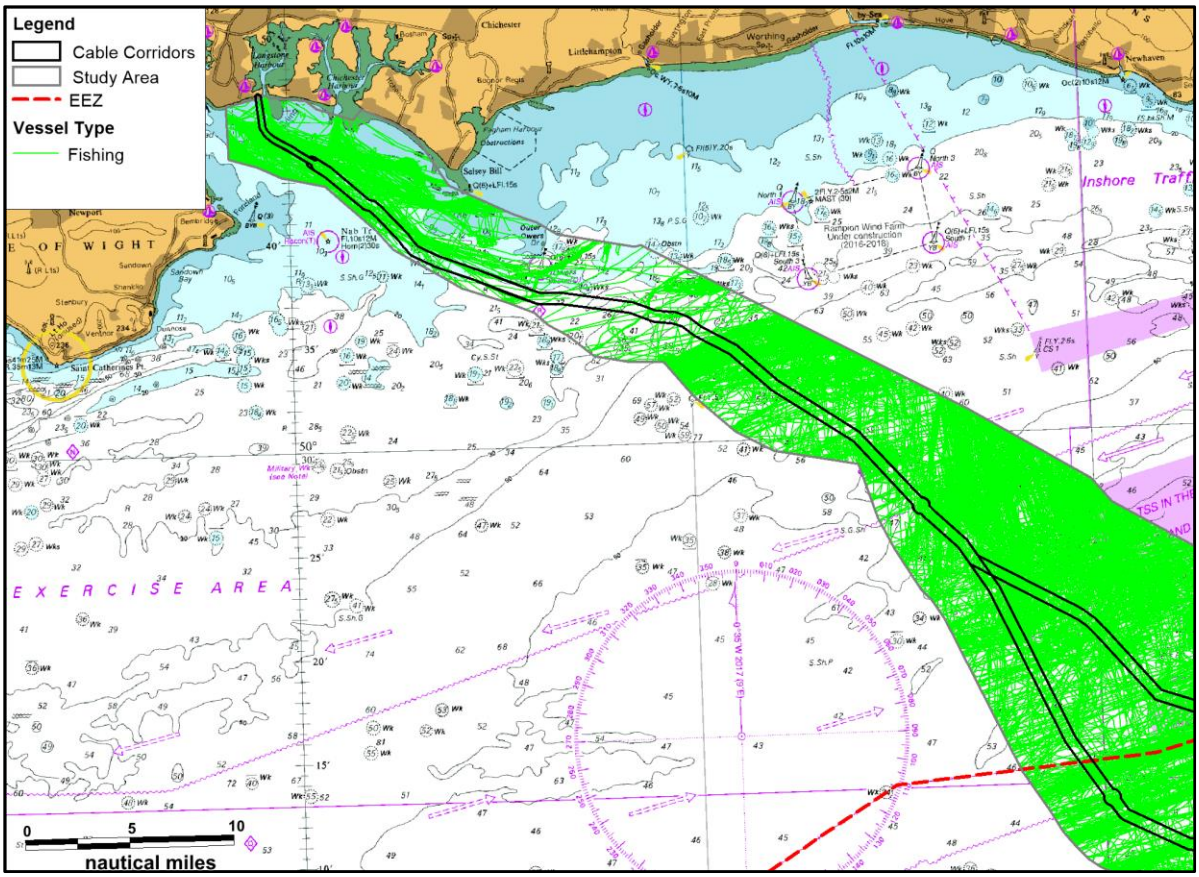

Figure 5.7.7: AIS Fishing Tracks (Anatec 2017)

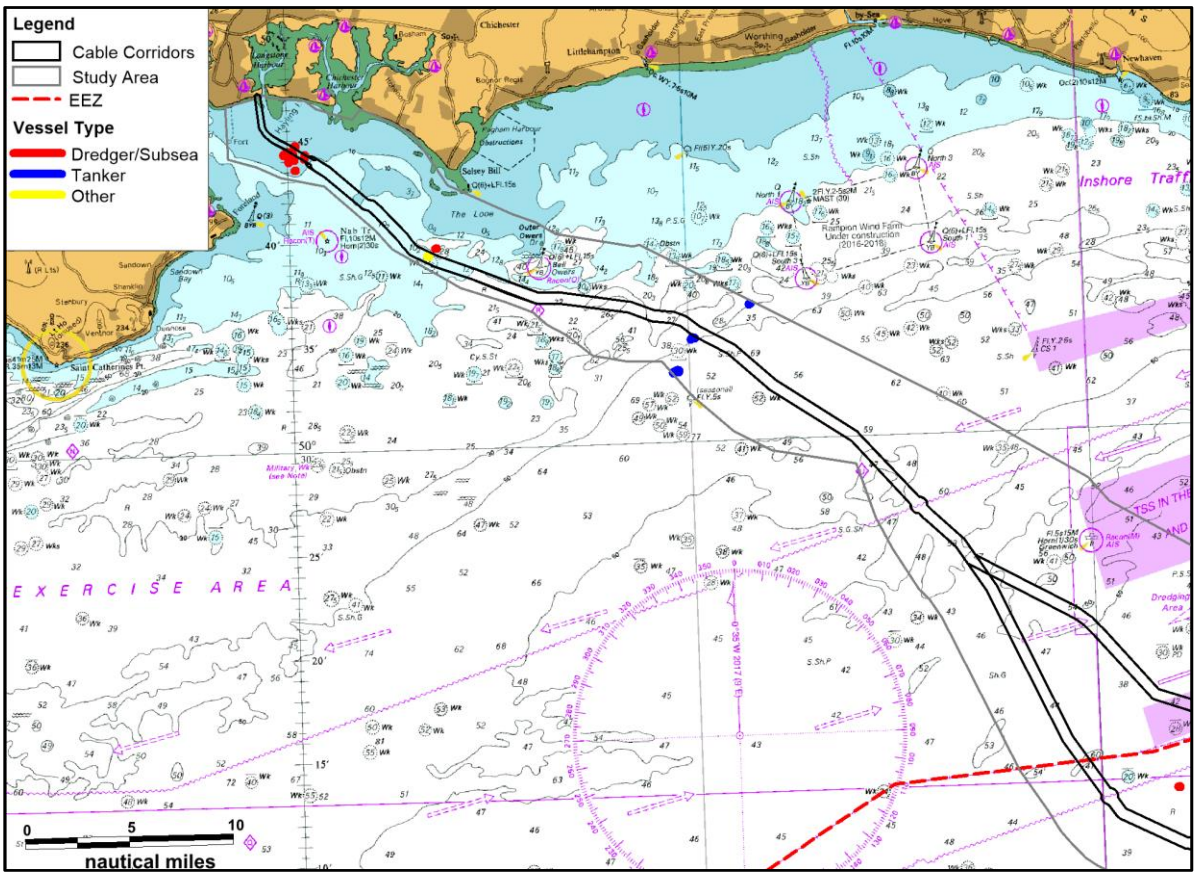

Figure 5.7.8: Anchored vessels (Anatec 2017)

Potential Impacts and Mitigation

5.7.21 Due to its location, it is not possible for the Proposed Development to avoid all active commercial navigation areas. Nevertheless, the route of the cable corridor has been selected with careful consideration given to constraints. Potential impacts to shipping and navigation have been mitigated through avoidance of the main navigational features in the area such as charted and known anchorages, maintained channel depths and prohibited regions. The following potential impacts have been identified:

- Installation vessels causing deviation to established vessel routes and displacement of recreational activity
- Increase in the risk of a vessel-to-vessel collision due to installation vessel activity
- Risk of interaction with vessel anchors and displacement of anchoring activity
- Displacement of fishing vessels into commercial shipping lanes
- Displacement of Third Party Marine Activities
- Reduction in under keel clearance resulting from laid cable and associated protection
- Interference with Marine Navigational Equipment

Vessel Route Deviation and Displacement of Recreational Activity

5.7.22 During the installation phase, regular traffic will be required to alter their planned route due to the presence of installation vessels. These installation vessels have limited manoeuvrability and will require a minimum passing distance in which no other vessel can enter to reduce the likelihood of incidents. Since this will cause disruption to shipping activity, to mitigate this potential impact, notice to mariners will be issued on a frequent basis before and during the cable installation period. This will inform the nautical community of locations of proposed works which may require vessels to temporarily make slight diversions to avoid specific areas.

5.7.23 During normal operations, provided it is buried to an adequate depth, the Proposed Development should have no significant impact to shipping and navigation in the area. However, if maintenance works or a repair is required along the cable, vessels will be present to carry out relevant works. The length of time in which these vessels will be required along the route will be dependent upon the location and amount of maintenance required and / or the complexity of the repair. During this time, vessels working on the cable will need to be avoided by vessels transiting through the area.

Increase in Vessel-to-Vessel Collision Risk

5.7.24 The presence of installation and/or maintenance vessels may increase the risk of a vessel-to-vessel collision. This includes both a collision between a third party vessel and a vessel associated with the laying of the cable, and a collision between two third party vessels resulting from route deviation. Standard mitigations including promulgation of information and minimum safe passing distances will be in place to mitigate this risk.

Risk of Interaction with Vessel Anchors and Displacement of Anchoring Activity

5.7.25 The route has been selected to minimise the risk from dragged anchors by avoiding designated anchorage areas, however due to the high level of shipping which will cross over the cable route on a daily basis and the size of vessels that regularly visit the ports of

Southampton and Portsmouth, an anchor dropped accidentally, in an emergency or negligently, may pose a risk to the cable.

5.7.26 A wider anchoring assessment within the proposed NRA will determine the extent and positions of anchoring activity near the cable, and the frequency of vessels passing over the cable that might present a risk of emergency anchoring.

5.7.27 Mitigation measures include marking of the cable on Admiralty Charts and suitable protection of the cable, such as burial or rock placement (see Section 3 for details).

5.7.28 During the operational phase, interaction between anchors and cables will depend on the cable protection. Therefore, an assessment will need to be undertaken (at the appropriate stage), taking into account the seabed sediment characteristics and external risks to determine optimal burial depths and additional protection methods if deemed necessary.

Displacement of fishing activity and gear snagging

5.7.29 The baseline assessment showed that fishing activity does occur within the study area, however further data assessment will be required as part of the NRA. The vessel presence associated with the laying of the cable is likely to displace this fishing activity within the footprint of the works. Section 5.6 (Commercial Fisheries) of this document summarises how consultation is ongoing with the fishing industry and how the Applicant will implement the Proposed Development utilising installation methods to reduce conflict with the fishing industry wherever possible.

5.7.30 The baseline assessment identified both dredging and demersal trawling occurring within the study area, both of which have the potential for interaction with the cable. Due to the limited penetration of fishing gear (up to 30 cm), once the cable is appropriately buried and protection is implemented, interaction between fishing gear and the cable is considered unlikely assuming that the cable depth and protection is monitored and maintained.

5.7.31 The charted presence of the cable should dissuade fishing activity to some extent, however previous experience suggests some vessels may continue to fish over installed cables, and therefore, there is still a snagging risk during the operation and maintenance phase. Again, it is noted that penetration of fishing gear is limited (up to 30 cm), and that this will therefore not necessarily lead to interaction, assuming the cable is suitably monitored and maintained.

5.7.32 This risk of snagging will be mitigated by clear marking of the cable on Admiralty Charts and suitable burial and protection of the cable.

Reduction in under keel clearance

5.7.33 The cable, and associated cable protection, may lead to a reduction in under keel clearance. It will be ensured that the relevant policy guidance is followed.

Scope of Assessment and Further Information

5.7.34 In order to inform the full impact assessment, a NRA will require to be carried out; this will include a baseline study which will summarise the available background navigation data and focus on any key shipping routes and / or anchoring areas and fishing activity in the vicinity of the cable corridor. Hazards will be identified and ranked and quantified where appropriate to inform the level of impact during both installation and operation, with appropriate mitigation measures identified.

5.7.35 The primary input to the NRA will be up-to-date marine traffic survey data. For the Proposed Development cable, this will cover 6-12 months of data taking into account seasonal variation.

5.7.36 AIS is required to be fitted aboard all vessels engaged on international voyages of 300 gross tonnage (GT) and upwards, cargo vessels of 500 GT and upwards not engaged on international voyages and passenger vessels (carrying 12 or more passengers) irrespective of size built on or after 1st July 2002. It is also mandatory for fishing vessels over 15 m to carry AIS. Vessels not required to carry AIS may still broadcast voluntarily via AIS Class A or B (a cost efficient version for non-mandatory vessels) and would also be recorded and assessed as part of the NRA.

5.7.37 The assessment methodology used in the NRA will primarily be based on the following guidance:

- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (FSA) – MSC/Circ. 1023 (IMO, 2002); and
- MCA MGN 543 (M+F) Offshore Renewable Energy Installations Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MCA, 2016).

5.7.38 The NRA will present a baseline assessment, which would include marine traffic surveys, desk-based assessment and consultation to allow the identification of higher risk areas. This phase is then followed by the Formal Safety Assessment (FSA), in line with the IMO FSA Guidelines (IMO, 2002).

5.7.39 The results of the baseline assessment will be used to identify the potential impacts arising from the installation and operation of the cable relevant to shipping and navigation. The impact will be ranked in terms of frequency and severity of consequence. This process requires a degree of subjectivity and professional judgement, therefore the assessment will incorporate the output of a hazard workshop involving national and local stakeholders relevant to shipping and navigation, and the lessons learnt from existing developments. Where applicable, quantitative risk assessment will be undertaken to inform the ranking process.

5.7.40 Additional data and information sources that will be reviewed include:

- Up to date hydrographic charts for the area;
- Maritime incident data in the area (20 years);
- RYA coastal atlas and reference materials such as sailing almanacs;
- Environmental statement studies for developments in close proximity;
- BEIS OESEA; and
- Fishing vessel activity data (AIS and VMS satellite data).

5.7.41 During the NRA, consultation with key navigational stakeholders in UK waters will be undertaken in order to obtain supplementary information. Parties consulted will include:

- Maritime and Coastguard Agency (MCA);
- Ministry of Defence (MoD);
- Trinity House;
- Chamber of Shipping;

- Cruising Association;
- Royal Yachting Association; and
- Relevant UK Port Authorities (ABP Southampton, Queens Harbour Master Portsmouth).

5.7.42 Consultation will be used to verify desk-based data sources and fill in any gaps in information. Consultation will also be required to verify that there are no conflicts between the Proposed Development and other marine users. The planned approach to the impact assessment and cumulative assessment work will also be agreed through consultation.

5.8 Human Environment (Other Marine Users)

Baseline

5.8.1 The area has a range of other marine users, these include:

- Military;
  - The MoD has designated practice or exercise areas in the vicinity.
- Aggregates;
- Offshore Wind Farms;
  - Construction of the Rampion Offshore wind farm is underway. This project is likely to be commissioned by the time that the Proposed Development is being installed, and so cumulative impacts would be limited to asset management activities.
  - The Marine Licence application for Navitus Bay project has been refused, and the developer has chosen not to appeal the decision of the minister. The Applicant will monitor future developments of this project, and include cumulative impacts assessments where appropriate.
- Recreational Users; and
  - The Solent and the areas around Isle of Wight is also a popular recreational area with facilities for a range of water sport activities.
- Other Infrastructure.
  - There are a number of existing cable routes which cross the Proposed Development.

5.8.2 There are a number of MoD practice and exercise areas (PEXA) in the vicinity of the Proposed Development which may be used for military exercises (see Figure 5.8.1 below). One MoD area intersects the Proposed Development at a location approximately 8 nm south-east of the Eastney landfall option, and another MoD area intersects the Proposed Development at a location approximately 7 nm south of Selsey Bill.

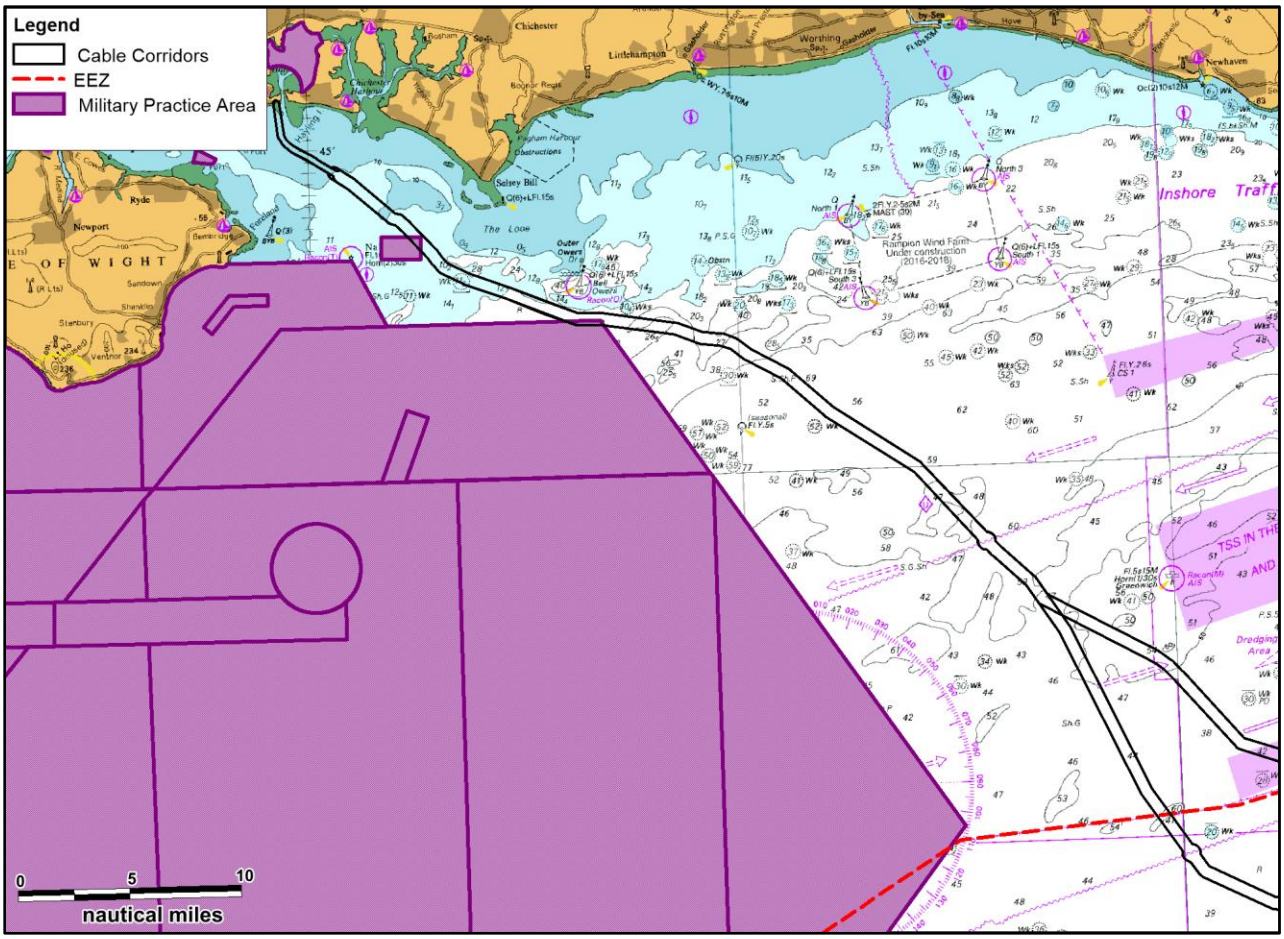

Figure 5.8.1: Military practice zones (UK MoD) – Anatec 2017

5.8.3 The eastern English Channel is nationally important for aggregate extraction although there are no known currently active aggregate dredging areas that intersect the Proposed Development, as illustrated in Figure 5.8.2. Consultations are also ongoing to ensure that the Proposed Development keeps potential sterilisation of other licenced only dredging areas to a minimum.

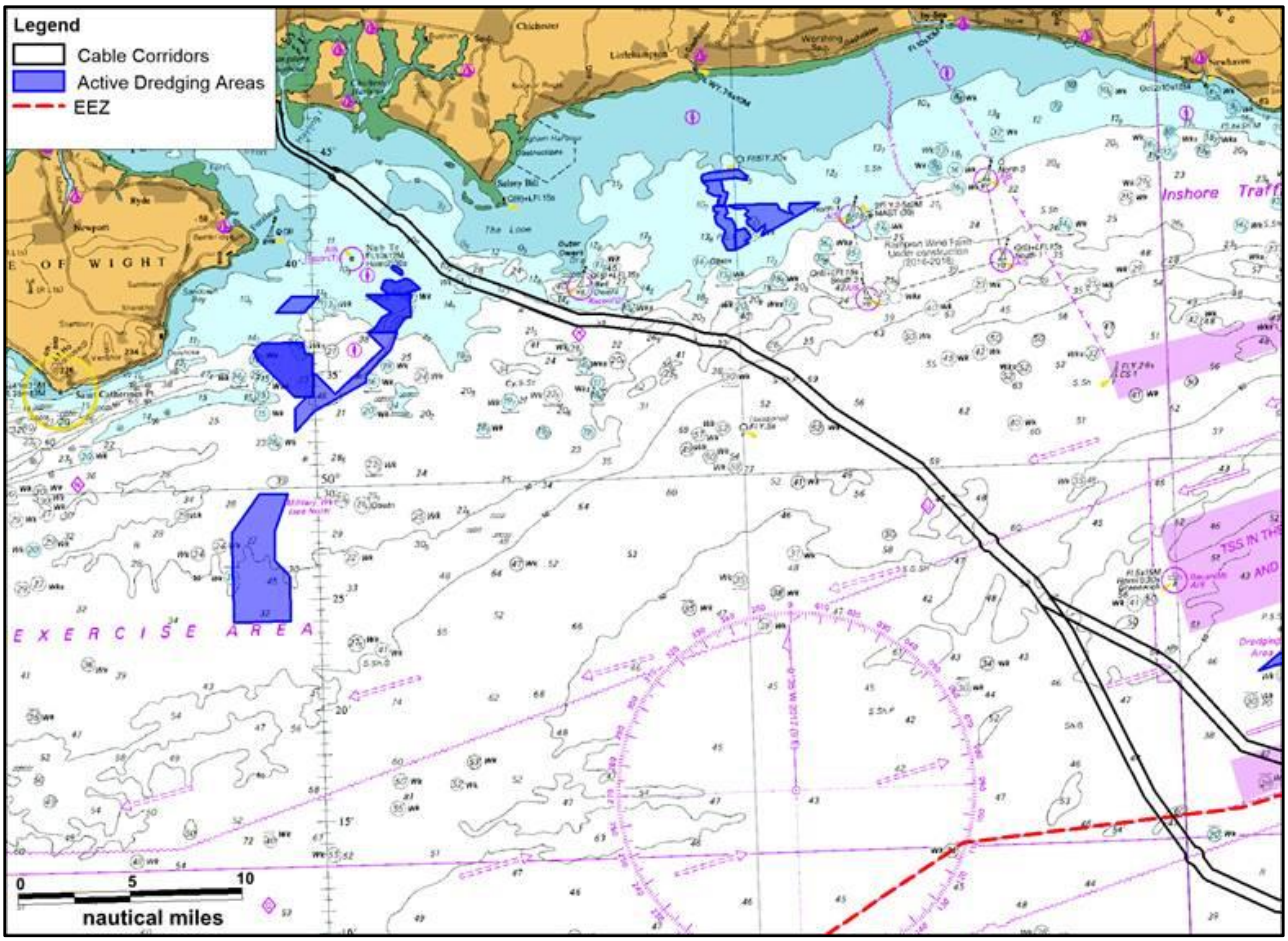

Figure 5.8.2: Aggregate active dredging areas – (© The Crown Estate - Dec 2017) - Anatec 2017

5.8.4 The area in and around the Solent and the Isle of Wight is popular for recreational purposes such as sailing, racing and water skiing. Figure 5.8.3 illustrates the numerous routes crossing the Proposed Development, and the sailing and racing areas located on the Eastney landfall location.

5.8.5 As shown in Figure 5.8.4, the Rampion Wind Farm is the only wind farm in close proximity to the cable corridor. It is located approximately 5 nm east of the cable corridor in UK waters.

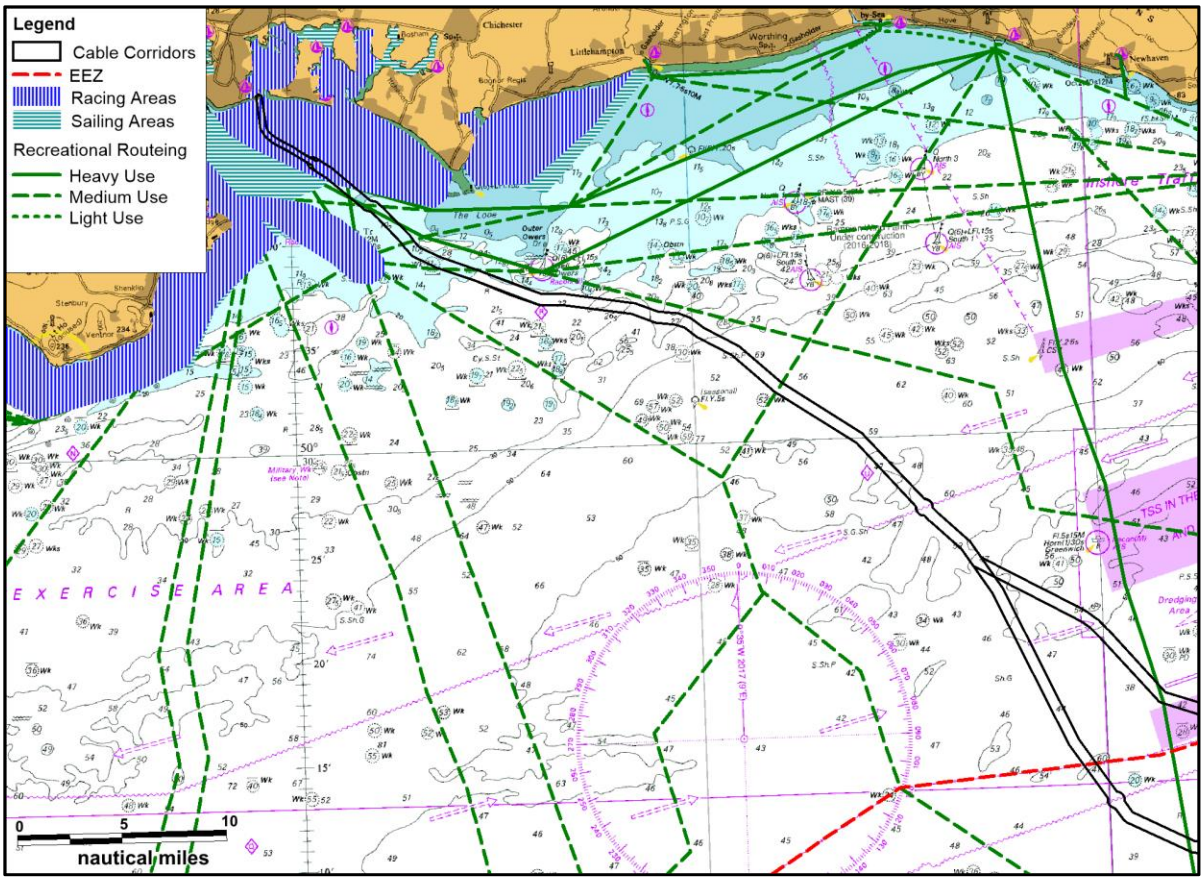

Figure 5.8.3: Recreational routeing (© RYA 2010, Anatec, 2017)

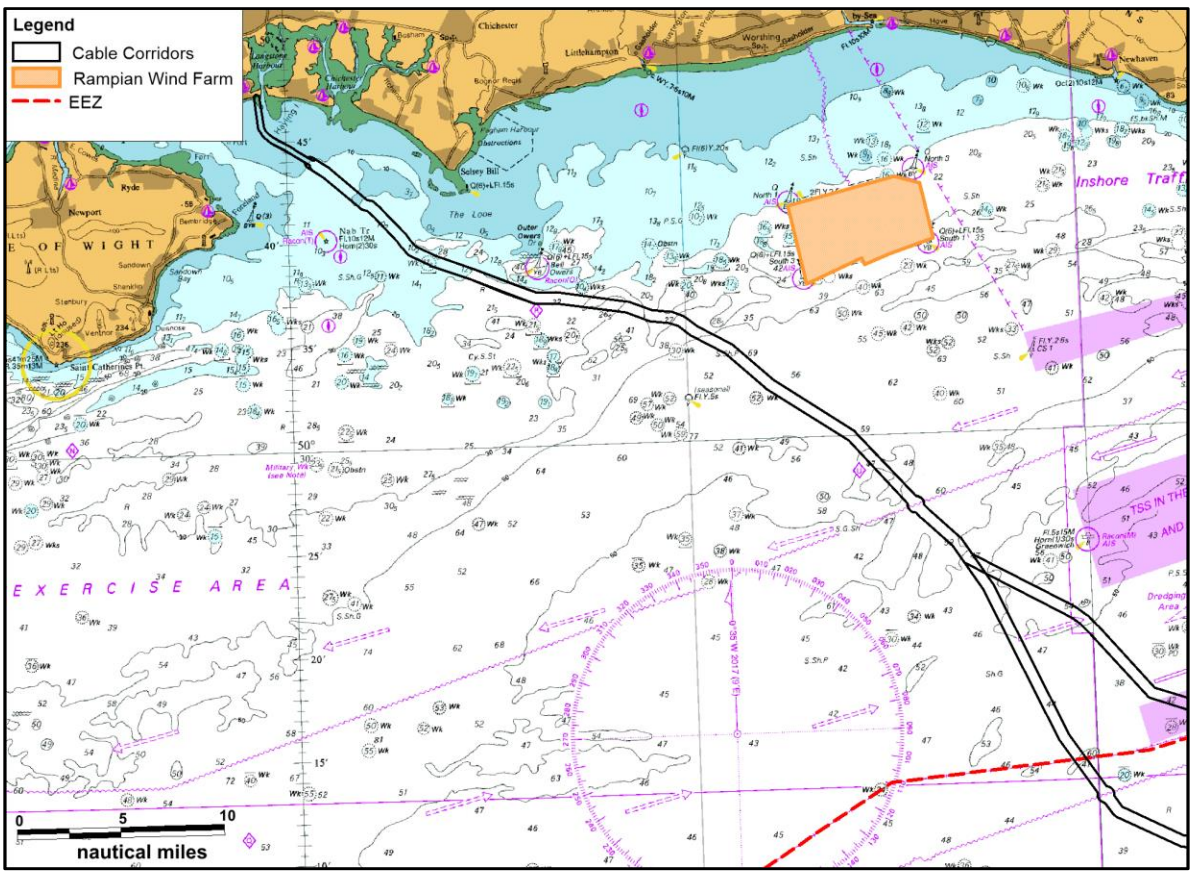

Figure 5.8.4 Offshore wind farm sites (Anatec, 2017)

Potential Impacts and Mitigation

5.8.6 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on other marine users in UK waters may include:

- Installation, operation (and decommissioning):
  - Vessel route deviation and displacement of recreational activity;
  - Increase in vessel to vessel collision risk;
  - Displacement of third party marine activities;
  - Reduction in under keel clearance resulting from laid cable and associated protection;
  - Interference with marine navigational equipment
  - Cables and pipelines

5.8.7 The installation works are likely to incur the most impacts due to exclusion zones needed to ensure the safety of all marine users. This could disrupt some recreational activity, however this disruption will be of a short duration whilst the cable is being installed. Operational effects will be limited to those arising from repair or any monitoring that may be required.

Vessel Route Deviation and Displacement of Recreational Activity

5.8.8 During the installation phase, regular traffic will be required to alter the planned route of travel due to the presence of installation vessels. These installation vessels have limited manoeuvrability and will require a minimum passing distance in which no other vessel can enter to reduce the likelihood of incidents. Since this will cause disruption to shipping activity, to mitigate this potential impact, notice to mariners will be issued on a frequent basis before and during the cable installation period. This will inform the nautical community of locations of proposed works which may require vessels to temporarily make slight diversions to avoid specific areas.

5.8.9 During normal operations, provided it is buried to an adequate depth, the Proposed Development should have no significant impact to shipping and navigation in the area. However, if maintenance works or a repair is required along the cable, vessels will be present to carry out relevant works. The length of time in which these vessels will be required along the route will be dependent upon the location and amount of maintenance required and / or the complexity of the repair. During this time, vessels working on the cable will need to be avoided by vessels transiting through the area.

5.8.10 Recreational users are common in coastal waters, and therefore may be affected by the installation of the cable, particularly near landfall. However, during normal operational phase, it is unlikely that recreational users will be impacted with the exception of cases when repairs / maintenance works are required.

Increase in Vessel-to-Vessel Collision Risk

5.8.11 As previously mentioned in Section 5.7, the presence of installation and/or maintenance vessels may increase the risk of a vessel-to-vessel collision. This includes both a collision between a third party vessel and a vessel associated with the laying of the cable, and a collision between two third party vessels resulting from route deviation. Standard mitigations including promulgation of information and minimum safe passing distances will be in place to mitigate this risk.

Displacement of Third Party Marine Activities

5.8.12 Within the English Channel, there are a large number of aggregate dredging areas (both active and licensed). Despite this, the Proposed Development does not intersect any identified dredging areas and thus has reduced any potential. There will be a requirement for an exclusion area for disposal and dredging in the vicinity of the cable throughout the operational lifetime. The Proposed Development lies within close proximity to MoD PEXA areas (with two areas intersecting the Proposed Development, see Figure 5.8.1) which have no current restrictions on the right to transit through them. Firing practice and exercises only take place when areas are considered to be clear of all shipping. However, potential impacts could include the disruption of installation activities if the timing coincides with firing practices. This could also be applicable to repairs and / or maintenance works. These potential impacts will be mitigated by on-going consultation with the MoD to determine the frequency and nature of activities so as to avoid unnecessary disruptions.

Reduction in under keel clearance resulting from laid cable and associated protection

5.8.13 The cable, and associated protection, may lead to a reduction in under keel clearance. It should be ensured that the relevant policy guidance is followed.

Interference with Marine Navigational Equipment

5.8.14 The electromagnetic field created by buried direct current cables has the potential to create interference on a vessel's magnetic compass, in particular on smaller recreational vessels, as such vessels may lack more sophisticated navigational equipment on-board.

Cables and Pipelines

5.8.15 A crossing agreement will be made with operators of all existing active cables and pipelines which the route crosses. These agreements will provide protection to the continued operation of these facilities. Specific protection measures will be discussed in the relevant section of the ES.

Scope of Assessment and Further Information

5.8.16 Consultation with all relevant stakeholders will be undertaken and their feedback used to finalise the route so as to avoid conflicts wherever practicable.

5.8.17 The NRA will present a baseline assessment, which would include marine traffic surveys, desk-based assessment and consultation to allow the identification of higher risk areas.

5.8.18 The results of the baseline assessment will be used to identify the potential impacts arising from the installation and operation of the Proposed Development relevant to shipping and navigation and other marine users.

5.8.19 Additional data and information sources that will be reviewed include:

- Up to date hydrographic charts for the area;
- Maritime incident data in the area (20 years);
- RYA coastal atlas and reference materials such as sailing almanacs; and
- Environmental statement studies for developments in close proximity.

5.8.20 During the NRA, consultation with key navigational stakeholders in UK waters will be undertaken in order to obtain supplementary information. Parties relevant to other marine users consulted will include:

- Maritime and Coastguard Agency (MCA);
- Ministry of Defence;
- Trinity House;
- Chamber of Shipping;
- Cruising Association;
- Royal Yachting Association; and
- Relevant UK Port Authorities (ABP Southampton, Queens Harbour Master Portsmouth)

5.8.21 Consultation will be used to verify desk-based data sources and fill in any gaps in information. Consultation will also be required to verify that there are no conflicts between the Proposed Development and other marine users. The planned approach to the impact assessment and cumulative assessment work will also be agreed through consultation.

5.9 Human Environment (Maritime Cultural Heritage)

Baseline

5.9.1 Archaeological and cultural heritage assets located within the UK section of the Proposed Development can be characterised as comprising four fundamental categories: seabed prehistory; maritime archaeology; aviation archaeology; intertidal heritage assets and marine installations. Other themes relevant to the archaeological baseline of the Proposed Development include the setting of known marine heritage assets and the historic seascape character of the area.

5.9.2 The baseline of known archaeological and cultural heritage assets within the proposed cable route refers to data obtained from the UK Hydrographic Office (UKHO) archives, which contains records relating to charted wrecks and other seabed obstructions that are considered navigational hazards. The National Heritage List for England maintained by Historic England comprises data of designated heritage assets including sites protected under the Protection of Military Remains Act 1986 and the Protection of Wrecks Act 1973. Data for the location of protected wreck sites have been downloaded from the National Heritage List for England (NHLE) webpage[67].

5.9.3 The UKHO data covered the UK extent of the Proposed Development and is presented in Universal Transverse Mercator (UTM) Zone 30 North projected from a World Geodetic System (WGS) 1984 datum (Figures 5.9.1 and 5.9.2).

5.9.4 This data collection has been completed in line with Chartered Institute for Archaeologists' (CIfA) *Standard and Guidance for Historic Environment Desk-Based Assessment* (CIfA 2017). This information has fed into the initial stages of the cable route selection and will be

[67] Historic England's National Heritage List for England. Available at: https://www.historicengland.org.uk/listing/the-list/data-downloads/. Accessed June 2017.

supplemented by a full desk-based assessment undertaken as part of the impact assessment process.

5.9.5 The following legislation applies to archaeological and cultural heritage located within both the UK EEZ and English Territorial Waters (up to 12 nm from the coast):

- Protection of Wrecks Act 1973: Section One and Two;
- Ancient Monuments and Archaeological Areas Act 1979 (as amended);
- Merchant Shipping Act 1995; and
- Protection of Military Remains Act 1996.

5.9.6 Due to the high level of mercantile activity in the English Channel region dating back as far as the Mesolithic (8500 - 4000 BC), many wrecks are located in the area, the highest concentrations are in the Solent and Approaches (Figure 5.9.1) in terms of UK waters.

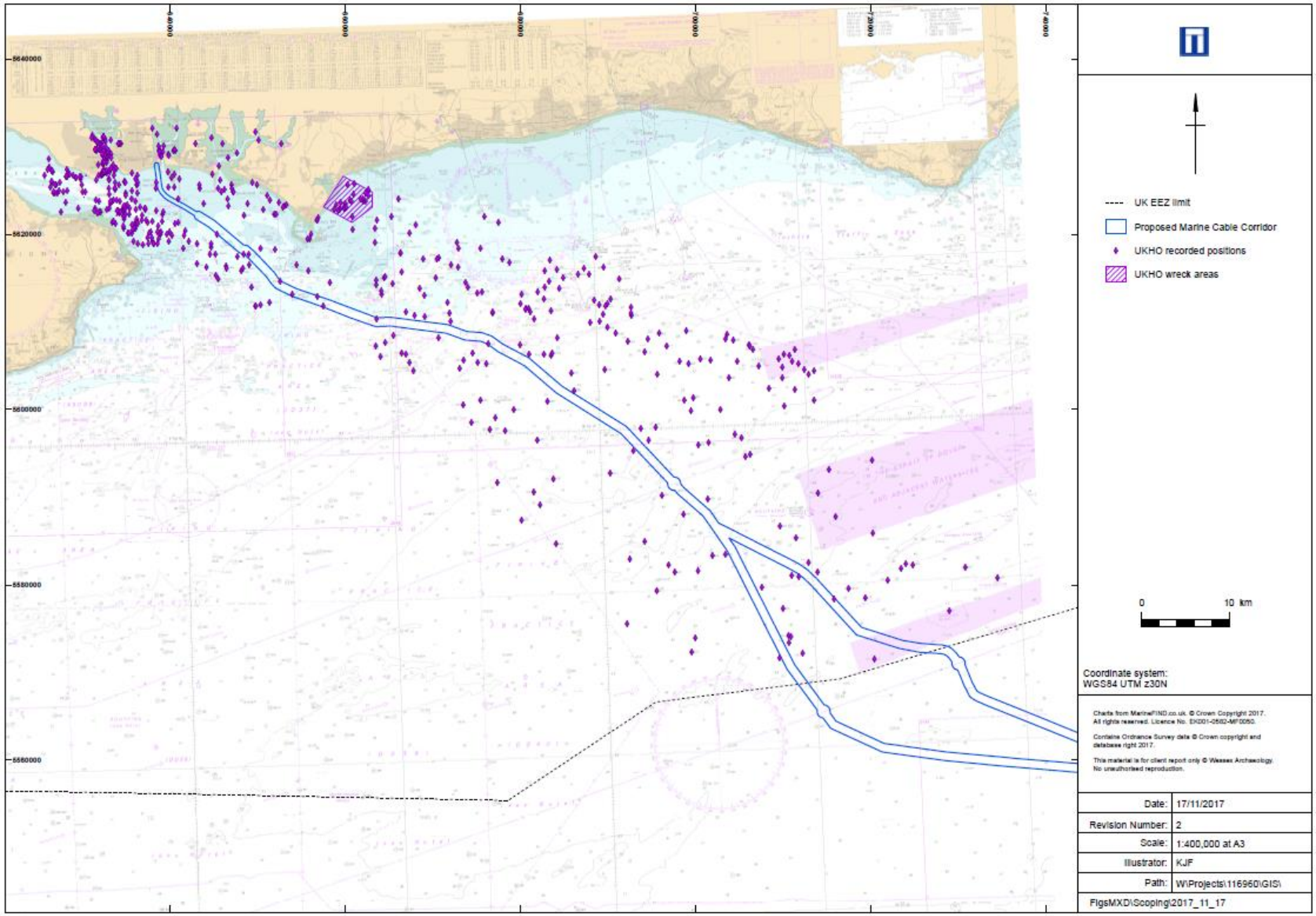

Figure 5.9.1 Known assets (UKHO dataset) in the Solent and approaches (Wessex Archaeology, 2017)

Protected Wrecks

5.9.7 There are no designated wrecks located within the UK element of the Proposed Development.

5.9.8 All wrecks protected by the legislation listed above are marked on appropriate UKHO Admiralty Charts. Interference or damage to these wrecks is considered a criminal offence. Although no protected wrecks are located within the cable corridor, there are four protected wrecks designated under Section 1 of the *Protection of Wrecks Act 1973* in the Solent and Approaches within approximately 6.5 km of the corridor (Figure 5.9.2). These consist of (UKHO wreck numbers in brackets):

- The Mary Rose (UKHO 19160), Henry VIII's flagship that sank in 1545. Whilst elements have been recovered from the site, including a large section of hull raised in 1982, the remainder of the wreck is a designated site within a 300 m protected area;
- HMS Invincible (UKHO 19370), a British Third Rate ship of the line that sank in 1758. The site is located less than 2 km to the south-west of the Proposed Development;
- HMS/m A1 (UKHO 20248), the first British designed and built submarine used by the Royal Navy that sank in 1911. The Statutory Instrument has defined a restricted area of 100 m around the wreck site; and
- HMS Hazardous (UKHO 20224), a British Third Rate ship of the line that ran aground and sank in 1706.

UKHO Recorded Wrecks

5.9.9 Within the UK element of the Proposed Development, the UKHO records eight wrecks or obstructions (Table 5.9.1). The locations of these records are presented in Figure 5.9.2 and a summary of these sites is presented below.

Table 5.9.1: Known marine archaeological assets

UKHO wreck category	Total
Dangerous wreck	5
Non-dangerous wreck	3
Total	**8**

5.9.10 The majority of the UKHO recorded wrecks are First World War casualties along with two unknown wrecks and one recent wreck from 1981. They comprise five steam ships, a barge, a trawler and a sailing vessel. Further details derived from their UKHO record and the published dive guide for Sussex are provided as follows:

- UKHO 20073 is the British steam ship Corbet Woodall sunk on 30 May 1917, weighing 917 gross tonnes. The vessel was mined whilst en route from South Shields to Poole. The remains of this vessel are classed as a dangerous wreck, now amended to 'dead';
- UKHO 20039 is classed as a dangerous wreck. Lowmount was a steam ship that sunk with masts visible after hitting a mine laid by UC-70 with the loss of five men on 7 May 1917;
- UKHO 20024 is classed as a dangerous wreck. The wreck is an unknown, well broken up steam ship with the bow facing west;

- UKHO 20019 is the non-dangerous wreck of the 2084-ton steam ship Brigitta, mined 4 December 1917;
- UKHO 20004 is classed as a dangerous wreck. The wreck is an unknown barge, approximately 60 m long that is intact, inverted and almost buried;
- UKHO 19982 is classed as a dangerous wreck. HMS Sapper was a hired First World War coaster or trawler, and believed to have been sunk by a mine or torpedo with the loss of all crew in December 1917 (McDonald 1999, 41);
- UKHO 19952 is a non-dangerous wreck, possibly the Vesuvio. This 1391-ton steam ship was lost in April 1916. The wreck lies on its port side and is broken in three places; and
- UKHO 20656 is the non-dangerous wreck, Tortona. The sailing vessel sunk after striking a submerged object in October 1981.

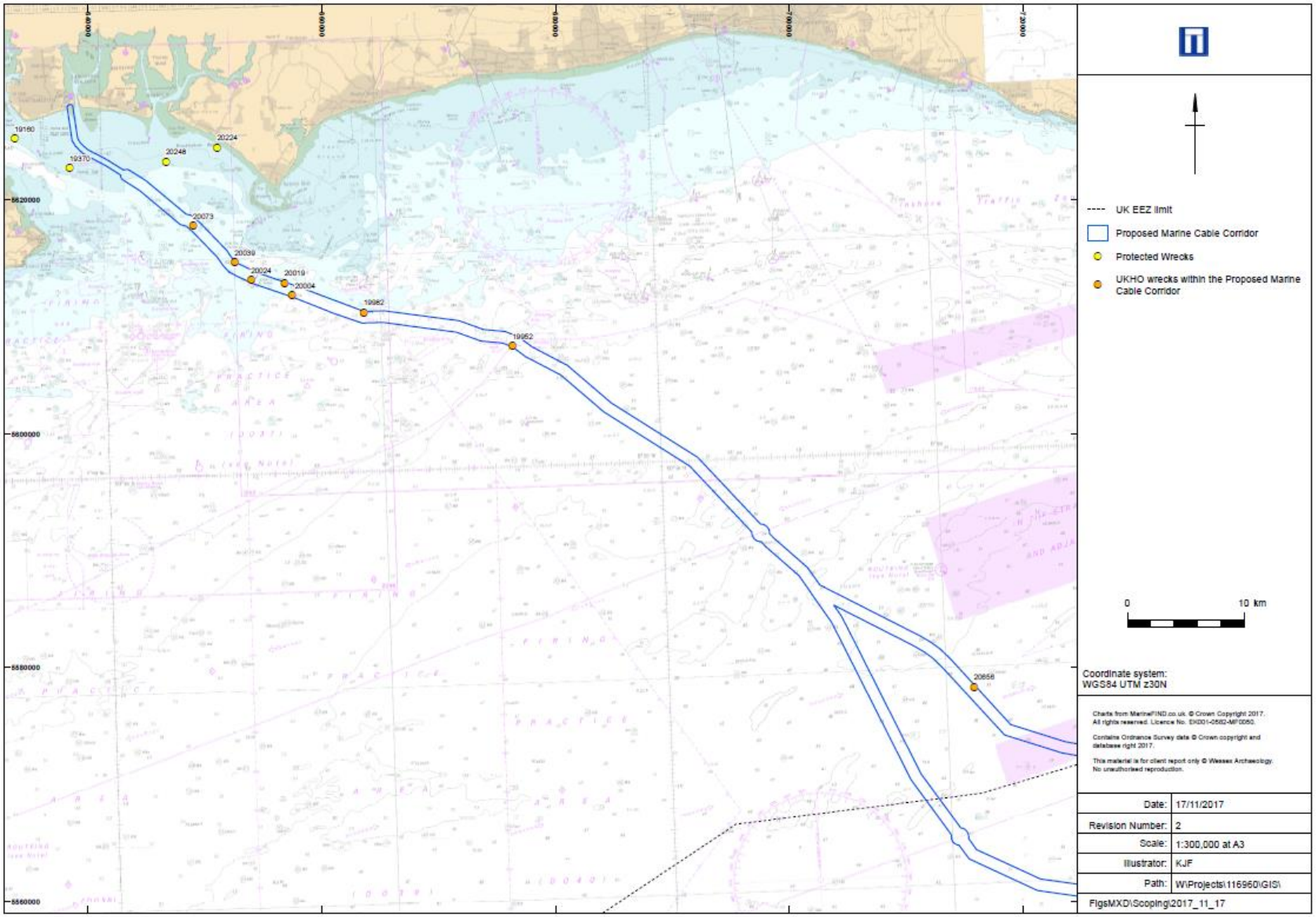

Figure 5.9.2 Protected wrecks and UKHO receptors within the proposed cable corridor

Potential Impacts and Mitigation

5.9.11 The potential impacts of the installation, operational and decommissioning phases of the Proposed Development on other maritime archaeology in UK waters may include:

- Installation (and decommissioning):
  - Potential damage or destruction to known assets; and
  - Potential damage or destruction to unknown assets.
- Operation
  - Potential damage or destruction to known assets; and
  - Potential damage or destruction to unknown assets.

5.9.12 Potential damage or destruction to known and unknown assets may occur through direct impacts and/or indirect impacts, which may occur during the installation, operation, maintenance and decommissioning phases of the project. Direct impacts include: seabed preparation; surveys and clearance of unexploded ordnance; cable burial and subsequent scour protection; and possible seabed contact by work vessels. Indirect impacts may be caused by sediment suspension and re-deposition, and scour associated with the direct impacts mentioned above.

5.9.13 Operational effects will be limited to those arising from repair or any monitoring that may be required.

5.9.14 Mitigation measures are necessary to reduce, remove or offset the impacts on heritage assets and should be presented in the form of a Written Scheme of Investigation document. In order to mitigate against impact to unknown resources, further analysis of all available data sources relating to the terrestrial, intertidal and marine archaeology for the area will be undertaken during the detailed desk-based assessment and associated EIA in accordance with best practice guidance[68]. Avoidance is considered the primary option with regards to mitigating impacts upon known heritage assets, which can be achieved through the implementation of Archaeological Exclusion Zones and/or through the micro-siting of the cable route to avoid vulnerable heritage assets. In addition, any geophysical, geotechnical, ROV, and dive investigations associated with the project can be subject to archaeological review. Another form of mitigation for reducing the impact on unknown marine heritage is the implementation of a protocol for reporting finds of archaeological interest, which aims to establish whether recovered material is of archaeological interest and will recommend appropriate mitigation where necessary.

5.9.15 In general, there is high potential for the presence of archaeological and cultural material that is currently uncharted or unrecorded, spanning from early prehistory to the present day. Material that could potentially be discovered could relate to prehistoric finds, sites or landscapes; maritime wreck sites and/or aviation crash sites along with associated debris; and marine installations.

[68] Chartered Institute for Archaeologists (2017). Standard and Guidance for Historic Environment Desk-based Assessment. Available online at http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf, accessed June 2017.

Scope of Assessment and Further Information

5.9.16 Further analysis of all available data sources relating to the terrestrial, intertidal and marine archaeology for the area will be undertaken during the detailed desk-based assessment and associated EIA in accordance with best practice guidance[69,70]. The data will be further reviewed alongside information generated by geophysical survey in order to further enhance and refine the Proposed Development's archaeology and cultural heritage baseline.

5.9.17 For geoarchaeological assets, an overview of existing core/geoarchaeological information available in the wider area will be undertaken and reported on within the ES. Subsequently, specialist archaeologists will input into the geotechnical survey campaign prior to mobilisation. All core logs from the geotechnical survey will be provided for assessment in accordance with best practice guidelines[71] and recommendations for further analysis will be made.

5.9.18 The overall baseline results of the detailed desk based assessment and the assessment of the potential impacts will be summarised in the cultural heritage chapter of the ES.

5.9.19 Results from the geophysical and geotechnical surveys will be incorporated into a full desk-based assessment, which will be undertaken using data from the UKHO and the NHLE[72] together with the following sources:

- National Record of the Historic Environment data maintained by Historic England, comprising data for terrestrial and marine archaeological sites, find spots and archaeological events;
- Local data from Portsmouth Environment Record and Hampshire Archaeology and Historic Buildings Record comprising a database of all recorded terrestrial and marine archaeological sites, find spots, historic buildings and landscapes, parks and gardens, and industrial monuments;
- Receiver of Wreck droit data;
- Second World War records for Air/Sea Rescue missions;
- The Historic Seascape Characterisation reports for Solent and Isle of Wight (2007) and Hastings to Purbeck and Adjacent Waters (2011);
- Records of Protected and Controlled Sites under the Protection of Military Remains Act held by the MoD;
- Historic England's intertidal and coastal peat database;

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[69] Chartered Institute for Archaeologists (2017). Standard and Guidance for Historic Environment Desk-based Assessment. Available online at http://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf, accessed June 2017.

[70] *Historic Environment Guidance for the Offshore Renewable Energy Sector* (Wessex Archaeology 2007). COWRIE 2007. https://www.thecrownestate.co.uk/media/5876/km-ex-pc-historic-012007-historic-environment-guidance-for-the-offshore-renewable-energy-sector.pdf

[71] Offshore geotechnical investigations and historic environment analysis: Guidance for the renewable energy sector (COWRIE, Jan 2012)

[72] Historic England's National Heritage List for England. Available at: https://www.historicengland.org.uk/listing/the-list/data-downloads/. Accessed June 2017.

- British Geological Society borehole records;
- Data generated from protocols for unexpected discoveries including the Offshore Renewables Protocol for Archaeological Discoveries (ORPAD), and the Marine Aggregate Industry (MAI) Protocol for Reporting Finds of Archaeological Interest;
- Find spots, sites and monuments recorded by CITiZAN, Portable Antiquities Scheme, Marine Antiquities Scheme and the South East Rapid Coastal Zone Assessment Survey (2013);
- Relevant mapping including Admiralty Charts, historic maps and Ordnance Survey; and
- Relevant documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeological Data Service and other websites.

5.10 Human Environment (Landscape and Seascape)

5.10.1 Effects beyond the MHWS will be limited to the installation of the Proposed Development where the use of heavy plant and installation vessels may be visible to shore based receptors. There may also be some visible ground disruption in the intertidal area.

5.10.2 These visual effects will be of a short duration through the installation phase with short term effects on the intertidal area.

5.10.3 These effects will be assessed as part of the landscape and visual impact assessment in the terrestrial onshore ES, and cross-referenced within the offshore ES.

5.11 Cumulative Assessment

5.11.1 There is foreseeable potential for the extent or magnitude of any effects identified for the Proposed Development alone to be cumulatively increased by the simultaneous presence of other existing or proposed activities or developments. It is expected that the assessments described in Sections 5.1-5.10 will focus on interactions with the activities outlined in Section 4.9, amongst others (agreed with the MMO and relevant stakeholders) occurring within UK waters and the French EEZ, and occurring in the vicinity of the Eastney landfall site (for benthic and ornithology intertidal assessments). Collation of existing environmental information for adjacent developments will be undertaken and utilised in addition to site specific information within the individual receptor specific assessments..

6 Way Forward

6.1 Introduction

6.1.1 This scoping report identifies what is currently known and understood by the Applicant's Project Team with respect to the Proposed Development through UK waters. Where receptor specialists consider that additional knowledge of the baseline conditions is required to inform a robust environmental impact assessment process, the scoping report outlines what studies, surveys and consultations are proposed to extend the team's knowledge. The team of specialists will then take the outcomes of this data gathering exercise, apply the assessment methodologies described in each section, and undertake a receptor specific environmental impact assessment on the potential effects predicted to arise from the Proposed Development.

6.1.2 Should unacceptable significant impacts be identified, mitigation measures will be sought and incorporated into the design of the Proposed Development where appropriate and practicable. The ES will then be compiled in order to be submitted as supporting information to the Marine Licence application for the Proposed Development.

6.2 Summary

6.2.1 Table 6.2.1 presents a summary of the potential environmental effects arising from the Proposed Development that have been identified to date, and proposes the further work that will be carried out to establish the magnitude of the impacts and significance of effects to be assigned.

6.2.2 Consultations with relevant authorities, organisations and stakeholders will be undertaken throughout the assessment and project design process, and this has already started as part of the cable routing process.

Table 6.2.1: Potential impacts and proposed further work

Topic	Potential impacts	Surveys and investigations
Physical environment	Physical disturbance to shallow geology and seabed sediments Impacts to local sediment regimes and coastal processes	Detailed desk-based assessment Analysis of data collected from geophysical, geotechnical and benthic surveys Cable Burial Risk Assessment
Benthic ecology	Installation (and decommissioning): - Seabed disturbance; - Deposition of sediment (smothering); - Temporary increase in suspended sediment concentrations; - Resuspension of contaminated sediment; - Introduction of invasive non-native species (INNS); Operation - Habitat loss; - Electro-magnetic field (EMF) emissions from HVDC cable; - Disturbance due to O&M activity	Benthic and intertidal surveys Desk-based assessments

Topic	Potential impacts	Surveys and investigations
Fish and shellfish	Installation (and decommissioning): - Temporary habitat disturbance; - Major works near a river mouth; - Temporary increase in suspended sediments; and - Noise and vibration. Operation: - Electro-magnetic field effects.	Desk-based assessments
Ornithology	Disturbance and displacement from installation and support vessels	Desk-based assessments
	Indirect effects as a consequence of prey disturbance and/or habitat loss	
	Exposure to surface hydrocarbons or chemicals due to accidental spills	
	Disturbance to species (within or outwith protected areas) that are key to the designation of protected areas.	
Marine Mammals	Increased anthropogenic noise from geophysical survey and positioning equipment which emits sound. UXO removal (if in situ detonations are required).	Desk-based assessments
Commercial fisheries	Installation and operation (and decommissioning): Temporary loss or restricted access to established fishing grounds; Temporary displacement of fishing activity into other areas; Interference to normal fishing activities; Safety issues for fishing vessels; Temporary increases in steaming times; and Obstacles on the seabed after installation.	Desk-based assessments and consultation with fishermen's groups to determine baseline.

Topic	Potential impacts	Surveys and investigations
Shipping and Navigation	Potential risk of collision of installation vessels with those vessels travelling existing routes Temporary diversion of vessels during installation works and any maintenance works Displacement of fishing activity and gear snagging Reduction in under keel clearance Risk of interaction with vessel anchors and displacement of anchoring activity	Desk-based NRA
Other Marine Users	Displacement of third party marine activities Conflicts with other marine users during the installation phase and during any maintenance periods	Desk-based assessments
Archaeology and cultural heritage	Damage to known and unknown archaeological resources.	Desk-based assessment of existing records (including offshore geophysical survey and geotechnical survey data)
Landscape and seascape	Temporary (installation activities) impacts on visual amenity and sea/landscape character	Desk-based assessments
Cumulative effects	Additive and interactive effects of the Proposed Development with other proposed and in-construction projects.	Desk-based assessments

APPENDIX 1 – Proposed Structure of the Environmental Statement

The structure proposed for the ES is in line with Schedule 3 of the *EIA Regulations* and other relevant good practice guidance. Essentially, the ES will comprise three volumes:

Volume 1: Environmental Statement

1 Introduction

2 Policy and Legislative Framework

3 Scope and Methodology

4 The Proposed Development

- 4.1 Route Selection and Alternatives
- 4.2 Description of the Proposed Development

5 Physical Environment

6 Intertidal and Benthic Ecology

7 Fish and Shellfish

8 Marine Mammals

9 Intertidal and Offshore Ornithology

10 Shipping and Navigation

11 Commercial Fisheries

12 Marine Archaeology

13 Other Marine Users

14 Summary and Environmental Management

Volume 2: Technical Appendices

Volume 3: Non-Technical Summary (NTS)