Kincardine Offshore Windfarm
Environmental Scoping Assessment

April 2014

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Plan Design Enable

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List of abbreviations

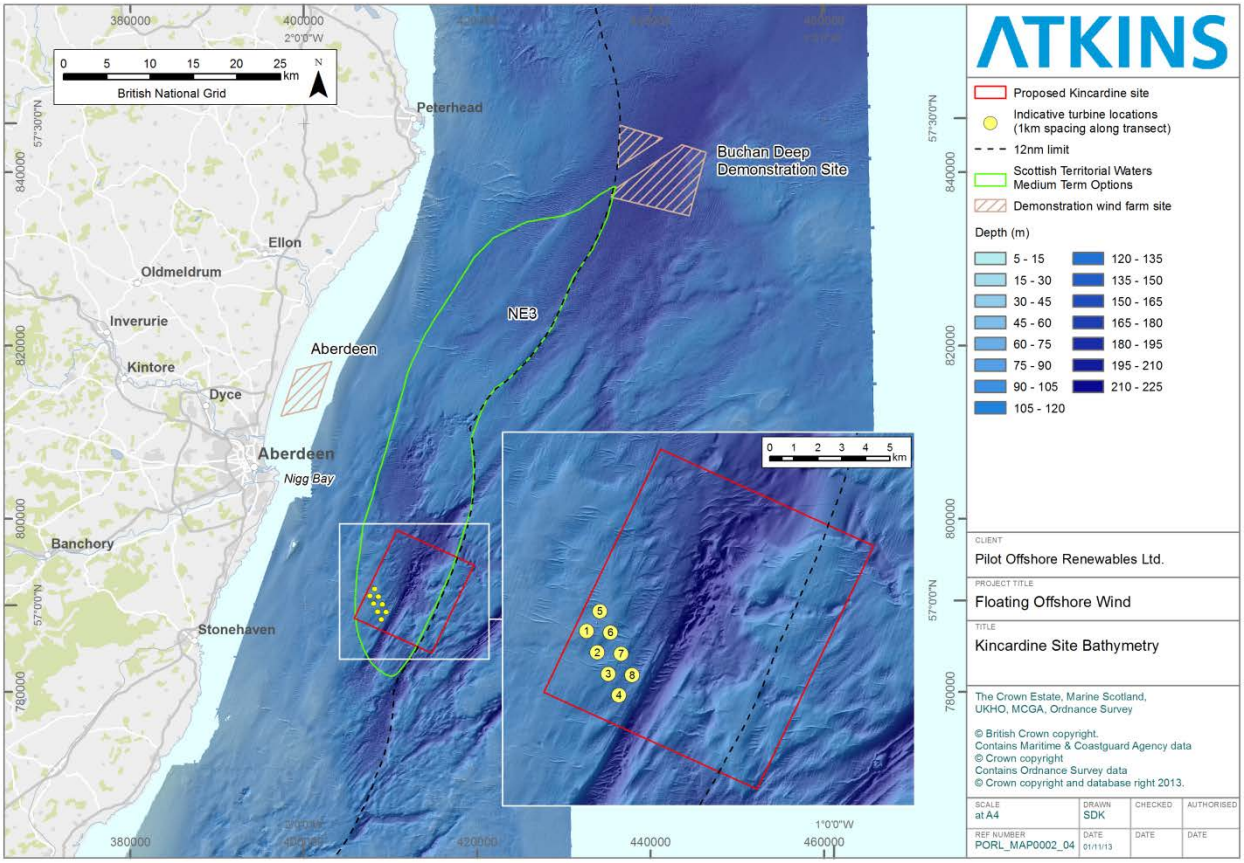
AfL	Agreement for Lease
AIA	Aberdeen International Airport
AIS	Automatic Identification System
BACI	Before-After-Control-Impact
BAG	Before-After-Gradient
BGS	British Geographical Survey
CAA	Civil Aviation Authority
CAR	Controlled Activity Regulations
CDM	Construction, Design and Management
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
COWRIE	Collaborative Offshore Wind Research Into the Environment
DNV	Det Norske Veritas
EC	European Commission
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EMR	Electromagnetic radiation
EPS	European Protected Species
ES	Environmental Statement
EOWDC	European Offshore Wind Deployment Centre (Aberdeen Bay)
FEED	Front end engineering design
FEPA	Food and Environmental Protection Act (1985)
GIS	Geographic Information System
ICES	International Council for the Exploration of the Seas
IPF	Initial Plan Framework
MESH	Mapping European Seabed Habitats
ML	Marine Licence
MS	Marine Scotland
MS-LOT	Marine Scotland Licensing Operations Team
MW	Megawatts
GW	Gigawatts
HRA	Habitats Regulations Appraisal
HSE	Health and Safety Executive
IBA	Important Bird Area
JNCC	Joint Nature Conservation Committee
KOWL	Kincardine Offshore Windfarm Ltd
MCA	Maritime and Coastguard Agency
MOD	Ministry of Defence
MPA	Marine Protection Area (Scotland)

MSFD	Marine Strategy Framework Directive
MS-LOT	Marine Scotland - Licensing Operation Team
NaREC	National Renewable Energy Centre
NATS	National Air Traffic Services
NLB	Northern Lighthouse Board
Nm	Nautical Miles
NPF	(Scottish) National Planning Framework
NSA	National Scenic Area
O&M	Operations and Maintenance
OMR	Offshore Marine Regulations
PEXA	Practice and Exercise Areas (Military)
PORL	Pilot Offshore Renewables Ltd.
PQQ	Pre-qualification questionnaire
RLG	Regional Locational Guidance
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
S36	Section 36 of the Electricity Act (1989)
SAC	Special Area of Conservation
SCADA	Supervisory Control and Data Acquisition
SCANS	Small cetacean abundance in the North Sea
SCI	Sites of Community Interest
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SFF	Scottish Fishing Federation
SHETL	Scottish Hydro Electric Transmission Ltd.
SMRU	Sea Mammal Research Unit
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy
SSSI	Site of Special Scientific Interest
TCE	The Crown Estate
UKHO	United Kingdom Hydrographic Office
VMS	Vessel Monitoring System
WANE	Wildlife and Natural Environment Act (Scotland) 2011
WFD	Water Framework Directive
WTG	Wind turbine generator
ZTV	Zone of theoretical visibility

Executive Summary

Kincardine Offshore Windfarm Limited (KOWL) is a proposed demonstrator floating offshore wind farm development that is located to the south east of Aberdeen, approximately eight miles from the Scottish coastline. The development is considered a commercial demonstrator site, which will utilise floating semi-submersible technology to install approximately eight wind turbine generators (WTG) in approximately 60 to 80 m of water.

Figure 0-1 KOWL Site location



KOWL are currently working with PILOT and Atkins Ltd to develop a 6MW or larger systems that will produce an installed capacity of up to 50 MW, with grid connection to Redmoss substation located to the south of Aberdeen. To connect the turbines to the substation there will be a requirement to install inter-array cables (linking the turbines together on the sea bed) and a main export cable from the site to the onshore substation. The export cable will be buried from the site to the near shore area and then, subject to necessary approval, via directionally drilled conduit to land. The location of the onshore landing point will be confirmed following confirmation from the local planning authority and the grid operators. The onshore cable route is not expected to exceed two kilometres and will be dependent on local planning authorities/land owner approval.

KOWL will submit a formal Section 36 (Electricity Act 1989) and accompanying Environmental Statement application to Scottish Government, through Marine Scotland Licensing Operation Team (MS-LOT) and the local planning authority for onshore works consent. The development will also require a licence under Section 21 of the Marine (Scotland) Act 2010 (Marine Licence), from MS-LOT. This report forms the written request required under Regulation 7 of the Electricity Works (Environment Impact Assessment) (Scotland) Regulations 2000 as part of the Environmental Impact Assessment (EIA) process and the production of an Environmental Statement.

This purpose of this report is to outline all of the environmental baseline information for the development area and to assess the potential environmental impacts that the development could have upon the development area (including offshore and onshore cable route).

At present the final array layout and design of the floating offshore development is not complete, however an outline plan of the construction and operational layout is provided within the scoping document (with eight turbine locations noted). Final design and layout will be determined following the completion of Front End Engineering and onsite investigations for development of the floating offshore demonstrator system.

As part of the new Marine Licensing (Pre-application Consultation) (Scotland) Regulation 2013, a pre-application consultation will be undertaken and submitted as part of the formal application process as outlined in the Marine (Scotland) Act 2010.

1. Introduction

1.1. Pilot Offshore Renewables Ltd.

Pilot Offshore Renewables Ltd. (PORL) is an Aberdeen-based joint venture between MacAskill Associates Limited and Renewable Energy Ventures (Offshore) Limited. Both are Scottish companies with extensive experience in the wind industry. The principals of each company, Allan MacAskill and Nicol Stephen, have made a significant contribution to the development of the offshore wind industry in Scotland through the Beatrice demonstrator project (the world's first deep water wind farm development), SeaEnergy Renewables, the Offshore Renewables Institute and other activities.

1.2. Atkins

Atkins is the 4th largest multidisciplinary consultancy in the world and the largest multidisciplinary consultancy in Europe with 18,000 employees and a turnover of £1.5 billion. Atkins has more than 200 permanent offices worldwide. As the UK's largest engineering consultancy Atkins has technical excellence at its core. Atkins is at the forefront of the offshore renewables revolution, providing robust concept and detailed engineering design and owner's engineer services in the wind, wave and tidal energy sectors. Atkins' extensive global experience and project track record in renewables and dealing with the challenges of pioneering energy, engineering and environment make it the first choice for new floating offshore wind developments.

1.3. The Kincardine Offshore Windfarm Project

The Kincardine Offshore Windfarm Project will be developed by a new company to be formed by PORL and this will be called Kincardine Offshore Windfarm Ltd (KOWL). The project aims to develop a pilot-scale offshore wind farm utilising floating foundation technology, which will demonstrate the technological and commercial feasibility of floating offshore wind. This will be the world's first array of floating wind turbines, and will establish a leading position for Scotland in the development and deployment of this novel technology. Floating foundations open the possibility for future offshore wind farms to be located further from shore in deeper waters, minimising visual impacts whilst accessing hitherto untapped wind resources. Floating structures also offer benefits over conventional fixed foundations in terms of reduced construction and installation costs, as extensive piling operations are not required. This also minimises potential noise impacts upon sea mammals during construction and installation.

The project site is located to the south-east of Aberdeen, and is approximately 15 km (8 nm) from the Kincardineshire coast at its closest point. The water depths at the site range from 45 to 143 m, which are beyond the technical scope of current fixed foundation technologies. However, these water depths are suitable for installing a range of different floating foundation technologies. Additionally, the site is positioned in an area with significant wind resources, and can be readily accessed from harbour facilities at Aberdeen or Dundee. Further details on the project site can be found in Section 2.

Whilst it is hoped that the Kincardine Offshore Windfarm Project will achieve an award of seabed rights from The Crown Estate, it has not done so to date and the project as described in this scoping report is entirely subject to award, or not, of rights by the Crown Estate within that process. It is confirmed that this scoping report in no way indicates that the Kincardine Offshore Wind Farm Project will be successful in being awarded seabed rights and this scoping report forms no part of The Crown Estate's leasing round process. Further it is confirmed that this scoping report is in no way connected or ancillary to the detailed stakeholder, consenting and Habitats Regulation work that Kincardine Offshore Windfarm understands has been undertaken by The Crown Estate in connection with its leasing round. This scoping report has been independently prepared by the Atkins Limited for Kincardine Offshore Windfarm, and does not reflect the views or intentions of The Crown Estate or any other party. Any references in this report to general terms of seabed rights or timetable in relation thereto are indicative only and do not represent any confirmation of commercial terms as between The Crown Estate and Kincardine Offshore Windfarm.

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1.4. Renewable Obligation (Scotland)

As part of the Scotland's renewables obligation legislation recent consultations (December 2012 to June 2013) have been undertaken to support innovative offshore wind generation in Scotland. This obligation is focused on two separate schemes. Firstly to support of offshore test and demonstration sites deploying innovative new to market turbines into the Scottish sector, and secondly to support pilot projects consisting of non-fixed generation e.g. floating turbines or those using "tension line" deployment systems.

This project is focused at achieving the second of the Scottish Governments renewable obligation targets and will utilise 3.5 renewable offshore credits (ROCs) to allow commercial floating offshore wind demonstrator projects to be built in the Scottish territorial waters where water depths exceed 60m and are unsuitable for current fixed turbine construction methodologies. The Scottish Government have placed an overall capacity ceiling of 75 MW on this scheme, but could undertake a review of bands inline with relevant legislative provisions if additional capacity is consented.

To meet the Scottish Government's target, the project must secure preliminary accreditation before April 1st 2017, for the initial installed capacity, and subsequent full accreditation and registration of all turbines with Ofgem by the end of September 2018.

Therefore timing is an extremely important principal for this project, given the complexities and challenges involved in the development of offshore projects. The Scottish Government has recognised this and has decided to take a more flexible approach to accreditation in light of these factors.

1.5. The Crown Estate

The Crown Estate is responsible for managing property and assets owned by The Crown (but not the private property of the monarch), including the seabed in territorial waters from the mean low water mark to the 12 nautical mile limit. The Crown Estate awards leases to developers of offshore wind developments in the UK, and has held five separate rounds of lease awards since 2000. These leasing rounds have increased in size and complexity, and have included rounds in Scottish Territorial Waters and for test and demonstration sites. As a result of developments facilitated by The Crown Estate's leasing rounds, the UK has achieved a world-leading position in terms of its installed offshore wind capacity and development portfolio.

There are currently five Scottish Territorial Waters sites that have been granted exclusivity for offshore wind projects with a potential capacity of 4.76 GW (Beatrice, Argyll, Inch Cape, Neart na Gaoithe and Islay), whilst the Round 3 sites around the UK could deliver a total capacity of up to 33 GW. The Round 3 sites are larger in scale and tend to be further offshore than developments from previous rounds; however this increase in scale and complexity has presented a number of technological, logistical and financial challenges. A gap analysis conducted in 2011[1] by GL Garrad Hassan on behalf of The Crown Estate identified a significant gap between supply and demand for test and demonstration sites of new wind turbine products that could lead to delays or even cancellation of a significant proportion of these products. Furthermore, the Offshore Wind Cost Reduction Pathways study[2], published by The Crown Estate in 2012, identified a clear need for additional test and demonstration sites in order to showcase new technologies, increase market confidence and investment, and drive cost reduction.

Current operational test and demonstration sites include the Beatrice Demo (10 MW), Gunfleet Sands (12 MW) and Blyth (4 MW). There are plans for up to 100 MW additional capacity at the NaREC demonstration site at Blyth, and the EOWDC test site in Aberdeen Bay was recently awarded consent for a development of 11 turbines. An additional test site for two turbines at Methil in Fife is also in development. In parallel, an onshore facility for testing offshore wind turbines is currently under construction at Hunterston in Ayrshire, with an initial capacity of 3 testing berths. However, of the current offshore test facilities, Gunfleet Sands, Blyth, Methil and the EOWDC are in water depths of less than 20 m, with the operational Beatrice demo situated in 45 m and the proposed NaREC facility being in 35-58 m. More recently the Hywind Project in Buchan Deep, proposed by Statoil using floating spar technology, has received an Agreement for Lease from the Crown Estate for a 30MW development.

[1] The Crown Estate (2011) *Gap Analysis of Test and Demonstration Facilities for Offshore Wind Technology*
[2] The Crown Estate (2012) *Offshore Wind Cost Reduction Pathways Study*

To supplement the existing test and demonstration leasing round, in June 2013 The Crown Estate announced a new leasing round for test and demonstration of emerging offshore wind technologies, including floating turbines[3]. The new leasing round aims to help demonstrate the commercial viability and technological feasibility of floating offshore wind. Eligible projects will include arrays of up to 15 turbines utilising floating foundations and producing up to 100 MW; it is intended that the Kincardine Offshore Windfarm project will meet these criteria and the current development consortium will apply for an exclusive lease for the site from The Crown Estate under the new leasing round process.

At present the Kincardine Offshore site is in the process of seeking an Agreement for Lease under this demonstration round from the Crown Estate. This environmental scoping report has been undertaken in parallel with the Crown Estate process to meet the Scottish Government's floating offshore renewable demonstrator timelines to qualify for enhanced ROC accreditation for non-fixed turbines.

1.6. The Purpose and Objectives of this Scoping Report

This Scoping Report has been produced at an early stage of the project development, and constitutes the request for a scoping opinion on the studies and methodologies required to obtain consent under Section 20 (1) of the Marine Scotland Act (2010) Scotland and Section 36 (Electricity Act) for the development of the demonstrator Kincardine Offshore Windfarm. The report aims to introduce the Kincardine Offshore Windfarm project and is intended to seek views of stakeholders and others on the objectives and potential outcomes of the project. The report also aims to demonstrate the main approaches to assessing any potential environmental impacts which might occur as a result of the construction, operation and eventual decommissioning of the Kincardine Offshore Windfarm. At this early stage, some of the detailed data gathering and analysis methodologies are still to be agreed with licensing agencies including SNH and Marine Scotland; however the development consortium has engaged with these agencies to ensure that best practice guidelines are implemented during the EIA process, whilst remaining mindful of the scale of the development.

The report will identify the main considerations that will be addressed during the EIA and aims to outline a structure for consultation on the approach to the EIA and the content of the Environmental Statement that will be produced to accompany the planning application. The report provides details of the key issues anticipated and outlines methodologies for the various technical assessments; however, it is acknowledged that the scope of the EIA may change as the project progresses and more information is accumulated and analysed. The development consortium will continue to review the EIA process in consultation with the key licensing agencies in the light of new information either gathered by the consortium or submitted by stakeholders.

1.7. Indicative Project Timeline for Project Progression

The aim of the project developers is to design, engineer, consent, procure and install an offshore floating project in less than five years (whereas the normal timeframe would be 6 to 8 years). To speed up the process and meet this challenging timeframe, the project developers intend to apply for consent based on one year's on-site bird and marine mammal data (rather than two) and the activities of consenting, engineering and procurement undertaken in parallel. The Scottish Government's "Survey, Deploy and Monitor" licensing policy for wave and tidal energy projects[4] is currently being extended to include offshore wind, and the basis of this policy is to provide guidance for developers of projects for which there are sufficient grounds to seek consent based on a minimum of 1 year's wildlife survey efforts.

The methods for seabird and sea mammal aerial surveys have been discussed with Marine Scotland; indeed the survey transect plan was amended after the first survey to incorporate two additional short transects in the "high interest area", following comments from Marine Scotland in May 2013. The protocols and approach have also been discussed with SNH during a meeting on 31st July 2013, and subsequent meetings with Marine Scotland on 5th November 2013 and 7th February 2014.

An interim report on the aerial bird and sea mammal surveys at the Kincardine site between April and November 2013 will be prepared and submitted to Marine Scotland and SNH in April 2014, in order to inform the decision on any requirements for additional data collection pre-consent application and pre-installation.

[3] The Crown Estate (2013) http://www.thecrownestate.co.uk/news-media/news/2013/leasing-round-announced-to-accelerate-testing-of-emerging-offshore-wind-technologies-including-floating/
4 http://www.scotland.gov.uk/Topics/marine/Licensing/marine/Applications/SDM

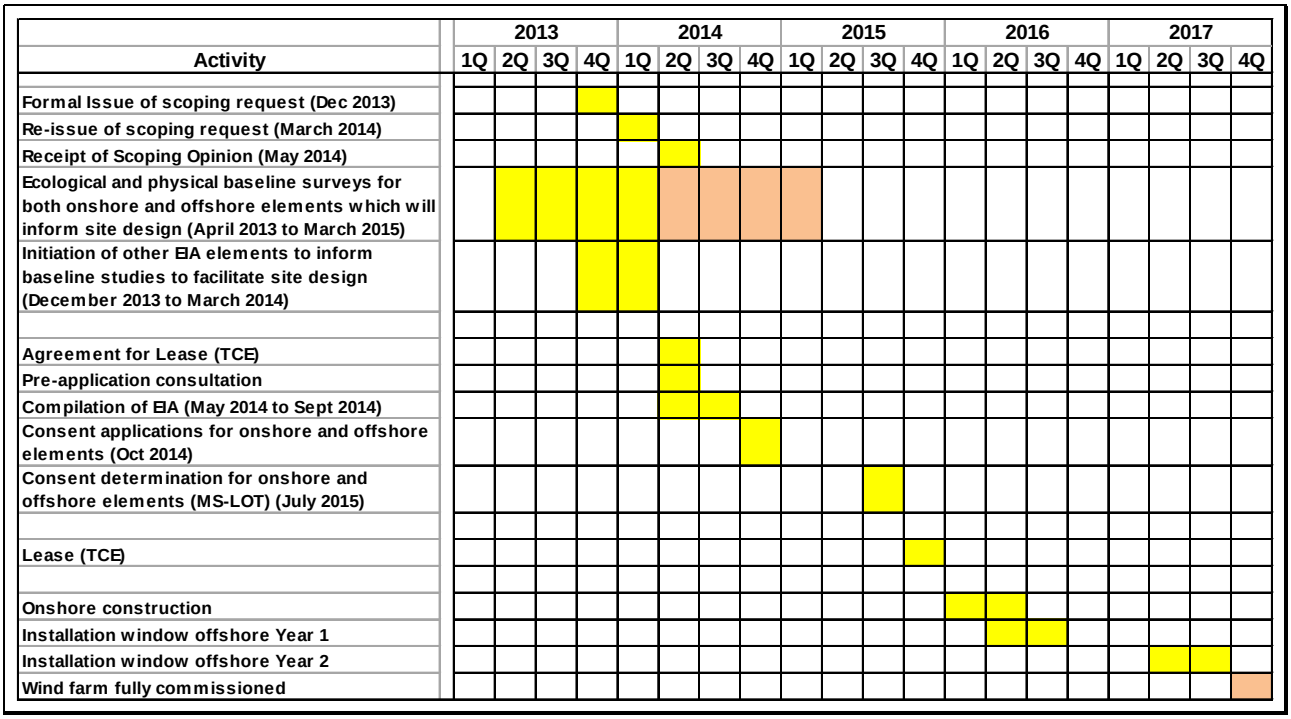
The Environmental Statement for the Kincardine project will provide analysis of data collected at the site since April 2013, in addition to contextual information from other data sources such as the European Seabirds at Sea project (courtesy of JNCC boat-based surveys) and the Joint Cetacean Database.

However, the project developers' approach is to focus upon data gathering at critical times in consultation with key experts to optimise data gathering and analysis. The developers are committed to an extended monitoring programme past consent application which is in line with our vision of maximising learning from this demonstration project. It is anticipated that consent and financial approval will occur simultaneously in 2015, with installation due for completion in 2017. The intended timeline for the progression of the Kincardine Offshore Windfarm is summarised in Figure 1-1 below.

On the 12th June 2013 the Crown Estate announced a new leasing programme for offshore wind test and demonstration projects, including a leasing round for floating offshore wind technology. The project developers have engaged with the leasing round process and have tendered for an Agreement for Lease (AfL) with the Crown Estate for the Kincardine Offshore Windfarm site. In the event of a successful award, the AfL will allow the project developers to secure limited development rights over the site and also an option (subject to fulfilment of all conditions, including obtaining the necessary consents) to call for the granting of a full lease. The full lease will allow the siting and construction/installation of offshore wind turbines of agreed specification within the agreed boundaries of the Kincardine Offshore Windfarm site. Indicative dates provided by the Crown Estate are for the award of rights during April 2014. Provided an AfL is granted, the project developers will then have three years in which to call for the grant of a full lease, anticipated to be in March 2016, prior to the start of construction/installation of the wind farm.

At the end of the lease period decommissioning will take place, which will include the full removal of all infrastructure installed by the Project and restoration of the seabed by the expiry of the term of the Lease.

Figure 1-1 Indicative timelines for progression of Kincardine Offshore Windfarm



1.8. Policy and Regulatory Background

The Scottish Government's 2020 Routemap for Renewable Energy in Scotland[5] has set a challenging target for Scotland of meeting an equivalent of 100% demand for electricity from renewable energy by 2020 and at least 30% overall energy from renewables, also by 2020. Building on the original Renewables Action Plan[6] ,

[5] Scottish Government (2011). 2020 Routemap for Renewable Energy in Scotland
[6] Scottish Government (2009)a. Renewables Action Plan

the Routemap recognises the importance of offshore wind in helping to achieve these targets and to make a significant contribution to the Scottish economy through the manufacturing and supply chain, job creation and training opportunities.

Under the Crown Estate's Scottish Territorial Waters (up to 12 nm from shore) offshore wind programme, agreements for lease for five sites (totalling 4.76 GW of capacity) have been awarded[7]. As part of the UK's Round 3 offshore wind programme, a further two sites have been awarded leases in Scottish waters beyond 12 nm for another 4.8 GW. The Scottish Government's Sectoral Marine Plan[8] has also identified a further 25 areas for further exploration in Scottish Territorial Waters. These have been classed as medium term sites suitable for further development before 2030. Although the Scottish Government would not expect to see these sites developed before 2020, it is possible that some of them could prove suitable for advancement in the short term. The proposed Kincardine Offshore Windfarm site falls within one of these areas known as NE3.

The Scottish Planning Policy (SPP)[9] is a statement of Scottish Government policy on nationally important land use. Published in February, 2010 it consolidated a series of topic specific policy statements into a single and more consistent statement. The SPP is a statement of Scottish Government policy on land use planning including concise subject planning policies (for example, renewable energy) and setting out the Scottish Government's 'expectations of the intended outcomes of the planning system'[10].

The Renewable Energy subject policy is covered under paragraphs 182 to 195, outlining the Scottish Government's commitment to renewable energy generation, encouraging planning authorities to support a diverse range of renewable energy projects. Although the planning system does not regulate offshore development, paragraph 192 states that '*it is essential that development plans take into account the infrastructure and grid connection needs of the off-shore renewable energy industry' identifying 'appropriate locations for facilities linked to the manufacture, installation, operation and maintenance of off-shore wind farms and wave and tidal devices*'[11].

The SPP is currently being reviewed with a draft SPP published for consultation (ending July 23rd, 2013). The draft SPP[12] continues the Scottish Government's support for renewable energy, setting out the Scottish Government's low carbon economy national objectives and targets, linking to the 2020 Routemap (paragraph 208) and providing for offshore energy projects within development plans (paragraph 77).

The second Scottish National Planning Framework (NPF2) was published in June 2009[13]. It sets the spatial strategy for Scotland's development to 2030 and designates 14 national developments of strategic importance to Scotland. A main element of the strategy is to 'realise the potential of Scotland's renewable energy resources and facilitate the generation of power and heat from all clean, low carbon sources'[14]. NPF2 recognises the contribution that offshore wind will make towards meeting the Scottish Government's renewable energy targets and that parts of the existing electricity grid will need to be strengthened with a priority for those areas identified for renewable energy development.

The Scottish Government is currently consulting on National Planning Framework 3 (NPF3) in conjunction with the SPP review. The consultation period ended on July 23rd 2013. The NPF3 main issues report[15] emphasises the Scottish Government's desire for Scotland to be a '*world leader in offshore renewable energy*'[16]. To do this it is suggested that NPF3 should complement marine planning by identifying and supporting the onshore electricity grid infrastructure required to realise offshore energy opportunities and;

[7] The Crown Estate Scottish Territorial Waters http://www.thecrownestate.co.uk/energy-infrastructure/offshore-wind-energy/our-portfolio/scottish-territorial-waters/
[8] Scottish Government (2011). Blues seas – green energy: A sectoral marine plan for offshore wind energy in Scottish Territorial Waters
[9] Scottish Government (2010). A statement of the Scottish Government's policy on nationally important land use planning matters
[10] Scottish Government (2010). A statement of the Scottish Government's policy on nationally important land use planning matters: 1
[11] Scottish Government (2010). A statement of the Scottish Government's policy on nationally important land use planning matters: 39
[12] Scottish Government (2013). Scottish Planning Policy – consultation draft
[13] Scottish Government (2009). National Planning Framework for Scotland 2
[14] Scottish Government (2009b). National Planning Framework for Scotland 2:18
[15] Scottish Government (2013a). Ambition, Opportunity, Place – Scotland's Third National Planning Framework main issues report and draft framework
[16] Scottish Government (2013b). Ambition, Opportunity, Place – Scotland's Third National Planning Framework main issues report and draft framework: 15

support investment in and development of ports and Enterprise Areas to facilitate offshore renewable energy construction and servicing activities.

NPF3 will focus on areas where major change is happening or anticipated. Area 3, Aberdeen and the North East has been recognised for its importance as an energy hub, prioritising key developments including Aberdeen Harbour, Peterhead as a port and generally as a hub for clean energy technology and national and international electricity transmission infrastructure. A key issue is to utilise the area's strengths to facilitate the transition to a low carbon economy.

NPF2 and NPF3 also refer to the Energetica project, a collaboration between public and private organisations to '*create an exemplar low carbon, sustainable development corridor [between Bridge of Don in Aberdeen and Peterhead] that will attract energy organisations and individuals to a natural and built coastal environment*'[17].

The Marine (Scotland) Act came into force on 10th March 2010 and provides a framework for balancing the competing demands on Scotland's seas. It introduces a duty to protect and enhance the marine environment as well as measures to support investment and growth in areas such as marine renewables.

This provides a simpler and more streamlined approach to handling marine/offshore energy development applications by running Section 36 of the Electricity Act 1989 (s.36) and Marine Licence (ML) applications simultaneously[18]. The Kincardine Offshore Windfarm project developers will work closely with Marine Scotland and its statutory and non-statutory advisors and other stakeholders to ensure that the responses to this scoping process are taken into account and used within an agreed timescale.

The Marine (Scotland) Act has also provided a framework for the Scottish Government to consult on and implement a marine spatial planning process. This is being implemented through the preparation and adoption of a National Marine Plan followed by regional marine plans with the aim of managing competing demands of use of the sea while protecting the marine environment[19]. The consultation on the National Marine Plan is currently in progress and will continue to run in parallel with the application and consenting process for this offshore wind farm, with final adoption anticipated by the end of 2014. The sectoral marine plan for offshore wind[8] will be integrated into and inform the National Marine Plan and licences issued for marine developments will be in accordance with the marine plans.

1.9. Consenting and Licensing

1.9.1. Electricity Act 1989

Under Section 36 of the Electricity Act 1989, consent is required by Scottish Ministers for the construction, extension and operation of an offshore wind farm development with a generating capacity greater than 1 MW. This Act is applicable for all offshore energy developments within the Scottish territorial waters (12 nautical miles (NM)). On granting consent of the Section 36, Scottish Ministers can also decided whether the application is suitable for planning permission and they can grant planning consent directly.

The capacity of the KOWL project is expected to have a maximum capacity of 48 MW and therefore the site will required consent under Section 36 of the Electricity Act.

The statutory consultees are:

- Aberdeen City Council;
- Aberdeenshire Council;
- SNH (within 12 nm); and
- SEPA

[17] Energetica About Energetica http://www.energetica.uk.com/about/?about
[18] Scottish Government (2012). Marine Scotland licensing and consents manual
[19] Scottish Government (2011a). Scotland's National Marine Plan – pre-consultation draft

1.9.2. Marine (Scotland) Act 2010

Under the Marine (Scotland) Act 2010, Marine Scotland has administrative responsibility for a range of statutory controls in the waters adjacent to Scotland for which responsibility lies with the Scottish Government; these include consents, licensing, planning, policy and enforcement. In April 2011, Marine Scotland initiated a one-stop-shop for offshore wind, wave and tidal developers to obtain consents and licences for marine renewable developments in Scottish waters, overseen by Marine Scotland's Licensing Operations Team (MS-LOT).

1.9.3. Town and Country Planning (Scotland) Act 1997

All onshore components of the wind farm development will require planning permission under the Town and Country Planning (Scotland) Act 1997. This will include the cable route from the shoreline to the substation and all associated works incorporated within such operations. A request to the local authority will be made under section 57 of this Act which will cover the onshore elements of this development.

1.9.4. European Protected Species (EPS)

It is an offence under the Conservation (Natural Habitats, & c.) Reg 1994, as amended by The Conservation (Natural Habitats, & c.) Amendment (Scotland) Reg 2007 to disturb or recklessly capture or kill European protected species (EPS), including all cetaceans. A licence to disturb/damage EPS can be obtained from the Scottish Government, however as part of this licence application a clear monitoring strategy must be outlined to monitor the incidental capture or killing of EPS, as well as undertaking appropriate research or conservation measures necessary to ensuring the incidental capture or killing does not have a significant negative impact on EPS considered.

1.9.5. Habitats Appropriate Assessment (Stage 1)

As part of the Crown Estate lease agreement, there is a requirement for them to undertake an Appropriate Assessment (AA) of the KOWL site. This information will be incorporated into the KOWL site, but it is recognised that this is assessment is not specific to the site. Consequently, a site specific AA will be undertaken by MS-LOT with information obtained from the KOWL and other MS sources.

1.9.6. Other Consents and Licenses

Determining bodies have been included in Appendix A and licenses associated with each have been included here. This is to ensure a more rapid engagement for this development and to facilitate the early approval of such licenses.

Depending on the findings of the baseline studies, consideration of the Conservation (Natural Habitats & c.) Reg 1994 could be required if protected species licences are required.

1.10. SEA of Scottish Territorial Waters for Offshore Wind

In February 2009, the Crown Estate announced 10 exclusivity agreements for offshore wind sites (wholly identified by developers) in Scottish Territorial Waters. Following this announcement, the Scottish Government undertook a Strategic Environmental Assessment (SEA) of a draft Plan to develop offshore wind in Scottish territorial waters[20]. The draft Plan proposed a further 25 areas of search for offshore wind development (now identified in the sectoral marine plan) following the assessment.

The SEA[21] provides high level environmental baseline information as well as information on the likely significant effects (both positive and negative) of implementing the Plan for offshore wind. Where relevant, these will be considered and incorporated into the assessment of baseline conditions and potential impacts during the EIA process for the Kincardine Offshore Windfarm site.

[20] Scottish Government (2010). Draft plan for offshore wind energy in Scottish Territorial Waters
[21] Scottish Government (2010a). Strategic Environmental Assessment (SEA) of draft Plan for offshore wind energy in Scottish Territorial Waters: Volume 1 Environmental Report

The sectoral marine plan for offshore wind published in March 2011[8] is subject to a two year review process during which the Scottish Government will seek to identify further areas for the development of offshore wind energy in Scotland. The Draft Initial Plan Framework (IPF)[22] details the areas of search for future commercial scale offshore wind developments on a regional basis and outlines the process for progressing these to the formal sectoral marine stage. A review of the 25 medium term areas in Scottish Territorial Waters has been carried out and an updated list of Scoping Areas of Search produced (which still includes NE3). Draft Regional Location Guidance (RLG) has been prepared in relation to the Areas of Search as well as the broader region in which they are located; this guidance provides more detailed technical, environmental, planning and socio-economic information about the areas. The RLG for the NE3 area will help to inform scoping and EIA for the Kincardine Offshore Windfarm site. Future stages in the process include pre-consultation, refining the Areas of Search into Plan Options and a Sustainability Appraisal (including, SEA, Habitats Regulations Appraisal (HRA) and Socio-economic Assessment), publication of a Draft Plan, Consultation and the publication of the final Draft Plan for Ministerial Approval.

1.11. Offshore Wind Regulatory Framework

The Marine (Scotland) Act 2010 along with the UK Marine and Coastal Access Act 2009 provides a framework for marine management. The Marine (Scotland) Act 2010 legislates for marine planning and licensing and conservation activities in Scottish inshore (territorial) waters out to 12 nm. The UK Act provides executive devolution to Scottish Ministers for planning, licensing and conservation powers in the Scottish offshore region (12-200 nm). Responsibilities for the offshore zone have been defined and agreed by a UK and Scottish Joint Ministerial Committee. International responsibilities for the implementation of the European Commission's Marine Strategy Framework Directive (MSFD) in the Scottish inshore and offshore region also falls to Scottish Ministers who are the competent authority[18].

The Marine Licensing system introduced by the Acts supersedes the former Food and Environmental Protection Act 1985 (FEPA) licence and Coast Protection Act 1949 consents. Under the Acts a Marine Licence from Scottish Ministers is required for any of the following (from a vehicle, vessel or other structure) in Scottish Waters:

- Deposit any substance or object in the sea or on or under the seabed
- Construct, alter or improve works on or over the sea or on or under the seabed
- Remove substances or objects from the seabed
- Dredging
- Deposit and/or use explosives
- Incinerate substances or objects

This includes the removal of small quantities of sediment from seabed over $1m^3$ as part of scientific and/or investigative surveys.

An application for consent under Section 36 of the Electricity Act 1989 is also required for the construction and operation of an electricity generating station with a capacity of over 1 megawatt in the Scottish marine area. The application for s36 consent can be made at the same time as applications for Marine Licences.

Currently, planning permission from the relevant Planning Authority is also required for any ancillary onshore development works which are not part of the offshore generating station. This is under the terms of the Town and Country Planning (Scotland) Act 1997.

Under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, Scottish Ministers are required to consider whether any proposal for an offshore renewable energy device is likely to have a significant effect on the environment. These regulations were amended in 2008 by the Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008 to meet the requirements of the Public Participation Directive 2003/35/EC. The amendment recognises that additional information can be generated during the application process and seeks to bring this into the public domain and allow further consultation on it.

Schedule 9 of the Electricity Act 1989 also places a duty on applicants to have regard to the preservation of amenity. When formulating proposals relating to the construction and operation of the generating station, the

[22] Scottish Government (2012a). Offshore wind in Scottish Waters – draft initial plan framework

applicant should take account of the effects the proposal would have on the natural beauty of the countryside, flora, fauna and geological and physiological features of special interest, and sites, buildings and object of architectural, historic or archaeological interest. Reasonable actions to mitigate the effects of the proposal on amenity should be taken.

The Energy Act 2004 introduced two new sections into s36 of the Electricity Act relating to navigation. Section 36a gives Scottish Ministers the power to remove public rights of navigation which pass through the area where the generating station (wind farm) will be established (within territorial waters). Alternatively, rights of navigation may be suspended for a specified period of time (e.g. during installation). Under Section 36b, Scottish Ministers have a duty not to grant consent for a generating station (whether in the territorial sea of Renewable Energy Zone) that would interfere with recognised sea lanes essential to navigation and of obstruction of or danger to navigation.

Annex IV of the Habitats Directive lists certain species of European Community interested and in need of strict protection. The protective measures are outlined in Articles 12 to 16 of the Directive and are transposed into Scottish Law through:

- Regulation 39 (1) and (2) and 43 of the Conservation (Natural Habitats, &c. (Regulations 1994 (as amended): (Scottish inshore waters within 12nm);
- Regulation 39 (1) and 43 of the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 applies (Offshore Marine Regulations);
- The Wildlife and Natural Environment (Scotland) Act (2011) (WANE).

Species listed in Annex IV are known as European Protected Species (EPS). Marine EPS whose natural range includes any inshore and offshore area of Scottish Waters include all cetaceans, five species of turtle and the common sturgeon. Consideration of WANE/EPS will be included as part of the marine licence application process to understand the potential effects the development might have on the EPS and any mitigation or further licences required.

Other licences and consents that may be required include:

- Local Acts and Orders if the project falls within a designated area such as a Statutory Harbour Authority area. These areas are under the control of Local Planning Authorities or Harbour Authorities and require Local Development Consents or Work Orders to be granted.
- A Controlled Activity Regulations (CAR) licence may be required from the Scottish Environment Protection Agency (SEPA) if the intended activity could have an adverse impact on the water environment (water quality, ecology and morphology). This is provided for under the Water Environment (Controlled Activities) (Scotland) Regulations 2005 which allow the Scottish Government to deliver its Water Framework Directive (WFD) obligations.

Decommissioning of the wind farm will be carried out in accordance with a decommissioning plan that will be developed to meet relevant regulatory requirements and guidance including:

- Decommissioning of Offshore Renewable Energy Installations under the Energy Act 2004: Guidance notes for Industry, DTI, December 2006;
- Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone, International Maritime Organisation (IMO), 19th October 1989;
- Guidance Notes for Industry: Decommissioning of Offshore Installations and Pipelines under the Petroleum Act 1998, DTI;
- OSPAR guidance documents on offshore wind farms;
- Guidelines for Environmental Risk Assessment and Management, Defra, September 2002; and
- United Nations Convention on the Law of the Sea (UNCLOS), 1982.

There will also be a requirement to obtain a lease from TCE for the use of the sea area at the KOWL project site.

1.12. Scope of the Environmental Impact Assessment

The Electricity Works (Environmental Impact Assessment) (Scotland) Reg 2000 implemented Council Directive 85/337/EEC as amended by Council directive 97/11/EC on the assessment of the effects of certain public and private projects on the environment, insofar as it relates to applications for consent to construct, extend or operate a power station or install or keep installed overhead electricity lines under Section 36 and 37 of the Electricity Act 1999. This states that under section 36 a development that is likely to have (over 1MW) significant impact on the environment must be subject to an EIA and Environmental Statement (ES) submitted to the Scottish Government Minsters with the Section 36 application.

An assessment of the type of developments can be found in Schedules 1-3 of the regulations and it is has been identified that this development falls within Schedule 2 "(1) a generating station, the construction of which (or operation of which) will require a section 36 consent, but which is not a schedule 1 development" and therefore KOWL believe that this development will require an EIA to be undertaken.

Schedule 4 of the regulations specifies the information required that must be included or may be provided in such a statement.

The regulations provide an opportunity to co-ordinate and consider the views of the various statutory and other consultees, and design the project to address the requirements of other consenting agencies and authorities.

The typical contents of the EIA as required by the EIA Directive (97/11/EC) are outlined below:

- A description of the development proposed, comprising information about its site and the design, size or an outline of the main alternatives studied by the applicant, or appellant, and an indication of the main reasons for their choice, taking into account the environmental effects.
- The data required to identify and assess the main effects that the development is likely to have on the environment.
- A description of the likely significant effects of the project on human beings, flora, fauna, water, air, climate, material assets, cultural heritage and the interaction between these.
- A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the development resulting from:
  - The existence of the development;
  - The use of natural resources; and
  - The emission of pollutants, the creation of nuisances and the elimination of waste.
- A description by the applicant of the forecasting methods used to assess the effects on the environment.
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.
- Measures to monitor these effects should the development proceed.
- An indication of any difficulties (technical deficiencies or lack of knowledge) encountered by the applicant in compiling the required information.
- A non-technical summary of the above information (this exists as a stand-alone document separate to the ES).

1.13. Scoping Opinion (Regulation 7)

Under regulation 7, the developer of a EIA scale development may submit a scoping document or 'scoping opinion' to the Scottish Government (via MS-LOT), before submitting an a Section 36 application, which will allow the early discussion and consultation about the appropriateness of the proposed Section 36 application and associated ES.

The scoping opinion should contain the following, as outlined in the Guidance note produced for Electricity Works (Environmental Impact Assessment) Reg 2000:

A site plan of sufficient detail to identify the site proposed for development;

A brief description of the nature and purpose of the development and the possible impacts on the environment; and

Further information or representations as to the persons making the request may wish to provide or make known.

This document outlines the above requirements and an associated Environmental Statement is outlined which will consider the main issues associated with this development at the selected location.

Once sufficient information has been acquired by MS-LOT (for the Scottish Ministers), they are required to consult and obtain the views of the statutory consultation bodies (Scottish Natural Heritage (SNH) and the Scottish Environment Protection Agency (SEPA) and any other organisation they see fit (see Appendix A). The outcome from this consultation will be included in the ES, giving clear reasoning behind each input.

1.14. Provision of information by Consultation Bodies (Regulation 8).

Under the Environmental Information (Scotland) Reg 2005, public bodies must make environmental information available to any person who requests it. These regulations are pertinent where a developer is preparing an ES for an EIA development. Once the developer has informed the MS-LOT (acting for Scottish Ministers) of proposed application, they will contact the consultation bodies and other relevant environmental organisations and ask them to make the information available. The development will be told who these organisations are and the addresses to contact them at.

1.15. Pre-Application Consultation

As part of the new Marine Licensing (Pre-application Consultation) (Scotland) Reg 2013, which comes into force on 1st January 2014 and applies to all relevant marine licence applications submitted to MS-LOT on or after 6th April 2014. KOWL will undertake pre-application consultation (as outlined within the MS-LOT guidance document) with the key stakeholders associated with this development.

- Activities that are covered by this consultation and relevant to this development are:
- Deposition of a submarine cable into the sea or under the seabed which is longer than 1853 m;

Construction of a renewable structure in or over the sea or on or under the seabed, where the total area in which the structure is to be located exceeds 10,000 m2;

As part of this new regulation, KOWL will request a ‘pre-application consultation statement’ from MS-LOT, which will confirm the opinion of MS-LOT as to whether the marine licensable activity in question is subject to the public pre-application consultation procedure. KOWL will provide MS-LOT with a plan of sufficient detail to identify the site, describe the nature of the development and any other information that KOWL believe pertinent to the application.

The pre-application process will consist of at least one public event where local communities, environmental groups, NGOs, regulators and other interested parties will be given the opportunity to consider and comment upon the KOWL application for the installation of the demonstrator floating offshore wind development.

As part of this process the following statutory consultees will be contacted to notify them that an application for the KOWL site will be submitted to MS-LOT. These consultees are:

- The Commissioners of Northern Lighthouses;
- The Maritime and Coastguard Agency (MCA);
- Scottish Environment Protection Agency (SEPA)
- Scottish Natural Heritage (SNH);

Any delegate for the relevant marine region (as described under Section 12(1) of the Marine (Scotland) Act 2010) – KOWL believe this will consist of Aberdeen City and Shire Councils (public authority), Scottish Fishing Federation (commercial purposes).

KOWL have undertaken initial consultation with Aberdeen City and Shire Councils in regard to this pre-consultation and they have suggested that KOWL can use their facilities to undertaken this consultation process. This process should be undertaken following notification to the above consultees at least six weeks prior to the event. This will include a notice in a local newspaper containing the following information:

A description, including location, of the KOWL site;

- Details as to where further details concerning the activity may be obtained;
- The date and time of the pre-application consultation event;
- A statement explain how persons wishing to provide comments may do so and the date by which this must be done;
- A statement clarifying that comments are made to the prospective applicant and not to MS-LOT.
- This process will be capture within a Pre-application consultation report and will include the following:
- A description of the consultation event;
- A description of the information provided;
- Comments received from the prospective applicant at the event;
- A description of amendments to be made to the marine licence application, where applicable, in response to those comments;
- An explanation for the approach taken where, despite the prospective applicant receiving relevant comments and objections no relevant alterations are proposed to be made to the marine licence application.

1.16. EIA Process

The EIA process follows an indicative process that will identify the potential environmental impacts that a development could introduce and the possible mitigation measures that could be used to offset or reduces these impacts. This process follows the following steps:

- Site selection and initial project assessment;
- Screening – is an EIA required?
- Pre-application discussions with relevant stakeholders;
- Scoping – consultation on proposed scope and methodology;
- Environmental baseline studies;
- Assessment of effects – determine possible effects;
- Mitigation of possible impacts and assess residual impact;
- Undertake Pre-application Consultation (per The Marine Licensing (Pre-application Consultation) (Scotland) Reg 2013).
- Prepare Environmental Statement (ES);
- Submission of Section 36 application;
- Consideration of application and environmental information by MS-LOT (for Scottish Ministers)
- Submission by MS-LOT to Scottish Ministers for granting/refusing consent (with or without conditions); and
- Implementation and monitoring.

1.17. Cumulative and In-Combination Impacts

The need to consider cumulative impacts is a requirement of the EIA process. Projects to be included in such an assessment must include those in the past, present and which are currently active planning applications. They must include not only other potential wind farms, but also other types of projects taking place in the marine environment.

The project developers recognise that the assessment of potential cumulative and in-combination impacts are of less significance in the Kincardine Offshore Windfarm area than for other zones of particular importance. However, there are two proposals for offshore wind projects in north-east Scotland that the Kincardine Offshore Windfarm project developers are currently aware of; the EOWDC near Blackdog, Aberdeen Bay, and the Statoil Hywind site at the Buchan Deep off Peterhead. These sites are situated approximately 10.8nm (20 km) and 27 nm (50 km) from the boundaries of the Kincardine site. To the south

of the site, the proposed Inch Cape, Neart Na Gaoithe and Forth Offshore wind projects are located approximately 26 , 42 and 19 nm (48.2, 77.8 and 35.2 km) from the southern border of the site.

Aberdeen Harbour Board has expansion plans with a preferred site at Nigg Bay, but it is not clear to date whether these are likely to have any significant cumulative or combined impacts with the Kincardine Offshore Windfarm.

1.18. Habitats Regulations Assessment (HRA) and Appropriate Assessment

The Habitats Directive (Council Directive 92/43/EEC) and the Birds Directive (Directive 2009/147/EC) form the cornerstone of Europe's nature conservation policy. Under the directives, European member states have the power and responsibility to classify Special Areas of Conservation (SACs) for the conservation of natural habitats, fauna and flora and Special Protection Areas (SPAs) for the protection of all wild birds, their nests, eggs and habitats within the European Community. SACs and SPAs together form a network commonly referred to as Natura 2000 sites. These sites are internationally important for threatened habitats and species.

In Scotland, the Habitats Directive is implemented inshore and offshore waters through the following legislation[18]:

- The Conservation (Natural Habitats, &c.) Regulations 1994;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004;
- The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007;
- The Conservation (Natural Habitats, &c.) Amendment (No. 2) (Scotland) Regulations 2007;
- The Conservation of Habitats and Species Regulations 2010 which replace the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) in England and Wales (and to a limited degree in Scotland - as regards reserved matters) and
- The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 and associated amendments.

The regulations are collectively termed the Habitats Regulations for inshore waters and Offshore Marine Regulations (OMR) for offshore waters and give protection to SACs and SPAs.

Where a plan or project may affect a Natura site (whether the plan or project is in, adjacent to the site, or regardless of location), the Habitats Regulations require the competent authority to undertake a Habitats Regulations Appraisal (HRA). HRA includes Appropriate Assessment which is required when a plan or project affecting a Natura site:

- Is not connected with management if the site for nature conservation, and
- Is likely to have a significant effect on the site (either alone or in combination with other plans or projects)

This applies to any plan or project which has the potential to affect a Natura site, no matter how far away from that site[23].

In Scotland, the Scottish Planning Policy document [24] states that Ramsar sites designated under the Ramsar Convention (The Convention on Wetlands (Ramsar, Iran, 1971)) are also Natura sites and protected under the same statutory regimes. However, where the interests of Ramsar sites correspond with overlapping SACs and SPAs there is no need to consider them separately. Sites protected either by law under the Habitats Regulations/OMR or by Government policy are referred to throughout the HRA process as European sites. Candidate SACs (cSACs), potential SPAs (pSPAs) and Sites of Community Interest (SCIs) are also considered in this process[18].

[23] SNH Habitats Regulations Appraisal including appropriate assessment http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/natura-sites/habitats-regulations-appraisal/
[24] Scottish Government 2010a

The 'plan or project' in this case is the proposed Kincardine Offshore Windfarm which will have to pass an Appropriate Assessment prior to Marine Scotland issuing a Marine License and s36 consent if it is considered that there is potential for the project to adversely affect the conservation objectives of any of the European sites designated along the east coast of Scotland. The assessment will include considerations as to the likely impact of the KOWL either alone or in combination with other plans or projects.

HRA is a separate requirement from EIA due to the specific assessment needs for projects that may affect European sites. Although both may be informed by the same information, more detailed survey work may be required to conduct the assessment and provide the confidence levels necessary to satisfy the Natura Tests contained in Articles 6(3) and 6(4) of the Habitats Directive, but it is currently expected that the current aerial survey will obtain sufficient onsite data to undertake an appropriate assessment as per the Habitats directive.

Baseline studies will give particular emphasis to gathering detailed information on the SPA and SAC qualifying species that utilise the development site. These species are identified in Section 9 and survey methodologies and potential impacts that could be experienced are covered in detail in section 9.2 of this document. It is considered that birds and marine mammals are the key species potentially requiring Appropriate Assessment at this stage in the EIA process. Marine Scotland has recently undertaken a series of benthic surveys of the site as part of their ongoing support of the offshore renewable sector within the Scottish territorial waters. It is believed that this survey is sufficient to undertake an appropriate benthic/sea bed assessment of the site due to the limited impact this project has on the sea bed (no piling required).

1.18.1. Approach to Undertaking HRA

Stage 1 – Initial assessment

As part of the initial stage of the HRA process an assessment of whether a HRA should be undertaken in relation to the project should be undertaken. The project size, its location relative to SPA and SACs along the eastern coast of Scotland and the possible impact that a development could have on nature conservation means that a HRA will be required as part of the project consenting process. At present the initial assessment is being undertaken by TCE as part of their leasing agreement with KOWL and this will be implemented into the following stage of assessment.

Stage 2 – HRA Screening

KOWL will undertake an initial screening assessment of the site following the completion of the initial year of aerial surveys at the site. This will be used, in conjunction with associated data collected as part of the desk study to assess what elements can be scoped out prior to undertaking Stage 3 (Appropriate Assessment). KOWL will seek advice from the appropriate bodies (including MS-LOT, SNH and JNCC) following the application of the SNH guidelines on the HRA process [25] to the screening process. This will aim to allow a more rapid assessment by the appropriate authority (MS-LOT) for this project.

Stage 3 – Appropriate Assessment

This stage will be undertaken by the appropriate authority (MS-LOT) to assess whether the project has addressed all the adverse effects the development could have on conservation objectives of the site. To allow MS-LOT to undertake this assessment, the following information will be provided by KOWL:

- Identification of the area of the development and the possible receptors for the area (aerial data to be used to confirm bird and marine mammal activity at site);
- Identification of the possible impacts the development could have on nature e.g. collision risk, possible disturbance and displacement;
- Identification of key species (from aerial survey data) that could be impacted by the development in a regional setting;
- Identification of key onsite activities associated with the project development (construction, O&M and decommissioning);
- Identification of seasonal variations in nature at site;
- Assess whether the impact from development would have an adverse impact on the region.

[25] SNH 2012 Habitats regulations Appraisal of Plans – Guidance for Plan Making Bodies in Scotland Version 2.

1.19. Marine Protected Areas

The UK is a signatory to several international agreements including the Convention on Biological Diversity and the OSPAR Convention that aim to establish an 'ecologically coherent network of Marine Protected Areas (MPAs)' by 2012 which is well managed by 2016. The sites in the network will work together to provide more benefits than an individual area could on its own. In the UK, the MPA network will consist of existing and new designations which will include:

- Natura 2000 sites
- Sites of Special Scientific Interest (SSSIs)
- Ramsar Sites
- Marine Conservation Zones (MCZs) (a new designation in English inshore and English, Welsh and Northern Irish offshore waters, established under the Marine and Coastal Access Act)
- Scottish Marine Protected Areas (a new designation in Scotland established under the Marine (Scotland) Act)
- Northern Ireland (outline proposals for nature conservation in NI's territorial waters which may include MPAs under the Northern Ireland Marine Bill)

The Marine (Scotland) Act and the UK Marine and Coastal Access Act include powers for Scottish Ministers to designate MPAs in Scotland's seas. Within territorial waters MPAs will be designated for:

- Nature Conservation – for the conservation of nationally important marine wildlife, habitats, geology and undersea landforms
- Demonstration/Research MPAs to demonstrate or research sustainable methods of marine management or exploitation
- Historic MPAs for features of historical/ cultural importance (e.g. shipwrecks and submerged landscapes).

In offshore waters, MPAs will be designated for the conservation of nationally important marine wildlife, habitats, geology and undersea landforms. They will also be referred to as Nature Conservation MPAs which will all be delivered through the Scottish MPA project, a joint initiative between Marine Scotland, JNCC and SNH. On the 1st November 2012, SNH and JNCC submitted formal advice to Marine Scotland on the selection of Nature Conservation MPAs, recommending 33 site proposals in Scotland's seas with further work proposed for four MPA search locations where there is currently insufficient evidence to make firm proposals[26, 27, 28].

Scottish Ministers are currently deciding which of MPA proposals will go forward to a public consultation expected to take place during 2013. When a decision to consult on a Nature Conservation MPA proposal is taken, the location should be considered as if it were a designated site. Since March 2012, MS-LOT has also been advising developers that Environmental Statements should consider MPA search locations. Nature Conservation MPAs will be subject to a range of protection levels depending on the conservation objectives, management requirements and socio-economic features. In most situations, existing sectoral measures or marine planning are expected to be sufficient for the management of a site, however, powers such as Marine Conservation Orders (used to achieve the conservation objectives of the site) may be put in place[29].

The development of the MPA network will continue concurrently with the EIA and planning application process for the Kincardine Offshore Windfarm. At the moment, no MPA areas of search or recommended sites overlap or are adjacent to the Kincardine Offshore Windfarm site. The project developers will continue to engage with Marine Scotland, SNH and JNCC throughout the MPA designation process so that progress can be taken into account with the Kincardine Offshore Windfarm EIA. Nature Conservation MPAs will not be part of the Natura 2000 network and therefore the designation of an area would not trigger an Appropriate Assessment. The baseline surveys (bird and mammal aerial surveys, sidescan and sub bottom profiling) being carried out for this EIA and described in section 9 will be sufficiently robust to enable impact assessment of any new sites designated within proximity to the proposed demonstrator floating offshore wind farm.

[26] JNCC Advice on developing a network of MPAs in Scotland's seas http://jncc.defra.gov.uk/page-5510
[27] Scottish Government Marine Protected Areas http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork
[28] SNH The Scottish MPA Project http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas/scottish-mpa-project/
[29] SNH (no date). Frequently asked questions about Nature Conservation MPAs.

1.20. Guidance and Best Practice

Current best practice guidelines for methodologies to establish baseline conditions of offshore wind farm sites have developed from experience gained through Round 1 and 2 developments and are available from a range of sources. The building out of consented Round 1 and 2 sites has also provided developers and stakeholders with opportunities to monitor predicted impacts against observed effects, and thus inform guidance documents and provide confidence to the EIA process of newly proposed schemes within the Scottish Territorial Waters and in Round 3. Statutory bodies, conservation advisors, trade associations and Collaborative Offshore Wind Research into the Environment (COWRIE) have all published a range of best practice and guidance documents and these will be used to facilitate the development of Scottish specific best practice methodologies. These COWRIE –commissioned reports are listed in Appendix A along with other best practice guidelines.

However as these guidelines have been written for the application to fixed structure, large scale wind farm develops and not demonstrator type projects. It is assumed that the requirements for a floating offshore scheme will be limited to a more appropriate level.

SNH has held best practice and ‘sharing good practice’ seminars, with the participation of stakeholders and potential offshore wind farm developers, with the aim to facilitate development of best practice within the Scottish Waters and review applicable lessons learnt from elsewhere. The context of these seminars has been the differences expected between the sensitivities of developing wind farms within 12 nm of the Scottish coast and the projects previously progressed as part of Rounds 1 and 2.

The majority of Round 1 sites, and all of Round 2 projects, have been situated outside of Scottish Territorial waters. It is recognised that the shoreline and waters of Scotland support a higher density of both ornithological and marine mammal species than those of England and Wales, and that this is reflected by the high proportion of coastline and waters carrying SPA and SAC designations. The high sensitivity of these ecological receptors has, and will in future, necessitate the development of survey methodologies that will provide robust data to support Appropriate Assessments for this small scale demonstrator project. Consultation is planned with SNH and further consultation is planned with JNCC and other key stakeholders (including RSPB) to agree best practice methodology for sensitive species, incorporating newly accepted technologies (e.g. high definition camera use during aerial surveying) and non-boat based data gathering techniques.

2. Kincardine Offshore Windfarm Site Selection

2.1. Background

In August 2012, The Scottish Government published a Draft Regional Location Guidance (RLG) document[30] to facilitate the development of offshore wind energy in Scottish waters. The RLG provided information on environmental, technical and socio-economic and planning issues in relation to the offshore renewable energy regions of Scotland, in order to inform developers and key stakeholders during the planning and licensing process.

2.2. Site Selection

During the initial period of site selection by KOWL two potential sites were identified by the developer for the installation of a demonstrator floating offshore wind farm development within Scottish Territorial waters:

- Forth Array (Firth of Forth, north of St Abbs Head) – a Round 2 development site
- NE3 – Aberdeen (RGL) (To be renamed Offshore Wind North East OWNE1 within updated RGL guidance).

A review of the both sites was undertaken based upon resource availability (wind), depth, grid connectivity, distance from coast, potential for expansion, and wave action.

Forth Array

The Forth Array site has significant benefits due to the initial work undertaken by Fred Olsen Renewables Ltd on the site development [31] and this would have significantly benefited the early deployment and installation of a floating offshore wind farm demonstrator site. The water depth found at site (50-65 m) is suitable for floating semi-sub technology devices, but limited for spar-type floating structures.

However the site was ruled out for two main reasons:

- Due to the cumulative impact of other offshore wind farm developments in the Firth of Forth on the bird movements (discussions with MS-LOT), the possible additional (very limited) impact that a floating offshore demonstrator development would have on key bird species was considered to be an potential issue. It should be noted that due to the initial suitability of the site an aerial bird and sea mammal survey was undertaken at this location in May 2013 as part of this project.

- Following discussions with the relevant grid connection company it was apparent that there was limited grid capacity at the onshore substation location and any additional installation at this location would be cost prohibitive for the project.

NE3

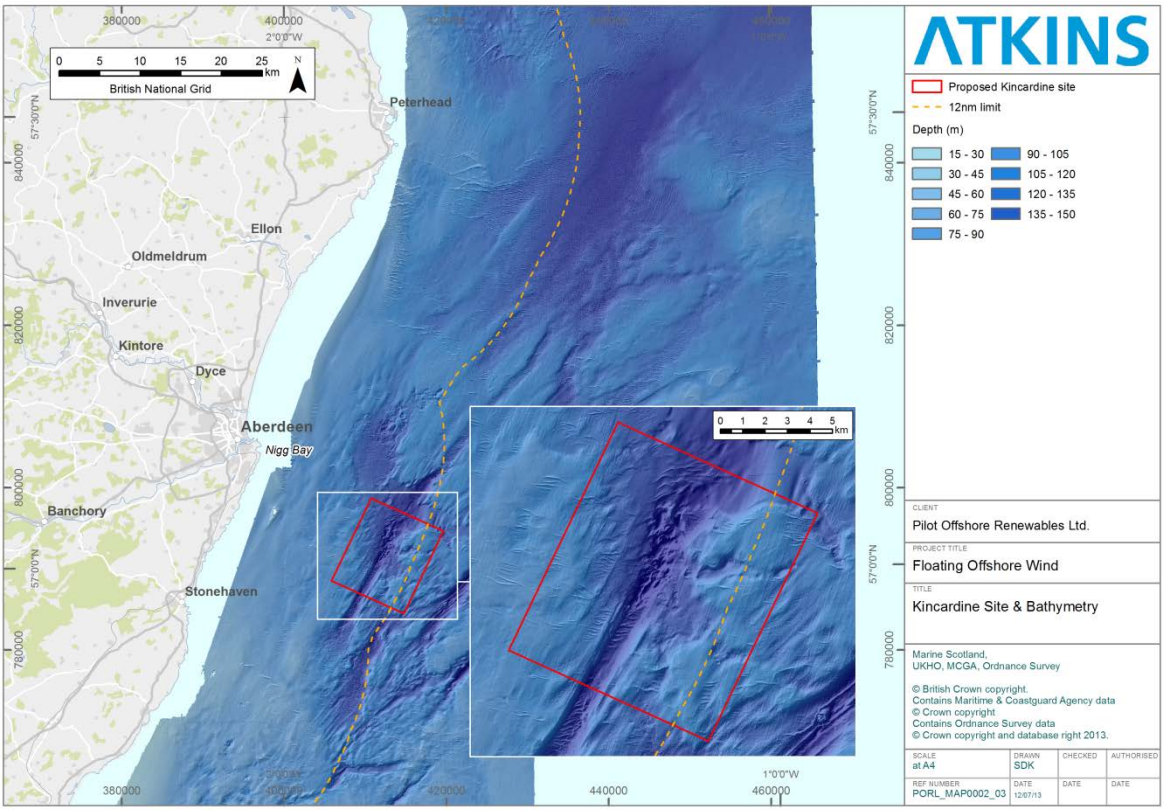
The NE3 site (Figure 2-1) is located south-east of Aberdeen and provides suitable water depth for a floating offshore wind demonstrator development. The deep channel located within the southern part of this potential development area allowed a technology neutral approach to be taken forward into the initial project development. Grid connection and capacity was also available at this location at a limited cost impact (when compared to the Forth Array site). Therefore this site was selected for the purposes of this project and it will be referred to as the Kincardine Offshore Windfarm ‘site’.

The project site overlaps with the eastern half of site NE3, but the site boundaries have been slightly modified by the current project developers to move slightly south-eastwards and also over the 12 nautical

[30] Scottish Government (2012b) Offshore Wind – Regional Location Guidance http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg
[31] Scoping Report – Forth Array Offshore Wind Farm Site, Firth of Forth March 2010. Fred Olsen Renewables Ltd

mile limit to the west to allow greater flexibility in locating the floating offshore turbines. This allows the project to take greater advantage of the area of deep water known on some charts as the “Dog Hole”. The site is rectangular with a width of 9.8 km and a length of 11.3 km (5.2 by 6.1 nm), representing an area of 110 km^2. The boundaries of the site are located approximately 15 km (8.1 nm) at its closest point to the Kincardine coast, shown in Figure 2-1.

Figure 2-1 The Kincardine Offshore Windfarm site (red box)



Key advantages for the site:

- The water depths at the site are suitable for deployment of floating wind turbine substructures fitted with the next generation large-scale turbines (6MW and larger).
- The location is representative of typical operating conditions for offshore wind turbines in the UK and northern Europe, thus representing an attractive test site for manufacturers wanting to demonstrate their technology.
- The RLG indicated that the site has an average depth of 87 m
- A mean annual wind speed of 9.33 ms^{-1}, ranging from 7.3 ms^{-1} in summer to a mean of 11.3 ms^{-1} in winter.
- Wave significant height at the site has a mean annual height of 1.54 m, a summer mean significant height of 1.05 m and a winter mean significant height of 1.94 m.
- The RLG suggested that connectivity options are numerous with electrical substations available in the vicinity of Aberdeen city. The closest (at Redmoss, near Altens) is at approximately 17 km (9.2 nm) from the site with four others between 24-28 km (13 to 15 nm) away; all these run at 132 V. A 275 V substation is situated north west of Aberdeen at approximately 30 km (16.2 nm).
- Fishing activity at the site is limited, although some scallop dredging occurs at the site according to the 2007-2011 amalgamated fishing intensity data (MS-LOT data).

The RLG noted that the site lies within strategic search area NE3 as recognized through the scoping study for offshore wind, and that constraints generated by other users of the sea have been deemed of an acceptable level for developments to go ahead within this area.

Furthermore, the RLG notes that the site is readily accessible from harbour facilities at Aberdeen (although the current developing consortium believes that the site could also be readily accessed from other harbour facilities elsewhere on the east coast of Scotland, e.g. Dundee). The RLG suggested that shipping is of low intensity at this site despite its proximity to Aberdeen harbour. Recreational sailing data from the Royal Yachting Association shows some light use sailing tracks cross through this area.

However, the extent of potential radar interference calculated at 140 m height extends over the site and constraints potentially exist from aviation as the 30 km (16.1 nm) buffer zone for civil aviation aerodromes overlaps the western half of the original site; the eastward modifications to the site boundaries proposed by the current developers will reduce the area of overlap. Interestingly, the RLG notes that the site could be expanded by utilising the deep stretch of water that extends from the eastern flank of site in a south west direction, which will be partially encompassed within the boundaries of the site.

The location of the demonstrator turbines within the larger development site is being considered against the initial site selection criteria, which has reviewed the technical, environmental, social, economic and political constraints that may impact the site location.

Initial, limited, stakeholder engagement has been undertaken and following initial discussions with Scottish Fishing Federation (SFF) they have recommended that structures and subsea cables should not be placed within the trench as this could impact on the fishing effort undertaken within this area. This does not exclude the eastern side of the trench or site, but significant technical issues (trenching of export cable(s) on steep slopes to remove trawling risk) would create significant development challenges that could potentially stop the development meeting the ROC floating offshore wind scheme deadlines in 2017.

The north western section of the site is suitable for the deployment of the floating offshore turbines, but the area encroaches into restricted air space used by Aberdeen Airport and could impact on the Nigg Bay port development and therefore this area is less optimal than the south west section of the development area.

The south western section of the site is predominantly used for none-quota fishing effort (squid) by the local fishing community and is therefore considered by KOWL to be of low impact to this stakeholder. This south western section of the site offers a number of significant technical advantages to the project and overall development cost and complexity:

- Closer to shore and grid connection location;
- No cable laying through trench system;
- Uniform sea bed and suitable anchoring location (initial data review);
- Limited impact to fishing industry.

These factors mean that the location of the floating offshore turbines in the south west section of the site would be the optimum location for the demonstrator site. This location does bring the turbines closer to the shoreline and will therefore be more visible from the Aberdeenshire coastline.

2.3. Wind Resource

An initial desktop analysis of the ambient long-term wind climate on the site was undertaken. This analysis employed industry standard wind resource prediction techniques and made use of historic wind data valid for the site. This analysis provided a strong indication that a commercially attractive wind resource exists at the proposed site. The initial wind climate prediction also provided a predicted long-term wind direction frequency rose for the project location. This indicated that the dominant wind sectors are west through south-west, consistent with the expectation for these latitudes. This predicted wind rose has been used to inform initial estimates of the number of turbines that could be accommodated within the site boundary and thus the overall site capacity.

2.4. Total Project Area

The provisional site has an area of approximately 110 km^2. Currently the project developers intend to install between 5 and 10 5.0 to 10 MW turbines with a total capacity of up to 50 MW, although we are currently considering a range of options which will be considered within the scope of the EIA. These will be mounted on semi-submersible floating platforms. The precise arrangement and positioning of the turbines will be

determined during the environmental and engineering scoping process, in order to maximise the use of the available wind resource at the site whilst minimising potential environmental impacts.

The export cable corridor has been identified however routing of the cable(s) within this corridor will be subject to further site investigation and clarification of the cable landing option to be adopted.

2.5. Seabed conditions

Review of the available seabed data indicates that the sea bed is predominantly sand and muddy sand across the site with occasional bands of exposed rock on the sea bed, which are mainly located to the south east of Aberdeen in a SW to NW orientation. This area will be avoided for any cable route due to the issues of cable burial. The site is bisected by an underwater canyon running NNE to SSW, with water depth varying from 45 m to 143 m. This canyon is mapped to have significant slope angles in certain sections and these areas will be avoided for cable laying and installation of anchor points for the floating offshore turbines.

The project developers consider that while this sea depth is greater than that currently commercially most attractive for offshore wind farm development, floating wind farm technology is likely to advance quickly over the next few years. Floating wind also means that issues associated with piling, foundation and scour and potential impact upon benthic ecology can be minimised.

2.6. Metocean Conditions

We have reviewed publically available data as to the meteorological and oceanographic (Metocean) characteristics in the vicinity of the site area in general. In order to build a more comprehensive metocean model the following approach and key areas have been identified.

- 1.Acquisition of all existing data sets;
- 2.Preliminary engineering design criteria;
- 3.Commissioning of modelling studies;
- 4.Engineering criteria for design.

1-3 are intended to gather the available baseline data to make outline engineering design decisions, and to plan and implement a later site specific site survey programme that provides sufficient data to carry out a detailed engineering design.

These sources include:

- Marine Scotland;
- Crown Estate;
- UK Met Office;
- Aberdeen Port Authority;
- Aberdeen Airport and heliport;
- British Geological Survey, geology and sediment maps;
- United Kingdom Hydrographic data covering tidal elevation and current data;
- British Oceanographic Data Centre archives of historical current measurements;
- MEDIN data base;
- Meteorological Office wave model data from the European and UK waters models;
- Relevant data sets from adjacent developments

2.7. Environmental, Wildlife and Nature Conservation Designations

The proposed site does not fall within or overlap any current designated protected areas however, the waters surrounding it and the adjacent coastlines are important for wildlife and their supporting habitats. At the coast there are a number of designated sites. These are described in 10.5.

From an early stage, the project developers have considered that Marine Scotland and SNH may request an Appropriate Assessment for sensitive species (from designated Natura 2000 sites) found within proximity to

or using the area of sea at the site, and KOWL are currently undertaking monthly airborne bird and mammal survey of the proposed site. The Scottish Government has proposed 33 new Nature Conservation Marine Protected Areas (MPAs) in Scottish Waters with a further four still to be fully assessed. Three of these sites are within proximity to the Kincardine Offshore Windfarm area and include Firth of Forth Banks Complex, Turbot Bank and Southern Trench. The closest of these current MPA sites is approximately 20 km (10.8 nm) from the proposed site, however, any potential impact associated with them will be assessed in the EIA.

Numerous other statutory and non-statutory designations exist on land. The potential impacts on these from the wind farm with regard to the cable landfall and route as well as the visual impact on the landscape and seascape will also be considered.

2.8. Navigation and Shipping

Aberdeen Harbour is the principal commercial port in Northern Scotland. It is the centre of activity for the offshore oil and gas industry's marine support operations in North West Europe and is also important for general cargo, roll-on/roll-off ferry services, container traffic and some fishing vessels[32]. AIS (Automatic Identification System) shipping density data available on Marine Scotland's National Marine Plan Interactive website[33] indicates that the proposed Kincardine Offshore Windfarm area falls within an area of relatively low shipping traffic with the greatest density of ship movements occurring to the north east of the harbour entrance.

Aberdeen Harbour Board is currently developing a plan for growing the harbour to accommodate current and emerging new demands. A feasibility study is being undertaken to determine the viability of various expansion options with the development of Nigg Bay to the south of the current harbour area being the preferred option for growth[34]. The Scottish Government's consultation on National Planning Framework 3[35] has also highlighted the expansion of Aberdeen Harbour as a national development to reflect its importance to the Scottish Government's spatial strategy. The predicted growth in demand for the harbour will also bring about increased traffic while an expansion into Nigg Bay could mean that shipping densities to the south east of the harbour and Nigg Bay become heavier in the future. Planning, installation and operation of the Kincardine Offshore Windfarm will take account of the current and future shipping requirements and impacts, and the site will need to be clearly marked by a series of cardinal buoys during installation and while the site is operational.

2.9. Ports

Assessing the port requirements for the construction of a floating offshore wind farm requires significantly different criteria from traditional jacket/monopile construction methods as the wind turbines are towed to location and then tethered to the sea bed with pre-installed anchor systems (anchor system design is still to be defined as on site bed conditions and locations have not been assessed).

Therefore, there will be limited construction related requirements placed on the local port infrastructure and it is unlikely that new port development would be required to support this wind farm during the construction period.

During the operational and maintenance (O&M) period the local ports will be used as a base to support the maintenance base, which is likely to consist of two work vessels and a small operational base in the port selected as being the most appropriate and cost effective for the development of the site. It is likely that the operational base will be located at one of the following:

- Peterhead;
- Aberdeen; or
- Montrose.

[32] Aberdeen Harbour – a world class port http://www.aberdeen-harbour.co.uk/
[33] Marine Scotland Interactive Marine Planning Tool http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome/nmpi
[34] Aberdeen Harbour Feasibility http://aberdeenharbour-future.co.uk
[35] Scottish Government (2013). Ambition, Opportunity, Place – Scotland's Third National Planning Framework main issues report and draft framework

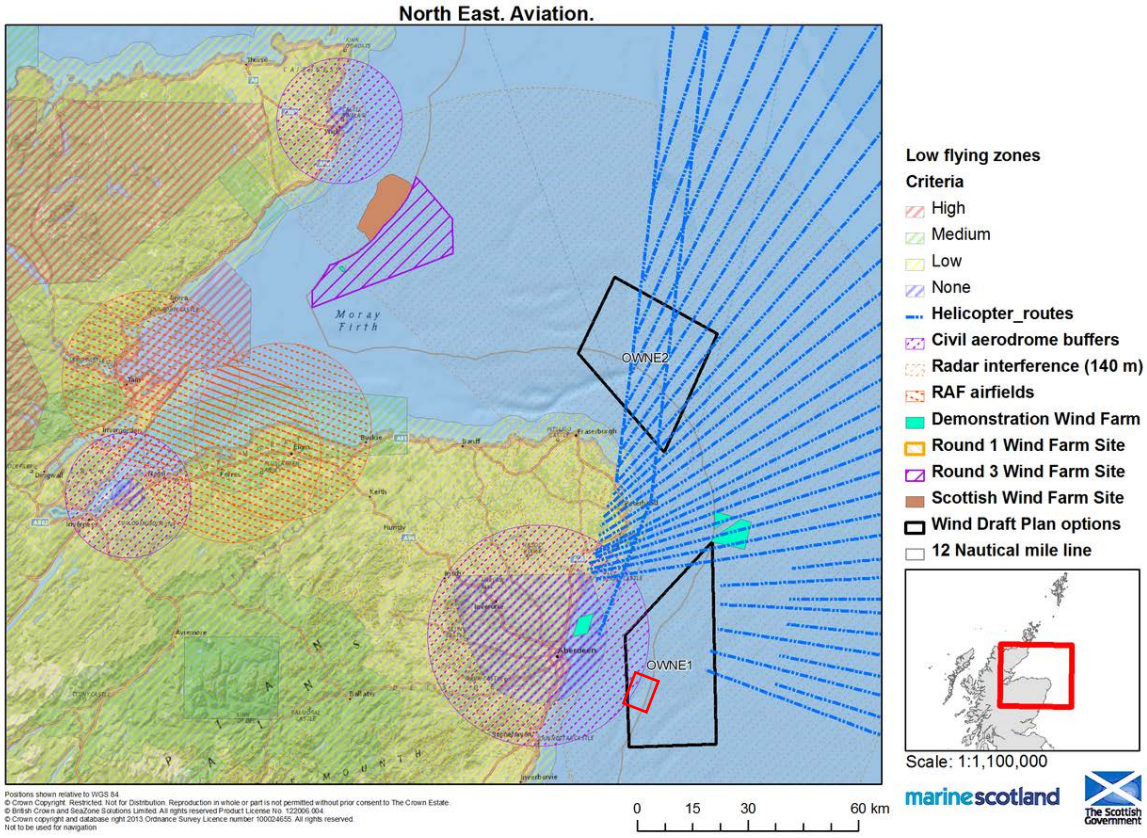
A detailed port assessment will be undertaken as part of the FEED development when specific loading and O&M requirements are defined.

2.10. Civil and Military Radar Considerations

National Air Traffic Services (NATS) will be consulted regarding the impact upon civil aviation radar operations by the proposed scheme. This will included the identification of potentially sensitive receptors to the floating offshore wind farm, including all known military and civil aviation facilities (e.g. airfields, airports and radar installations - both airborne and shipping).

The proposed site is marked on Figure 2-2, which shows the aviation activity in the North East of Scotland. The wind farm site is located outwith any helicopter routes however the North West corner of the site overlaps the outer edge of the civil aerodrome buffer.

Figure 2-2 North East Aviation Map



2.11. Onshore EIA Topics

The onshore components of the EIA process are not expected to be significant in terms of both scale and scope due to the short distance between the cable landing point, the route to the identified substation and the current land use within this section of the Aberdeenshire coastline. The impact from the cable route is expected to be limited to the following components and will be undertaken as part of this EIA process:

- Local air quality;
- Onshore noise;
- Traffic and transport (Road and rail);
- Visual impact (limited);
- Terrestrial ecology;
- Onshore archaeology and cultural heritage.

3. Offshore Wind Farm Components and Installation Methods

3.1. Introduction

The Kincardine Project is a demonstrator offshore wind development that seeks to utilise floating substructures to support higher capacity WTG's within a limited array configuration. The project is currently negotiating an Agreement for Lease (AfL) under The Crown Estate Floating Foundation Demonstrator round.

3.2. Site Selection

The site boundaries will be selected from within the area identified in the AfL applied for through the Crown Estate Floating Wind Demonstrator round. The site will cover a relatively small area, approximately 5km x 7km, but further engineering will be required to confirm the area and optimum layout once turbine and foundation selection have been made.

The original site area was selected as it contained a range of water depths within its borders that would be suitable for all different types of sub-structure deployment. Nomination of the preferred sub-structure type will be significant factor in the identification of the preferred project site within the larger area that has been identified in the AfL.

3.3. Project Schedule

It is planned to have the offshore wind farm fully operational by 2017. The following are indicative milestones in achieving that target:

- Receipt of Agreement for Lease from The Crown Estate — Q2 2014
- Submission of Consent Application — Q3 2014
- Receipt of Consent to build — Q2 2015
- Final Investment Decision — Q2 2015
- Grid Connection — Q2 2016
- Offshore Construction — Q2/Q3 2016/2017
- Completion of Commissioning — Q4 2017

3.4. Project Overview

There are currently three potential floating offshore substructure options, Spar, Tension Leg (TLP) and semi-submersible. Of these the semi-submersible has been selected as the preferred option for the Kincardine Offshore Wind Project due to its suitability for the water depths off the Scottish coast and its proven track record as a prototype design. There are prototypes in operation off the coast of Portugal and off the coast of Japan at Fukushima. The intent is to deploy sufficient WTG's to generate up to 50MW headline capacity, with each unit rated at 6MW or above. These will then be deployed into a pre-engineered array with power exported to a grid connection point ashore, to further validate the technology.

At this stage it is envisaged that, based on the use of 6MW WTG's, there will be eight substructures deployed, connected by inter-array cables with the resultant power being exported directly to the onshore grid by two transmission lines. These will then connect into the Grid at Redmoss onshore substation, subject to final agreement with the operator.

KOWL would seek to demonstrate the principal advantage that floating structures bring to the offshore renewable wind industry; the ability to significantly reduce offshore construction activities, by pre-fabricating the sub-structure/WTG assembly in port and utilising catenary moorings to maintain the structures in place on location.

Inter array cables will connect the structures within the field, to gather generated power for onward export to shore. There will be no Offshore Substation Platform and the power will be exported at 33KV down a single or twin transmission line(s) from the offshore site to the landing point ashore.

The transmission cables will come ashore via, preferably, directionally drilled conduit(s), for connection to land cable and onward transmission of the power, via an onshore substation, to the grid connection point.

The operational Kincardine Offshore Windfarm will be comprised of the following components, each of which will be discussed in turn in the following sections:

1) Turbines (tower, nacelle, rotors and hub)
2) Floating sub-structure (spar, semi-submersible or tension leg design)
3) Anchors and moorings
4) Inter-array electricity cables
5) Export Cables to shore
6) Onshore connection to the Grid connection point.

Subsequent sections will describe considerations for protection of cables and foundations, potential cable and pipeline crossings as well as factors influencing the layout of turbines within the array.

3.5. Turbines

WTG's are typically three-bladed horizontal-axis type, with yaw-controlled upwind rotors with diameters of 80–130 m. To reduce the cost of energy generated from offshore wind the generation capacity has been rising to above 5MW per unit. With this comes an increase in blade diameter. We are committed to using second generation WTG's on the Kincardine Project with a minimum of 6MW capacity being considered.

The conditions of the Crown Estate leasing round will limit the capacity of the site to 100 MW with a maximum of 14 turbines. KOWL have elected to limit our current request for consent to under 50MW. There are a number of turbines under development by a range of manufacturers in the range of 5 to 10 MW that could be suitable for inclusion in the Kincardine Offshore Windfarm project; however it is expected that 6MW and greater units will be used. The final choice of turbines for the site will be based upon an options appraisal of available turbine designs, but for indicative purposes, if 6 MW turbines are chosen for the project, then 8 turbines would give a combined capacity of up to 48 MW.

For illustrative purposes a potential site layout is discussed in Section 3.10, although the final design of the wind farm will depend upon a number of technical, physical, environmental, and economic factors.

The colour of the Kincardine Offshore Windfarm turbines is likely to be matt light grey, similar to other offshore wind turbine developments, unless the Civil Aviation Authority (CAA) or other stakeholders advise differently. The lighting scheme and navigation marks will be designed following consultation with stakeholders.

Table 3-1 Summary of WTG options

Type/option	Possible requirements
WTG Nameplate Capacity	6MW or larger
Development Size	Under 50 MW
WTG Hub Height (to centreline of hub)	LAT +107 m
WTG Blade Length (to centreline of hub)	85 m
Effective Tip Height	LAT + 192 m

Type/option	Possible requirements
Colour	Matt light grey/off white
Navigation Lighting	As required by CAA, MCA etc

3.6. Floating sub-structures

The substructure provides a base for the installation of the wind turbine. The substructure as defined here has three key components: (1) the mooring system, which anchors the structure to the seabed; (2) the substructure, a floating structure that supports the wind turbine; and (3) the transition, which provides the connection from the substructure to the wind turbine tower. Substructures are typically made of tubular steel columns.

Fixed substructures are less suitable for deeper waters (>50m), and floating substructures, where water depth presents less of an issue, could be a viable option.

In addition to allowing turbines to be installed in deeper waters further from shore, floating structures offer benefits in that their construction is largely yard based, with significantly less offshore construction activity, therefore reducing the impacts of offshore construction, the cost and scheduling uncertainties traditionally associated with more conventional wind farm construction. The substructure is constructed and the turbine installed in a dry dock or inshore, thus reducing the high costs of assembly and installation at sea. Once the machine is complete it is towed to site where the moorings will have been pre-installed. The substructure is then fully ballasted, moorings are picked up and tensioned, the cable head pulled-in and the machine commissioned.

The project developers plan to use a semi-submersible sub-structure for the proposed development. This option was chosen for a variety of reasons, but primarily because it is seen as the most applicable floating solution for use in the waters off the UK coast, and more particularly off Scotland. Other technologies such as Spar and Tension Leg systems require either deeper water, which limits its application in UK waters, or the technology remains unproven at this time, rendering it unsuitable for selection.

The Windfloat semi-submersible prototype, designed by Principle Power, was installed and grid connected in October 2011 in the Atlantic Ocean approximately 2.2 nm (4 km) offshore of Aguçadoura, Portugal in approximately 45 m of water. The Windfloat design involves a tri-column triangular platform with the WTG installed on one of the three corners of the platform. The triangular is moored using four catenary lines, two of which are connected to the column supporting the turbine, thus creating an asymmetric mooring. The semi-submersible foundation provides improved dynamic stability via a secondary hull-trim system that moves ballast water between each of the three cylindrical columns, allowing the substructure to maintain an even keel without having to de-power the WTG in higher wind speeds or wave heights. Its shallow draft allows for depth-independent siting and wet tow; the turbine and substructure was fully commissioned onshore prior to the unit being towed over 215 nm (400 km) by tugs from the manufacturing site to its deployment location. The prototype in Portugal employs a 2.0 MW wind turbine, and was the first offshore wind turbine to be deployed without the use of any offshore heavy lift vessels.

A demonstration project employing semi-submersible designs with two 2.0 MW turbines was deployed in 2013 approximately 10.8 nm (20 km) off the coast of Fukushima, Japan, in a project led by the Marubeni Corporation, and began generating power in autumn 2013.

The semi-submersible sub-structures will be symmetrical in shape, comprising of vertical tubular sections, up to 12 m in diameter, at each corner; connected by horizontal and vertical diagonal members above and below the water line. The maximum length of each face of the structure will be around 55 m from the centrelines of the 12 m columns. This will effectively give a maximum 67 m overall length.

The WTG will be attached via a transition piece mounted on the upper surface of the substructure. The deck level of the sub-structure will be at approximately 12 m above the waterline, the centreline of the nacelle hub

of the WGT will be no higher than 107 m and the tip of the blades at maximum extension, 198 m above the waterline, at high water.

3.6.1. Corrosion, markings and navigational aids

It is likely that the floating sub-structure elements exposed above sea level will be painted matt light grey/off-white to limit visual impacts from shore, whilst consideration will be given to the requirements of the MCA, Trinity House and others with regard to identification of the structures as potential navigational hazards to vessels in transit. The substructures will require protection against corrosion, either via a polyurethane or epoxy coating, and/or the use of sacrificial aluminium anodes. The final design will incorporate recommendations arising from experience of corrosion protection in existing offshore wind farms as well as current industry best practice.

The foundation mounted turbine will be painted a matt light grey as per standard offshore wind farm developments.

Discussions will also be held with MCA and Trinity House to determine the most appropriate markings for the turbines, their lighting and requirements for marking the boundaries of the site as a potential navigation hazard.

Table 3-2 Summary of corrosion, marking and navigational aids options

Type/option	Possible requirements
Sub-structure type	Semi-submersible
Elevation above waterline	Max 12 m
Geometry	Equilateral 3 or 4 sided
Horizontal Face length	Max 70 m
Diameter of vertical columns	Max 12 m
Access Points	Two boat-landings
Electrical Cable Access	Up to three J-tubes
Mooring Points	4 point mooring
Colour	Matt light grey/off white
Navigation Lighting	As required by CAA, MCA etc

3.7. Anchors and moorings

The preferred substructure option identified above will require moorings to anchors on the sea bed to maintain position over the lifetime of the development. The type and number of anchors and moorings employed at the Kincardine Offshore Windfarm will depend upon the type of substructure, loads imposed on the mooring system by the substructure/WTG assembly in the metocean conditions prevailing on site, in addition to the geotechnical and environmental considerations. These issues will be closely evaluated in the FEED engineering phase of the project. The significant advantage of floating offshore wind substructures is the reduction, and possible elimination of subsea piling operations, which are known to have an adverse impact upon Marine Mammals (SNH 2008[36]). Although the Kincardine project area is not known as an area that has a high population of Marine Mammals, and indeed the surveys of the site have encountered low numbers of marine mammals, it is the intention to develop the project without use of piled anchors

Table 3-3 Summary of mooring system options

Type/option	Possible requirements
Sub-structure type	Semi-submersible
Number of Mooring lines	4
Mooring type	Catenary Anchor
Anchor Type	Drag embedment anchors, Torpedo Anchors, Gravity Based Anchors
Clump Weights	Steel or reinforced concrete circa 25 tonnes in weight
Mooring lines	Anchor chain, Mooring cables, polyester mooring lines
Pennant Wires/Buoys	Temporary surface buoys during construction
Pennant Wires/Buoys	Permanent submersible buoys at seabed for ROV recovery
Mooring Line Radius	Max Approx 9 x Water Depth Dependent upon configuration and engineering Analysis

3.8. Export and Inter-array cables

Power generated by the individual WTG's will be collected via a series of inter-array cables for export to the onshore grid. The arrangement of the cables, connecting the turbines into an array, is determined by the layout of the wind farm, which is usually optimised for production of power given the prevailing wind direction on site. A priority of the array cabling is to provide redundancy, in the case of cable failure or breakdown, whilst seeking to ensure cable integrity. Further studies will be required to optimise the cable array once the turbine and foundation type have been confirmed.

[36] SNH Report No. 265 Anthropogenic noise in the Moray Firth SAC; Potential sources and impacts on bottlenose dolphins 2008.

Inter array cabling is usually surface laid and, where required, post lay buried to provide protection from external aggression. Given that we are using floating sub-structures to support the turbines, a focus of the early stage engineering will be ensuring that all inter-array and export cable approaches to the structures are properly addressed to ensure the longevity of the assets. Dynamic cable types have been designed to resist the potential of cables to fatigue under these circumstances but additional work will be required once the array and foundation type has been confirmed. The assessment of possible post lay burial/protection will be undertaken following a review of the site lay out and mooring design for the floating structures as part of the environmental impact, including a review of navigational safety at site with the mooring system design selected. The anchoring systems associated with floating offshore structures may require an exclusion zone extending to an appropriate distance from the anchor points and this may result in a fishing exclusion zone that covers most of the development site. It is currently proposed that the inter-array cables are not buried.

The decision to limit the KOWL project to less than 50 MW means that the project will not require an offshore substation platform. Power will be gathered at 33 KV, via the inter array cabling, and then exported to shore via dedicated 33 KV export cable(s). At present we would like to retain the option to install two export cables, as this maintains our philosophy to provide redundancy in the system. Export cables are often a point of vulnerability for offshore wind as failure in the transmission asset can render the entire farm inoperative. Damage, once in operation, usually arises from external aggression originating from fishing operations or vessel anchoring. To overcome this and to provide security during installation cables are usually separated by a distance that is a function of water depth. In the water depths envisaged along the export route from the site to shore we would expect this separation to be a minimum of 500 m, converging locally at the beach landing point, and diverging at the offshore site to terminate at different substructure locations.

Cable route engineering is very important to ensure the integrity of the export cable systems. Cables need to be routed through areas where there is sufficient sediment to allow for burial, whilst avoiding side slopes and variable seabed conditions. It is usual to lay and bury export cables in a single operation feeding the cable through a cable plough that buries the cable via a depressor into the seabed as the vessel tracks along the defined cable route. Often export cable installation is undertaken from an anchored vessel and therefore the proposed cable separation provides a measure of safety for the second of the two cables installed in parallel routes. The separation also helps ensure that should a cable be caught by fishing or anchor operations during its operation, then only one cable is impacted in any ‘damage event’. Cable burial/armouring will be assessed following the completion of the side scan and sub bottom profiling survey work as this will determine the requirements of the export cable route.

Should any sections of the marine cable require additional protection following combined lay/burial operation, then this will be provided by postlay jet burial, engineered, localised rock dumping or mattressing. Sections of cable may also be fitted with additional cast iron or synthetic external cladding to provide localised protection in certain areas.

Table 3-4 Summary of Export Cable options

Type/option	Possible requirements
Export Cable No.	Max 2
Export Cable Length	Max 19 km ea
Export Cable OD	Max 180 mm
Cable Burial	Target depth 1.5 m
Inter Array Cable	Max 12
Inter Array Cable lengths	Max 2.5 km ea

Type/option	Possible requirements
Inter Array Cable OD	180mm
Cable Burial	None Proposed
Cable Protection	Localised burial, rockdump or mattressing
Bend restrictors	Localised as required
Subsea Joint Box	4m x 4m x 4m
Subsea Joint Box	Gravity Based

3.9. Scour Protection

Marine structures such as fixed turbine foundations, and cables, can be susceptible to erosion, or scouring of the bed sediment in the vicinity of their foundations due to the action of waves, currents and tides. Floating sub-structures, reliant upon a catenary mooring system, reduce interaction with the seabed significantly and therefore pose a much reduced potential for scour. In general the potential for scour is dependent upon the prevalent sediment type, the variation in sediment type over depth and the speed of the flows. The risk of sediment scour around the anchors for the floating turbines will be assessed as part of the EIA process.

3.10. Wind Farm Layout

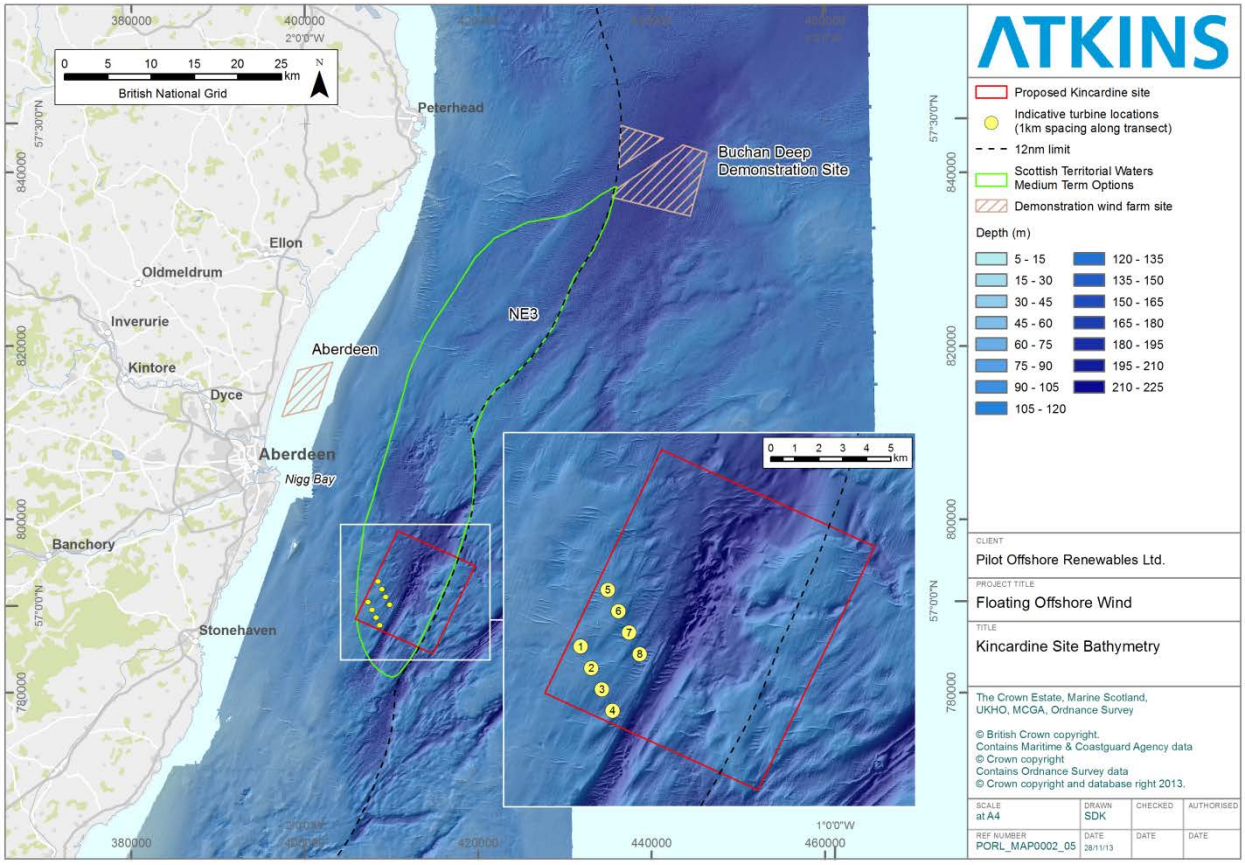
The wind turbines would be placed in a layout which gives the best utilisation of the wind resource available while at the same time offering the most harmonic visual impression, whilst fitting any navigation and environmental constraints. The visual impact for the proposed development is expected to be minimal as the minimum distance to the coastline is 15 kilometres. The final turbine model would not be selected until after all of the statutory consents are in place, however, the turbines would be of one type. They would be three bladed with a horizontal axis nacelle positioned on a floating semi-submersible support.

The rotor blades would start to turn in wind speeds of between 2 and 5m/s and optimum power output is generally achieved at around 12-18 m/s. Turbines would generally shut down once wind speeds exceed 25 m/s for safety reasons. Power is controlled automatically as wind speed varies. All rotor blades on the wind turbines within the wind farm would rotate in the same direction, i.e. clockwise when viewed from the windward direction. The turbines would have tubular steel towers assembled from two to three sections. The nacelle placed on top of the tower would contain a variable speed gearbox, a brake, and a generator generating electricity at 690 V. There would be a transformer stepping this up to 33 kV located either within the base of the tower or on top of the nacelle. The final turbine colour would be decided in consultation with the regulatory authorities.

Technical, environmental and human use considerations, determined through the baseline site assessment would guide the final layout of the wind farm components including cable and array design. Results of surveys and consultation may highlight constraints on the site that will influence the overall site layout. In particular, design considerations for the final layout would be influenced by seabed characteristics (avoiding rock where possible), benthic communities, geotechnical conditions, metocean conditions determined through modelling, and foundation and installation options. Constraints highlighted through site studies including designated areas, visual effects, energy yield etc. will also influence final site design.

The preliminary arrangement of the turbines in the Kincardine Offshore Windfarm is given in Figure 3-1.

Figure 3-1 Indicative layout of Kincardine Offshore Windfarm turbine array. Note that this is a preliminary layout, which may be altered as a result of the issues identified during the scoping process



3.11. Resource Assessment

For a small demonstrator array such as proposed in the Kincardine Offshore Windfarm project, initial resource assessment will be made by developing a model that draws on existing data sets and information from surrounding areas. There are a number of options that may be used to verify the model at a later date such as shore-based LiDAR, but the intent with much of what is proposed for the demonstrator is to make use of the demonstrator structures installed on site to provide quality site specific data that could be used in any future application for a larger commercial development.

Indicative wind resource assessments have been obtained from the Marine Scotland GIS database (Figure 3-2 and Figure 3-3) and this shows that the site has an annual mean wind speed of between 8.79 and 9.45 m/s, with an annual mean power of between 850 and 1033 W/m^2. Full modelling would expect to reduce the range to approximately 4% accuracy.

The model is necessary for two key stages of the project's progress – long term wind climate prediction for absolute energy yield estimations and defining climatic conditions for infrastructure design, planning and turbine procurement. The data will also be extremely useful for a number of other applications as the project develops, these are given below:

- Wind turbine selection and hub height optimisation with the consented wind farm envelope;
- Defining climatic conditions for structural design;
- Defining climatic conditions for construction access risk assessment;
- Defining climatic conditions for operational strategy and risk assessment;
- Long-term operational data platform for operational control and monitoring;
- Long-term operational data collection platform for contractual power performance testing.

Figure 3-2 North East Wind Energy Resource (m/s)

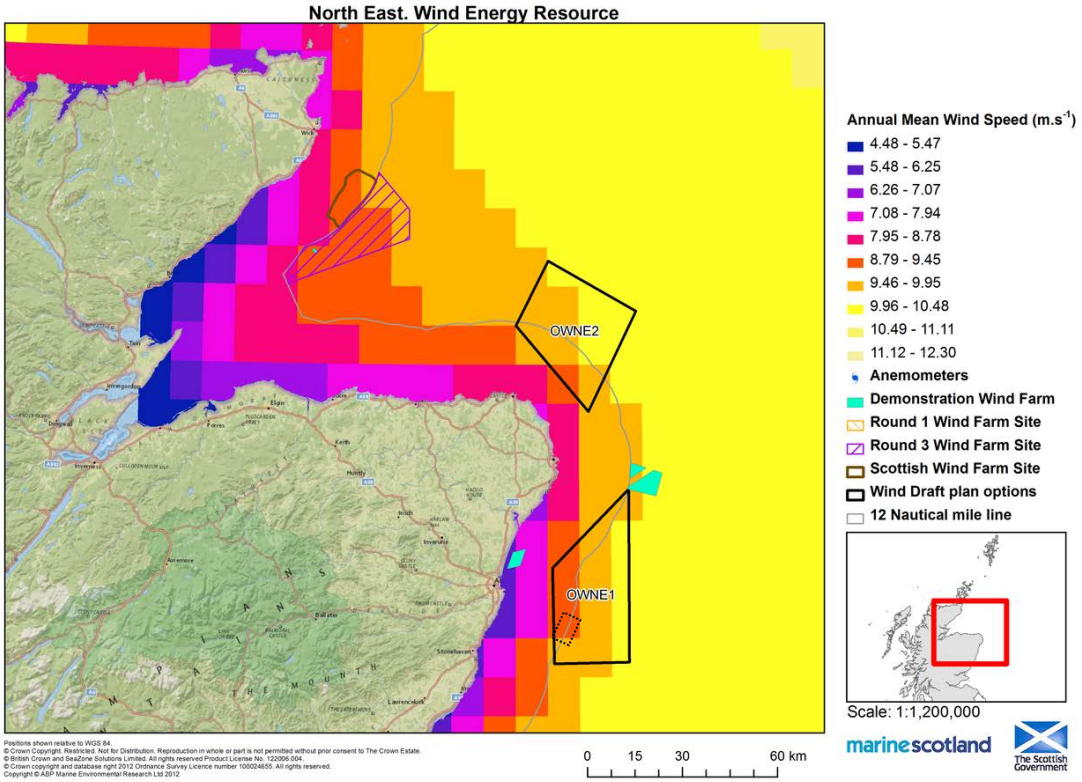
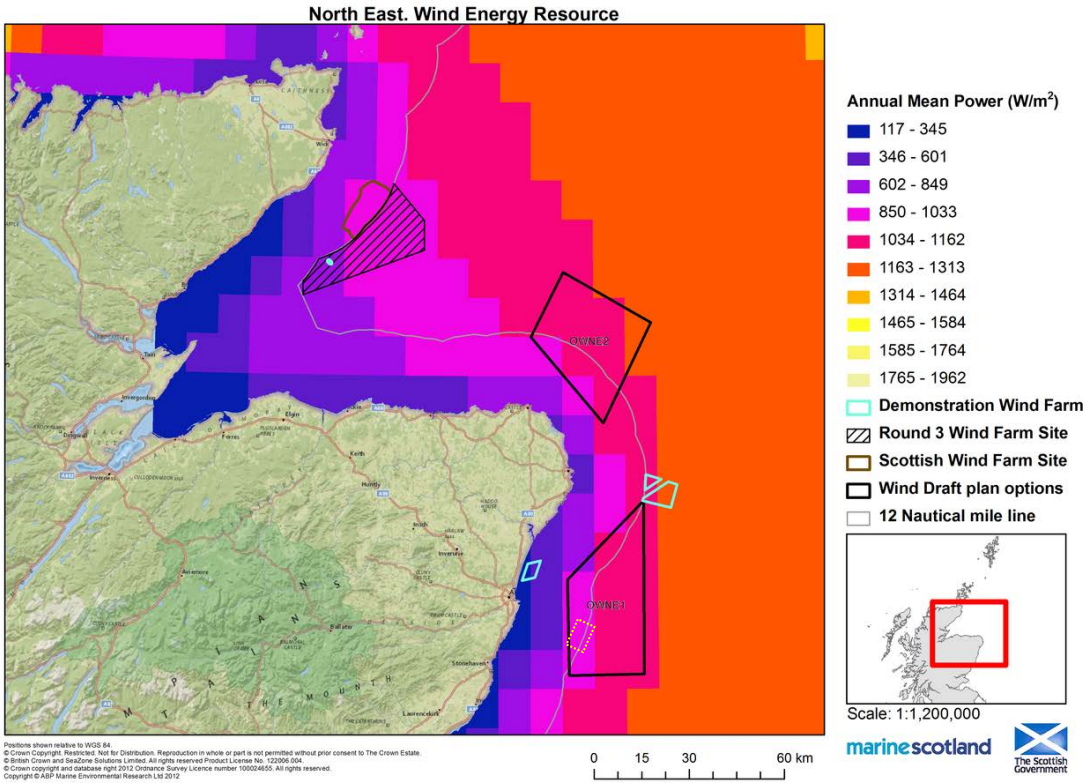


Figure 3-3 North East Wind Energy Resource (W/m2)



3.12. Onshore connection to the Grid connection point

3.12.1. Marine Export Cable Landing Location

The precise location of the landfall for the marine export cables has not yet been identified. Further discussions with stakeholders are required to understand the siting of any onshore facilities and the resultant optimal onshore cable routing. The preferred option is to land the cable(s) via horizontal directionally drilled bores that exit off the coast for the marine installation spread to initiate lay and burial operations along the pre-determined route to the offshore site. Alternative approaches may involve surface lay and post lay trenching using a combination of land based and offshore equipment. It is probable that an onshore jointing pit will be constructed at the Export Cable landing to allow jointing of the single or twin marine export cable to a single land cable arrangement for onward connection to the Grid connection point.

3.12.2. Onshore Electrical Facilities

In order to accommodate the power generated by the Kincardine Offshore Windfarm Project into the grid additional electrical infrastructure will be required, including dedicated switchgear between the marine cable landing point and the rid connection point. The project is in the process of determining a suitable area to house these facilities. Until such time as system studies have been completed the extent of these facilities will be unclear. The smallest footprint would be required to meet the requirements for simply additional switchgear however the possibility that reactive compensation or harmonic filters may be required can only be clarified following detailed discussions and studies associated with the grid connection agreement.

3.12.3. Onshore Cable Route

The land cable route will be determined following confirmation of the Grid connection point, the location of the additional electrical facilities and the marine cable landing point. The preferred route would make use of the existing road network in the area. The land cable would be buried using conventional open trench installation techniques. Based on the use of Redmoss as the grid connection point, it is anticipated that the land cable route would be no more than 3km long.

4. Grid

4.1. General Description

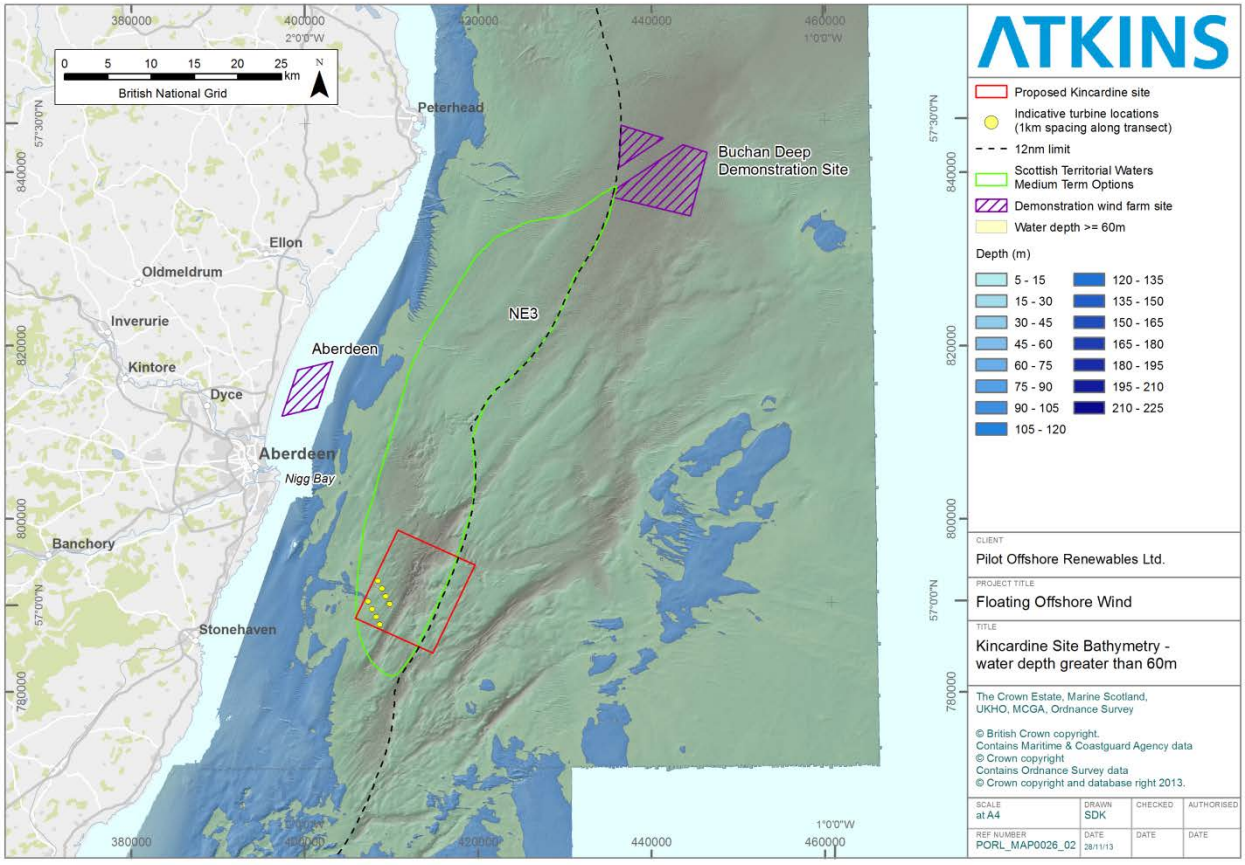
The developers of the Kincardine demonstrator site are seeking to consent up to 50MW under this Consent application. Currently, turbines up to 10 MW are available to the market. The Kincardine Offshore Windfarm is likely to incorporate 6 MW turbines, with a maximum expected installed capacity of up to 50MW. This option would see eight 6MW turbines with an aggregate headline capacity of 48MW. If 7MW units were to be utilised at the site, then seven units would be install with a corresponding capacity of 49MW.

Technical, environmental and human use considerations would guide the final layout of the wind farm components including footprint, cable and array design, and offshore substation location. Surveys and consultation would highlight constraints that will influence the overall site layout such as seabed characteristics, geotechnical conditions, metocean conditions and installation options.

The turbines would be placed in a layout which best utilises the available wind resource while at the same time offering the most harmonic visual impression, whilst considering any geotechnical, grid connection, navigation and environmental constraints.

The site is approximately 17km (9.2 nm) south-east of Aberdeen (Figure 4-1), and runs approximately parallel to the adjacent coastline in order to enable orientation of the turbine array against the prevailing wind direction (south westerly). It is approximately 26.5 km (14.3 nm) from the Buchan Deep Demonstrator Site, which is located to the north of the site (Figure 4.1).

Figure 4-1 Kincardine Offshore Windfarm bathymetry



4.2. Inter-array Cable

The wind turbines would be inter-connected by 33kV subsea cables which connect to one or two export cables to transmit the power ashore. Both the inter array and export cables are included as part of the Kincardine Offshore Windfarm development. It is envisaged that an estimated 10 km (7 nm) of inter-array cabling will be required to connect eight turbines (6MW WTGs), although this may vary with the number of turbines installed.

4.3. Potential Cable Crossings

Cable crossings would be avoided through site design wherever possible. Where cable crossings are necessary, the methodology for such crossings would be considered in the Environmental Statement. Initial review of the Marine Scotland RLG and UKHO charts indicate that there are no offshore cables or pipelines between the site and the proposed cable landing at Nigg Bay or the immediate shoreline to the south of Nigg Bay and therefore it is not likely that cable crossing will be required as part of this demonstrator project.

4.4. Offshore Cables

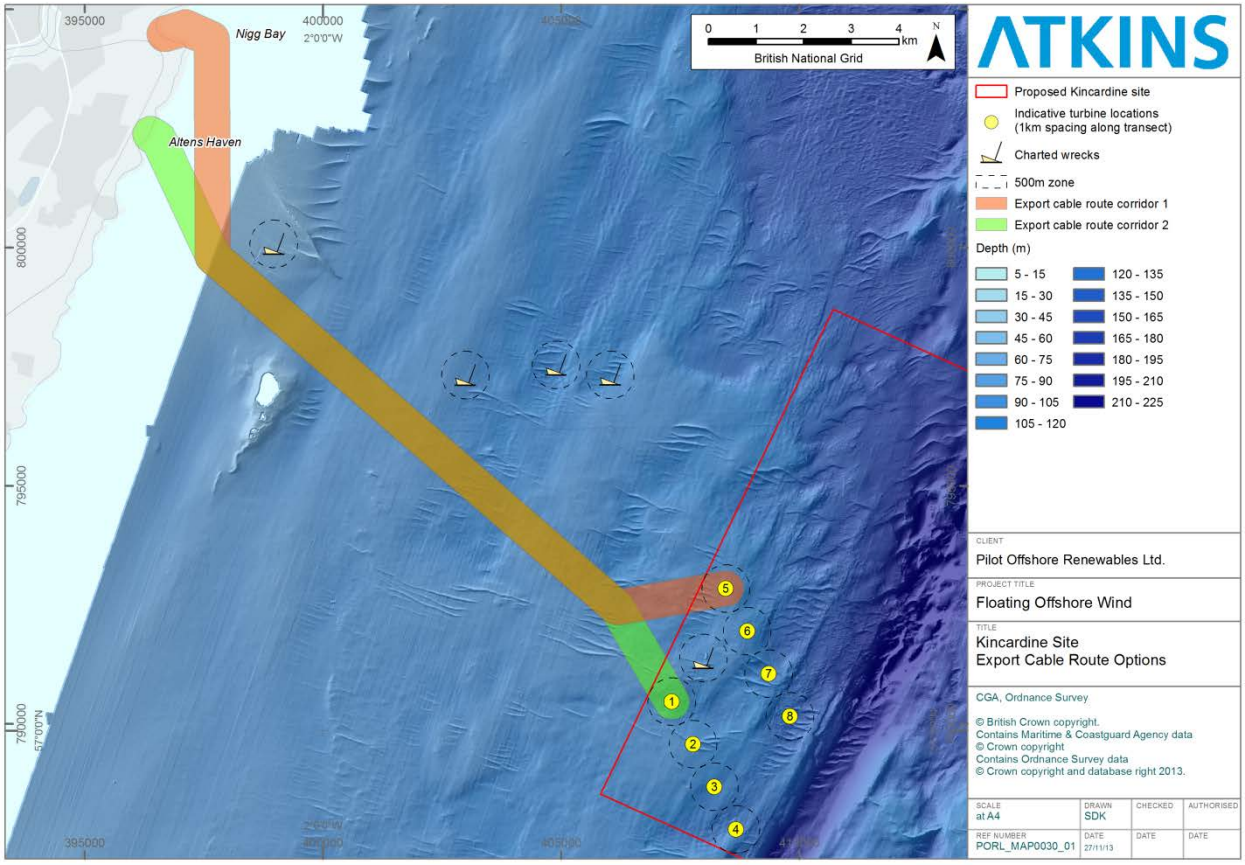
From the offshore wind farm site to the grid connection point, ownership and installation of the asset will be the responsibility of KOWL as the total MW is below 50MW for the site. The floating wind farm development would require probably two offshore export cables connecting to a single onshore export cable for onward transmission to the Grid connection point at Redmoss.

As part of the EIA process an assessment of the onshore cable route to the onshore substation is required and this will be incorporated within the EIA as the onshore cable route will be less that 8 km and direct to the substation. The onshore component of the EIA will be undertaken once the preferential cable route has been selected as the landfall site of the cable could have a significant impact on the onshore scope of works and length of onshore cable required (see possible options in Section 4.5).

The export cable (Figure 4-2) has been routed to avoid all known wrecks from the UKHO bathymetric chart (chart 0210), any hard rock location (adjacent to Findon Ness) and the major sand waves that are evident from the high resolution UKHO bathymetric chart for the area. No subbottom profiling data is presently available for the area and therefore amendments to the cable route could be required following further investigation to ensure difficult sea bed areas are avoided i.e. hard rock outcrops on the sea bed.

Figure 4-3 shows the likely export cable route from the development site to the shore. The route represents a 500 m corridor to allow the placement of two export cables (for operational redundancy), where the cables will be separated by around 300 m and have a 100 m external buffer zone on each side. Presently there are two possible cable landing locations, one at Nigg Bay (northern route) and the second via direction drilling under the sea cliffs to the south of Nigg Bay. The cable route is split at the development site to represent the two cables that will run from the site to ensure operational redundancy in the export cable, this will be finalised during detail design following further detailed investigation.

Figure 4-2 Kincardine Offshore Windfarm Export Cable routes (including identified wrecks)



4.5. Cable Landfall

A desk top study will be conducted to verify an opportunity for cable landing and potential grid connection at Redmoss. Initial investigations suggest that a possible cable landfall location could be situated in Nigg Bay – less than 1 km (0.45 nm) south of Aberdeen (Figure 4-3). For the purposes of s.36 applications, the Local Authority will be Aberdeen City Council and it is recognised that there is a current development plan for Nigg Bay, as an extension to the existing port facilities in Aberdeen. This development could impact on the possible cable route and therefore an additional cable route has been outlined which would utilise directional drilling to bring the export cable ashore approximately 2.5km to the south of Nigg Bay (Figure 4-4).

Two options for landfall and connection routes from Nigg Bay to Redmoss substation are shown in Figure 4-3 and Figure 4-4 although the final landing point, and associated onshore cable route, will be agreed following detailed discussions with stakeholders.

Figure 4-3 Cable route 1

Figure 4-4 Cable route 2 with two options for directional drill locations (only one to be used) and expected length of directional drill (red line).

Appropriate cable corridor options will be assessed further during the detailed design phase of work. Where the cable comes ashore, detailed surveys of the foreshore landing area will be undertaken to assess the suitability.

4.6. Grid Connection and Onshore Works

Cable landing and potential grid connection for the Kincardine Offshore Windfarm is at Redmoss substation (Figure 4-5). Further investigation will be required to determine any issues with regards to sensitivity of this area and access to the landing site. Horizontal directional drilling and a cable pit may be required onshore. The potential environmental impacts of any onshore works will be addressed as part of the Environmental Statement for the project from the landing point to the Redmoss substation (see Figure 4.4).

4.7. Existing Substation

Connections into the existing SHETL substations would predominantly be via an underground cable. Initial investigations have shown that Redmoss substation could physically accommodate the connection.

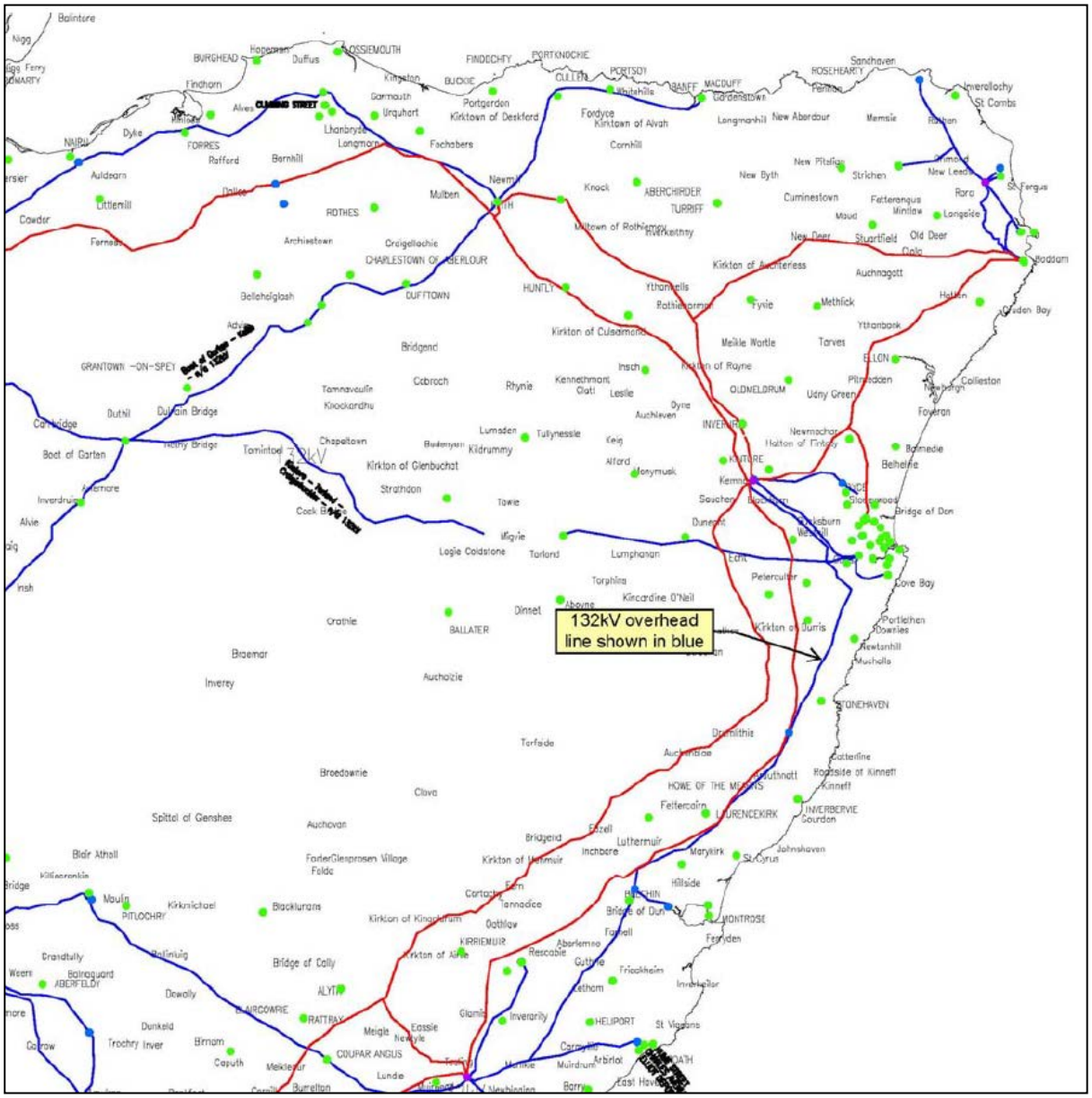
Figure 4-5 Redmoss aerial photograph

4.8. Overhead Line Connection

Running south from Aberdeen there is a single circuit overhead line which connects between Craigiebuckler – Fiddes – Bridge of Dun – Arbroath – Teal (Figure 4-6) This circuit is summer rated at 90MVA. Dependant on running arrangements the offshore generator could connect into this circuit. A suitable site would need to be investigated for a new substation between Aberdeen and Arbroath.

Following initial review of the distribution and transmission networks, a connection to either Redmoss a 132kV substation or to the 132kV overhead line running south from Aberdeen could enable the Kincardine Offshore Windfarm to be connected into the SHETL transmission network (the connection from the development site will be at 33kV).

Figure 4-6 Overhead lines



4.9. Repowering and Decommissioning

If the Kincardine Offshore Windfarm obtains sea bed consent, the Crown Estate will award a lease for the site. The length of this lease period is expected to be longer than the expected design life of current offshore wind turbine technology, but the design life of the balance of plant could exceed this. It is possible that a programme of 'repowering' could be considered during the course of the lease, but this will require additional consent from the Crown Estate and will be at their sole discretion. The grid infrastructure has a design life in excess of the forty year lease and, therefore, would plan to reuse the existing intra-array and grid connection cables, subject to their suitability for any replacement turbine technology.

At the end of the lease for the Kincardine Offshore Windfarm, the grid infrastructure assets and inter-array cabling would be decommissioned.

5. Continuous Consultation

5.1. Consultation process

The KOWL project team will engage in consultation and communication exercises during all phases of the project, with reference to legal requirements and best practice guidelines[37]. The project team is fully committed to a thorough engagement process with regulators, marine stakeholders and local communities aiming to ensure that stakeholders are consulted and informed of developments during, and beyond, the EIA process for the Kincardine Offshore Windfarm.

This scoping report aims to introduce the proposals for the Kincardine Offshore Windfarm and to outline the proposed approach to the EIA, including its scope, methodologies, assessments and outputs. It also aims to present what the project developers consider to be the main issues and topics that must be addressed in the EIA. For this purpose the contents of this Report will be shared with the consultees identified in Appendix E; key areas of the EIA consultation appropriate for each of the consultees are also shown in Appendix E. However, this list is not exhaustive and it is likely that as stakeholder engagement progresses, other organisations may be consulted, especially at a more local level. S36 statutory consultees are:

- Marine Scotland – Licensing Operations Team (MS-LOT)
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH);
- Northern Lighthouse Board (NLB);
- Maritime and Coastguard Agency (MCA);
- Marine Scotland Science (MS-Science);
- Marine Scotland Compliance (MS-Compliance);
- Ministry of Defence (MOD);
- Aberdeen City Council Planning Department;
- Aberdeenshire Council Planning Department;
- The Crown Estate (TCE);
- Civil Aviation Authority (CAA);

The KOWL project developers will develop a Project Communications Plan that will guide stakeholder consultation for all phases of the project, including a communications protocol and strategy for key stakeholders. Communications with statutory consultees, the public, community bodies, elected representatives and the media for the Kincardine Offshore Windfarm project will be co-ordinated by the project team. This consultation process is likely to include websites, public exhibitions, meetings and press releases. The outcomes of consultation with the public will be recorded in appropriate sections of the ES.

Part of the new Pre-application Consultation (Scotland) Reg 2013 requires KOWL to undertake defined pre-Environmental Statement submittal consultation with the key stakeholders and local community groups. This allows early mitigation to be included into the project development to reduce the possible consenting process challenges raised by stakeholder groups.

[37] British Wind Energy Association, 2002, Best Practice Guidelines: Consultation for Offshore Wind Energy Developments, BWEA, London, 32 pp.

6. Construction

6.1. Site Access

The construction phases for the project would include both onshore and offshore works. As a result, a 24-hour working period would be implemented to carry out all offshore activities; however with the use of a floating offshore wind turbine the site construction activities will be significantly shorter than a traditional offshore wind farm development.

6.2. Lighting and Marking

It is anticipated that a temporary exclusion zone would be established around the area where construction activities are underway, in compliance with the International Lighthouse Authority Maritime Buoyage System and Northern Lighthouse Board (body responsible for marking within the Scottish sector). Marine warning lights, mounted on temporary buoys would mark this area. In accordance with the relevant regulations, the project developers would issue a Notice to Mariners and arrange for Radio Navigational Warnings to be issued by the Maritime and Coastguard Agency. An offshore Health and Safety Officer would be responsible for informing, in advance, fishing vessel operators and other marine users, of construction works associated with the offshore cable and wind farm site.

The project developers would also consider the use of a guard vessel during the construction phase. Such a vessel is often engaged during marine operations of this type to provide emergency response, rescue, protection, towing and other duties on a standby basis.

6.3. Pre-Construction activity

The following activities are anticipated at the pre-construction stage of the development:

- Site geophysical and geotechnical surveys.
- Installation of temporary metocean data verification buoys

Although floating offshore wind sub-structures potentially impact the seabed significantly less than fixed foundations, the need for seabed survey remains a high priority. Geophysical and geotechnical surveys are closely related in that the geophysical survey, based on survey techniques that are generally conducted from moving vessels and have minimal contact with the seabed, inform the more static seabed sampling methodologies that for the geotechnical campaign. Geophysical surveys can include the following sensors:

1. Single and multi beam bathymetry
2. Side Scan Sonar
3. Sub Bottom Profiler
4. Magnetometer
5. Sparker or Boomer array

The intent is to provide detail of the seabed; its depth, contours, sediment cover, obstructions or rock outcropping and depth of the various sediment layers that exist below seabed level. These help in the micro-siting of the structures within the site and the transmission cable route.

The geotechnical survey draws on the results of the geophysical campaign to identify areas where further definition of the seabed and sub-surface conditions are required. These are usually clarified by taking physical samples (by vibrocore) or penetration tests (Cone Penetration Tests) at specific locations. Onshore sample geotechnical bores may be required to assess ground conditions for the Directionally Drilled bores required at the transmission cable landing points. These are common processes prior to a wide range of onshore construction activities.

It is anticipated that the mooring system of the floating sub-structures will include holding anchors rather than piled fixed points, and the depth to which these investigations will be required is unlikely to extend beyond 7m below seabed.

Maximising cable protection, to ensure cable integrity, is a critical aspect of Offshore Wind farm developments. The most effective way of ensuring cable protection is to bury the cable below the seabed during, or immediately following, cable installation. This requires that the cable route is carefully selected to ensure that obstacles are avoided, the cable is laid long a corridor where seabed sediments exist that will allow cable burial and that the route avoids gradients and heading changes that make installation difficult. These issues are all addressed by ensuring adequate information is collected during the early geophysical and geotechnical survey campaigns.

Metocean data and wind resource verification are relatively easily modelled, but are usually confirmed by a comparatively short term deployment of measuring equipment. In the case of the Kincardine Offshore Windfarm these would only be floating, rather than fixed, sensors.

6.4. Construction Programme

One of the main advantages of floating offshore wind substructures is that a considerable amount of the offshore site construction activity can take place onshore or inshore before the assemblies are towed out to site. This not only substantially reduces the extent of marine operations associated with the project construction but also the requirement for specialist construction vessels during installation operations.

The onshore pre-construction activities would focus on the use of suitable fabrication and port facilities to allow final assembly of the sub-structures and installation of the WTG's close to the project site.

The mooring arrangements for the sub-structures will be determined during FEED and further refined during detailed design, following inputs from site surveys, sub-structure/WTG design and loadings and metocean data for the site. Pre-installation of the moorings will be conducted prior to arrival of the WTG/Substructure on site. This work can be conducted by a suitably equipped anchor handling vessel.

By eliminating the use of piled anchors for attachment of the mooring lines to the seabed, we anticipate that the final configuration will include drag embedment anchors, with associated chain, clump weights and wire rope in the arrangement. This arrangement would be readily deployed from a range of vessels available locally in Aberdeen.

Each structure would be subject to a full mooring analysis and the pre-tensioned mooring system would be completed for each structure in accordance with the outcome of these studies. Following deployment the pre-installed/tensioned the mooring system, cable ends would be buoyed off temporarily, for later recovery and attachment to the WTG/sub-structure assembly following its arrival on site.

Following installation and partial commissioning of the WTG on the completed sub-structure alongside the fabrication facility, or inshore, each completed unit would be towed out to site by anchor handling tugs. Once on site the pre-installed mooring lines would be recovered and attached to the sub-structure assembly and tensioned to the pre-engineered levels to maintain the position of each unit in the array.

Inter array cables will be installed between the structures to collect generated power for onward transmission to the grid connection onshore via the export cable(s). These cables will have to be specially designed to withstand fatigue from the dynamic effects of the sub-structure movement and may require bend restrictors at the exit from the j-tube bellmouth on the substructure and at the touchdown point to ensure cable survival for the design life of the project. Further engineering will be undertaken to identify these requirements. As the inter-array cables will have be dynamic it is not proposed, at this stage to bury the inter array cables.

The transmission, or export cable(s) will be installed in pre-defined corridor(s). Selection of these corridors will be based on the criteria identified in the survey section above. Again dynamic cabling will be required at the sub-structure end to prevent motion-induced fatigue and we may wish to install a subsea jointing box to enable replacement of the short section that is subject to dynamic loading. This subsea jointing box would be located on the seabed within the anchor pattern of the sub-structure and be low profile to provide minimum impact, should it be incorporated into the export cable arrangement. As above there may be a requirement for additional bend restrictors or stiffeners at the j-tube bellmouth on the sub-structure or in the seabed touchdown area. The export cables will be initiated at the shore and following the pull-in of the cable end from the beach, probably via a directionally drilled conduit, the preferred method of installation would involved the simultaneous lay and burial of the cable from a dedicated cable installation vessel. The cable

would be progressively laid and buried by the installation vessel as it moves along the centreline of the approved cable route corridor towards its termination at the nominated offshore sub-structure. Cable burial would be based on a target depth of 1.5m. As with the inter array cables there would be a section that remains unburied, with or without the use of a subsea jointing facility, to allow the cable touchdown seabed touchdown point to move in response to any sub-structure excursion within its mooring pattern. In any areas where burial achieved is not considered adequate to provide protection to the cable then post lay jet burial, localised rock-dumping or mattressing may be used to provide additional security from external aggression.

Throughout the construction phase and, subject to discussions with the MCA and other stakeholders, navigational marker buoys may be required to identify the location of the site boundaries or to provide warnings regarding the existence of temporary facilities under the seabed. These temporary measures may be replaced by permanent markings in accordance with agreed requirements, for the lifetime of the project.

At the landfall, if cable routing is via Horizontally Drilled Duct, care will be taken to engineer the arrangement so it conforms to requirements. Drill mud discharge will be kept to a minimum and water based, rather than oil based, lubricants used.

The wind farm would be installed and commissioned in a number of phases, but unlike traditional offshore wind farm developments the length and impact of the construction programme is significantly shorter. Also as this is a technology demonstrator site there will be a limited number of floating structures being installed and most of the construction phase is centred around the land construction phase which will see the structure being outfitted and then towed to site for a rapid deployment phase. The timing of which would be subject to consultation and assessment as part of the EIA process.

The final phasing would be defined in the ES following this assessment.

The typical construction phases would include:

- The construction site is mobilised, local manufacturer commences and wind farm components are delivered;
- Civil engineering works are undertaken for the onshore substation connection to the export cable
- Substructure moorings are installed and pre-tensioned
- The turbine is towed to site and moored on position;
- Following connection at the agreed landfall point, the sub-sea electricity cables are laid between the shore and site;
- Subsequent turbines are installed;
- The 33kV sub-sea cables within the wind farm are installed.
- The systems are tested and commissioned and the construction plant is demobilised.

6.5. Environmental Management System – Construction

An Environmental Management System (EMS) compliant with the ISO 14001 standard will be developed and implemented prior to the installation of the wind farm at the site. The aim of the EMS is to prevent and eliminate pollution and to protect the environment against potential impacts. The findings from the EIA will be used to help inform the EMS, for example contributing to the register of aspects and impacts and providing the baseline information against which environmental improvement can be measured[38].

The project developers will formulate an environmental policy specific to the project which will set out environmental targets for the construction phase of the project. The policy will be included in tender documents as a requirement on contractors who should be able to demonstrate a track record and proven ability to meet the environmental standards. An environmental management plan will be developed to provide a framework to protect the environment before, during and after installation to ensure that all legislative and regulatory requirements are met. This will include details of environmental monitoring, auditing and reporting systems to be employed during installation.

The EMS developed for the installation of the wind farm will be used to develop an operational EMS ensuring the maintenance and consistency of environmental policy procedures moving into the operational period.

[38] Palframan L (no date). The integration of Environmental Impact Assessment and Environmental Management Systems: experiences from the UK http://uhra.herts.ac.uk/bitstream/handle/2299/4618/904108.pdf?sequence=1

6.6. Health and Safety – Construction

A Construction Stage Health and Safety Plan would be put in place under the requirements of the Construction (Design and Management) Regulations, 2007 (CDM Regulations). The CDM Regulations are aimed at improving the management and co-ordination of health, safety and welfare throughout all stages of construction projects to reduce the potential for serious accidents.

The KOWL will appoint a CDM Co-ordinator with key responsibilities in overseeing the safe design and construction of the wind farm. The CDM Co-ordinator will remain in place until the wind farm is handed over to operational management. During construction there will always be an appointed Principal Contractor, who is tasked with the day-to-day management of safety on site, both for their own personnel and those of other contractors.

The Kincardine Offshore Windfarm project developers will make clear their Health and Safety expectations to contractors via the Health and Safety Policy and the Performance Standards that support it. These Performance Standards cover both health and safety management aspects (e.g. the selection and retention of suppliers) as well as key risk aspects of the work in hand (e.g. crane operations). All contractors will be subject to a program of inspection and audit against these and legal requirements during construction. Many of the requirements can be met by application of the best practice guidance, offered by RenewableUK, HSE, DNV and others, which will be used as reference in providing assurance reports as part of the project's health and safety governance.

7. Operation

7.1. Site Access

Operations and maintenance of the wind farm will be required every day 365 days a year to ensure the safe and effective operation of the turbines and the substructure. However, given the number of turbines in the development it is unlikely that operations and maintenance activities will take place every day, but on a risk based programme

7.2. Lighting and Marking

The lighting and marking of the wind farm will be agreed in consultation with the relevant authorities. These consist of NLB, The General Lighthouse Authority for Scotland and the Isle of Man, MCA, CAA and MOD.

The position of all turbines, subsea cables and ancillary structures would be notified to the UKHO so that their location can be incorporated onto the relevant Admiralty Charts.

7.3. Operation – Radar Interference

The project developers consider the following to be key considerations associated with the operation phase

Guidance and Best Practice

- Wind Energy and Aviation Interests – Interim Guidelines 2002
- Mitigating the impacts of wind turbines on NATS En-Route ltd (NERL) operations 2008
- CAP 764: CAA Policy and Guidelines on Wind Turbines 2010
- Investigation into the interference impacts of wind turbines on the PAR system 2009

Aberdeen International Airport (AIA) serves more than three million travellers a year and is the world's busiest heliport, transporting more than 500,000 passengers in support of the North Sea oil and gas industry[39].

The north western corner of the proposed site falls within the NERL (NATS (En Route) plc) consultation zone for secondary surveillance radar. Data available from NATS also indicates that turbines with a blade tip height of 200m would be in line-of-sight of at least one of the primary surveillance radar operated by NATS En-Route. The site also falls within the 30 km (16.2 nm) safeguarding zone of AIA and the wind farm application must be assessed by AIA's Safeguarding Team to ensure that there will be no technical effect on safe airport operations.

The closest Military base is RAF Buchan ASACS 74 km (39.9 nm) 410531,840357.

7.4. Visual Amenity

Visual impact has become a key consideration in the evaluation of wind farms. There are now a series of defined methods to assess potential visual impact on amenity and tourism.

The Zone of Theoretical Visibility (ZTV) of a draft 14x200m to tip machines shown in Figure 11-1 that the proposed wind farm will be visible from many parts of the low lying Aberdeenshire coastline as well as higher ground in land over 40 km (21.6 nm) away from the site. The key visual receptors within the study are:

- Residents of Balmedie, Cove, Portlethen, Stonehaven, Aberdeen and some of its suburbs, and residents of smaller villages and isolated dwellings along the coast and inland.
- Recreational users of the foreshore, Balmedie Country Park, Sands of Forvie, Foveran Links (other golf courses), Aberdeen Beach, Stonehaven and Dunnottar Castle. Also potentially higher ground including some areas of the eastern Cairngorm National Park.

[39] Aberdeen Airport: About Aberdeen Airport http://www.aberdeenairport.com/about-us

- The development is also likely to be visible from a number of key transport routes including, ferries to and from Aberdeen, certain air routes into Aberdeen airport, and roads such as the A90.

A number of viewpoints along the coast and also inland will be used to establish the effects on key visual receptors. These will be located in after consultation with stakeholders and to establish good coverage of the site layout. A number of these may duplicate viewpoints used for the proposed EOWDC Aberdeen Bay EIA to provide an understanding of the cumulative and in combination visual impact of both sites.

7.5. Other Marine Users

Other marine users that will be considered as part of the EIA process will include:

- Offshore oil and gas exploration;
- Other offshore renewable developers;
- Marine aggregate extraction;
- Subsea cables and pipelines;
- Commercial fishing;
- Leisure and recreation;
- Shipping;
- Marine waste disposal and dumping.

This part of the EIA will be addressed within the cumulative and in-combination impacts as described in Section 11.7.

The project developers recognise that detailed information with regards to these uses, and assessment of potential impacts from the presence of the Kincardine Offshore Windfarm and its associated infrastructure, would require consultation following award by the Crown Estate.

If KOWL are successful in obtaining award of The Crown Estate's sea bed rights for the proposed Array site, the project developers will undertake a high level Information and Data Gap Analysis to quantify development risks. The outputs of this analysis have been used to inform this Scoping Report and have helped identify those elements requiring further desk review, data collection and field survey, utilising methodologies to be agreed with key consultees and stakeholders. The Kincardine Offshore Windfarm project stakeholder and communication plan will ensure that dialogue and information exchange with marine user groups is continued throughout the development phase as they recognise that this is an important component of the EIA process.

7.6. Wind Farm Control

On completion of the construction phase the development will move into operational mode, where a strict planned maintenance regime will be set up to monitor and maintain the WTG's and the sub-structure on site. For routine operations small dedicated craft will support the transfer of specialised personnel out to the sub-structures to perform these tasks.

Periodically, the condition of the substructure itself and the marine cables will be surveyed, in situ. The frequency of these surveys will be determined following detailed discussions with Marine Warranty Surveyors and or insurance companies.

Should more extensive work be required the entire substructure and WTG assembly can be unmoored and returned to port where major works can be undertaken in a more controlled environment before being returned to the offshore location.

A wind farm control centre and service base will be established, probably in Aberdeen. This would be responsible for management of the wind farm, operation and control of the turbine and a maintenance compound to hold spares and equipment.

Information relating to on-site conditions, turbine status and generated output would be held within a SCADA System, linked to each individual turbine. They would be monitored and controlled remotely allowing any turbine or group of turbines to be shut down immediately, if required for maritime safety operations.

7.7. Wind Farm Inspection and Maintenance

The wind farm will be serviced and maintained throughout its life from Aberdeen or another suitable port on the NE coast. Offshore wind farm maintenance can be split into three categories:

Periodic Overhauls: These will be carried out in accordance with the manufacturer's warranty. They are planned and scheduled to occur during the periods of the year with the best conditions, preferably in summer. They are carried out according to the supplier's specifications and typically include function and safety tests, visual inspections, analysis of oil samples, changes of filters, lubrication, bolt checks, replacement of brake pads, oil changes on the gearbox and hydraulic systems etc.

Scheduled maintenance: This applies primarily to inspections and work on parts susceptible to failure or deterioration between periodic overhauls. A schedule inspection of each turbine and substructure is likely to occur every six to 12 months. The task will typically include inspection and minor fault rectification.

Unscheduled maintenance: This applies to sudden defects, ranging from minor failures to complete failure or breakdown of main components.

Workboats would take personnel, tools, and equipment to the site to undertake most of the offshore work programme. However in the event of catastrophic failure of major components, then the turbine may be disconnected from the Wind farm and taken to port for repairs or a major overhaul (a key advantage of this floating offshore wind farm demonstrator). Events that require the turbine to be returned to port will be rare and will only apply to failure of major components.

Inspection and maintenance of the substructures and subsea cables will be performed on a regular basis, as will ad-hoc visits for surveillance purposes.

7.8. Remote Shutdown

The turbines will be monitored and controlled remotely allowing any turbine or group of turbines to be shut down immediately, if required.

7.9. Operation Management – Environmental

The wind farm will be designed and constructed and operated to a high standard incorporating appropriate levels of environmental control. Effective environmental management will minimise the impact of the development on the local environment.

The project developers will require the contractors responsible for operation of the Kincardine Offshore Windfarm to operate an environmental management system in accordance with ISO 14001.

7.10. Health and Safety – Operation

An evolving Health and Safety Plan would be put in place during the operation period that meets the new operational requirements of a floating offshore wind turbine system. Turbines would be remotely monitored and controlled remotely allowing any turbine or group of turbines to be shut down immediately, if required.

Whilst all unauthorised vessels will be deterred from making fast to turbine bases, the floating structures will remain accessible as refuges for seafarers in distress. There would, however, be a prohibition of the wind farm site as an anchorage in order to safeguard inter-array cabling and the mooring cables for the individual structures. Clear signage on the floating structures would make it clear that unauthorised boats may not tie up to the turbines. In addition, information boards showing the layout, latitudes and longitudes of the turbines would be placed at all local ports and slipways on the coastline. The location of the wind farm will also be registered with the UK Hydrographical Office to allow the site to be clearly marked for all seafarers and will be marked as per the Northern Lighthouse Board requirements. The same information would be given to local sailing clubs and fishermen's groups for distribution to members, and the site would be clearly marked by a series of cardinal buoys to aid navigation by all marine users.

Due to the spread of the possible mooring layout and the distances between turbines there could be a requirement to obtain a "Operational Safety Zone" around the demonstrator site to restrict vessel traffic and

fishing within the site boundary and this assessment will be undertaken with consultation with DECC, together with Marine Scotland and the Coastguard agency.

An operational centre will be set up to monitor set radar feeds, AIS, tidal and meteorological data. This information would assist in safe vessel management within the wind farm site and enable regulation of personnel movements and personnel tracking. There are a number of vessel management products on the market which perform this function. Through the control centre, FOR would instigate the Work Order System which exerts control over the moments of personnel and the activities in which they are engaged to safeguard those individuals and the assets of the wind farm.

The control room would also communicate regularly with the coastguard and lifeboats, and the project developers would investigate the use of Closed Circuit TV (CCTV) to visually monitor the wind farm site which could be associated with any observational research undertaken on the floating offshore structures.

In addition to the above best practice working procedures, the project developers also commit to:

- Undertaking best practice for equipment required for, and methods utilised, for personnel movements on and off turbines safely.
- Application of the BWEA/RenewableUK Wind Turbine Safety Rules in their latest revision as a means to mitigate the risks from electricity and rotating equipment during operation.
- Providing the necessary fixed system for working at height, with personnel equipment and training provided to minimise the risk of falling and the risk from dropped objects when working at height.

8. Decommissioning

KOWL would intend to maximise the use of the site during the lease period from the Crown Estate. Wind turbines typically have a design life of 20 years, while the foundations and electrical equipment may have significantly longer lives. KOWL could seek to re-power the site after the design life of the original turbines, utilising the foundations and grid infrastructure that is already in place. Any re-powering of the site would be subject to the Crown Estate consent and would be at their sole discretion.

Design considerations for all offshore constructions will ensure that the ability to decommission safely and efficiently is addressed as part of the design process.

8.1. Decommissioning Method

The wind farm would be decommissioned at the end of commercial operation, which may be 40 years if re-powering takes place. The Crown Estate lease and expected planning approval conditions will require a decommissioning plan that will be updated periodically throughout the operational life of the Kincardine Offshore Windfarm. This decommissioning plan will be drawn up with regards to the requirements of the Energy Act 2004 (revised 2011) and the UK's obligations under the OSPAR Convention for the Marine Environment of the North East Atlantic, or other legislation in place at the time of decommissioning.

Under current legislation, decommissioning of the offshore wind farm would require the removal of the following offshore structures:

- Above water structures (turbines))
- Substructures (floating foundations, mooring lines and anchors)

The decommissioning of the assets will essentially be a reverse of the installation procedure. The inter- array cables will be recovered, the sub-structures released from their moorings and towed back to port for full decommissioning and the anchor configurations retrieved and returned back to port. Essentially all assets deployed will be recovered with the possible exception of the export cable(s) which may, subject to agreement with the relevant authorities be cut and left buried on the seabed.

8.2. Site Access

It is envisaged that site access requirements during the decommissioning phase will be similar to the requirements for the construction phase.

8.3. Post Decommissioning Monitoring

Requirements for post decommissioning monitoring would be agreed between KOWL and Marine Scotland in consultation with other Scottish Government Departments and stakeholders. Details of post decommissioning monitoring would be included in a Decommissioning Plan.

It is envisaged that the turbines will either remain in place as part of a commercial wind farm, or be removed entirely and disposed of onshore. The presence of any wind farm structures that are not fully recovered or buried would be subject to monitoring for the duration, at suitable intervals, as specified in the Decommissioning Plan. The presence of any remains would be notified to mariners and would be marked on the relevant Admiralty Charts.

9. Approach to Scoping and EIA

9.1. Introduction

The EIA is an assessment of the potential impacts of the development could have on the environment. These potential impacts can be positive or negative. The scoping report identifies the significant environmental impacts which may occur and what outline mitigation methods or management can be used to reduce or removed these impacts to an acceptable level.

The EIA process is a systematic and on-going process that continues throughout the development phase until construction is complete. The process involves a detailed understanding of both the project and the environment that the project would like to install the systems in and the significance of these effects on the receptors within this area of impact from the development.

9.2. Assessment Methodology

Chapter 10 outlines all the sub-topics that are part of this scoping assessment and will follow the following assessment methodology.

- Gather baseline data – desk study, consultation and primary data collection (where appropriate).
- Identify data gaps and how further data will be collected to provide sufficient information to quantify impacts.
- Assess potential effects based on the Rochdale envelope (maximum extent) of project.
- Identify potential significant impacts and develop mitigation solutions.
- Assess residual effects following mitigation solutions.

9.3. Cumulative and in-combination Impacts

Reviewing the cumulative and in-combination impacts of this development in relation to other known developments in the area of the site (such as other offshore wind farm developments and significant onshore/marine developments) will be important for the consenting process. This will be especially important where regional biology and habitat could be impacted by the cumulative impact.

9.4. Impact Identification

To allow a more rapid review of the potential impacts, a colour coding scheme will be used for each section below.

Table 9-1 Impact key

Colour/ranking	Consideration of effects and impact significance
Positive Impact	Has a potential beneficial effect
No Impact	No impact (and therefore scoped out of the detailed investigation
Low	Effect is low/negligible (and therefore scoped out of the detailed investigation)
Medium	Potential medium effect requiring further investigation as part of the EIA to determine significance
High	Potential significant effect requiring detained investigation in the EIA
Unknown	Unknown effect required further data and/or assessment as part of the EIA

C= Construction; O&M = Operation and maintenance period and D= Decommissioning.

10. Environment

10.1. The Physical Environment

The potential for effects on the physical environment arise from the physical existence of the wind farm, the construction methods adopted and the materials used in the development. As a floating offshore structure will have a larger surface presence than a traditional offshore wind turbine structure the utilisation of the structure by nature is likely to be increased. Post-deployment monitoring of the site will be designed to allow comparison with pre-construction datasets, according to the principles of the Scottish Government's "Survey, Deploy and Monitor" policy.

The schedules and monitoring technology to be deployed at the site are likely to be the focus of an independent, EU funded assessment conducted in partnership with academia. The scope of this project is still under discussion, although the project developers intend to apply to the EU for funding under the Horizon 2020 initiative, as part of the LCE3 2014/2015 "Demonstration of renewable electricity and heating/cooling technologies call for proposals. The academic partner of choice has been identified as the Offshore Renewables Institute (recently established by the University of Aberdeen, University of Dundee, and Robert Gordon University). The post-deployment monitoring plan will include surveys of birds, marine mammals, fish and benthic communities at the project site.

The physical impact on the environment during construction is significantly reduced due to lack of impact from piling operations and the ability to undertake a significant quantity of the construction process at an offsite port location prior to placement at site.

The potential for effects of the project on the physical environment and the strategy to assess the impact of such effects will be based on the following:

Table 10-1 Summary of Physical Environment

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	10.1.1
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	10.1.2

10.1.1. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 10-2 Baseline information – Physical Environment

Type/description of data	Source	Status
Bathymetry	United Kingdom Hydrographic Office (UKHO) Admiralty Chart data (Easychart) & UKHO INSPIRE bathymetric data Seazone – HydroSpatial One data	Obtained Obtained Obtained
Geology and offshore sediments	British Geological Survey	Obtained

Type/description of data	Source	Status
	Marine Scotland Marine Scotland (onsite survey-drop down video and camera)	Obtained Obtained
Metocean data	UKHO Tidal stream data (Total Tide) Marine Scotland Aberdeen Offshore Wind Farm ADCP data ECMWF ERA Model output BSH (Budesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency)	Listed below Listed below Used in separate Metocean model Used in separate Metocean model Used in separate Metocean model
Quantitative metocean data	MEDIN data base British Oceanographic Data Centre (BODC) Meteorological Office (wave and wind data for European and UK models) Wavenet directional waverider data collection	To be used as part of the Metocean model for validation of the marine wind and wave model.
Geology and geomorphology	BGS – maps and online borehole logs BGS – Offshore bore hole logs Marine Scotland PILOT site walk over	Downloaded and being used for initial cable route assessment Onsite review of possible cable route options.

10.1.1.1. Bathymetry

There is a significant volume of publically available baseline bathymetric data currently available for the site area and therefore no additional on site survey data is required at this stage of the project development.

10.1.1.2. Metocean Data

There is a significant volume of publically available baseline data relevant to the metocean characteristics in the vicinity of the site area and therefore no additional on site survey data is required at this stage of the project development. The most appropriate datasets will be used to construct an accurate metocean model which will be used in the subsequent engineering studies. The marine model build process will use the following methodology:

1) Review of existing information (including other wind farm developments)
2) Preliminary engineering design criteria
3) Build a model on data available
4) Engineering criteria for design

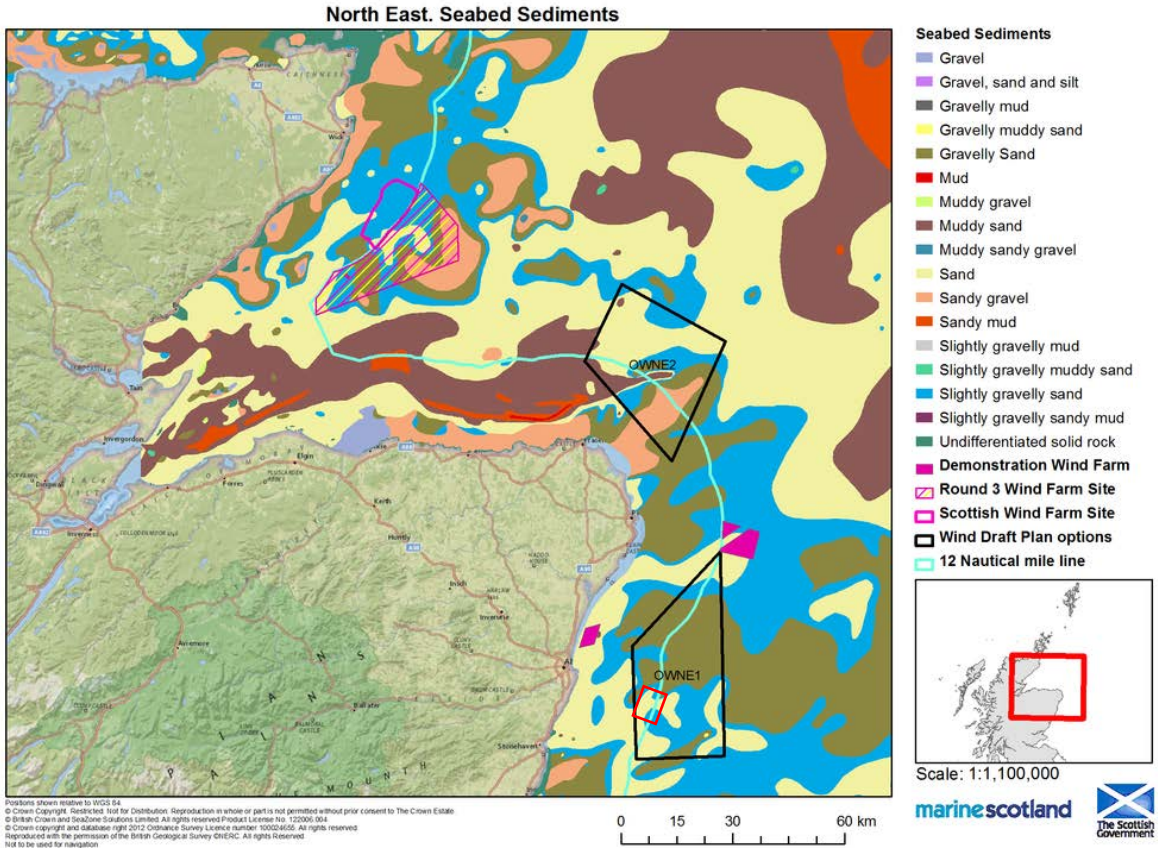
1-3 are intended to gather the available baseline data to make outline engineering design decisions and then the model will be used to undertake detailed engineering design for the site.

10.1.1.3. Seabed Sediment and Geology

The project developers have undertaken a high level desktop study investigation of sea bed conditions across the proposed site with an aim to inform the specification of geophysical surveys needed across the site. The principle sources of data characterising the sea bed are the British Geological Survey (BGS) mapping and regional reports, with additional data inputs from Marine Scotland (Figure 10-1). From those relevant to the proposed site, the surface sediment is generally composed of sand, with some sandy gravel

to the north of the site (Figure 10-1). There is evidence of rock outcrops within the deep channel at the centre of the site with steep cliffs of over 30 m noted. Associated with this feature, there is also evidence of glacial moraines within the site boundaries.

Figure 10-1 Seabed Sediments



10.1.1.4. Coastal Description

Large wind farm developments (fixed structures) have the potential to impact on the tidal flows and wave energy in the vicinity of the site due to their size and footprint on the sea bed. The presence of these fixed structures also impacts on the potential to increase sediment scour and erosion of the sea bed and associated increases in suspended sediment plumes, especially during the construction phases.

The size of the demonstrator site and the use of floating offshore wind turbines negate the impact on tidal flows and wave energy on the sea bed sediments as there is very limited sea bed contact and therefore it is expected that the installation of the demonstrator turbines will have very limited impact on the hydrodynamic processes of the site.

10.1.2. Impact Assessment

10.1.2.1. Proposed Survey

A multibeam survey of the proposed site and export cable route will be undertaken during FEED works to enable in micro-siting of the facilities. It will also assist in determination of the extent and characteristics of any bed forms present as well as detailing the location and extent of features such as the main channel running through the site to assess slope angles. Siting to date has been based on the UKHO data for the site. A sub bottom geophysical and subsequent geotechnical survey will be required to assess the depth/type of sediment at some of the anchoring points (following review of sub bottom profiling survey) and cable routes, during the FEED works. The anchor spread design and placement of the turbines will help determine the scope of the geophysical survey to be conducted later in the FEED studies. Due to the use of Floating sub-structures for the turbine foundations and the use of anchoring systems rather than piling systems, it is anticipated that sub bottom information will not be required below circa 8 m below seabed level.

No additional site surveys are planned for metocean data sets as the currently available data are sufficient to undertake a suitable and fit for purpose metocean assessment.

10.1.2.2. Data Analysis

The metocean, bathymetric, geological and geomorphological data will be used to understand the possible impact the cable route and mooring could have on the seabed and will be used to identify the location of large scale bed forms and hard rock outcrops. Additionally the bathymetry data will be used to precisely chart the location of the wreck located within the site to ensure sufficient offset on anchor spreads and subsea cabling is achieved.

It is not expected that a coastal processes study will be required as part of this demonstrator project as the small number of floating offshore structures will not have a measureable impact on the shore line to the west of the site as this is predominantly a hard rock coastline with significant water depths adjacent to the coast. The nearest sensitive receptors being:

- Sands of Forvie (17 nm / 32 km to the North West) (SPA)
- Foveran Links (16.5 nm / 31 km to the North West) (SSSI)

As these sensitive receivers (areas where there are soft sediments) are a significant distance from the site, there will not be a measureable impact from the demonstrator site at these sites and therefore this has been removed from the scope of the study.

10.1.2.3. Consultation

Marine Scotland has provided additional data sources as part of the initial consultation process and this data (as seen above) will be used as part of the desk based studies.

10.1.2.4. Data and information Gaps

No data gaps have been currently identified, with the onsite survey fulfilling the remaining data requirements for the site.

10.1.2.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the physical environment and the coastal sediment dynamics of the area are considered in Table 10-3 below.

Table 10-3 Potential impacts on physical processes and sediment dynamics

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Changes to wave climate	Low	Low	Low	The limited number of demonstrator WTG units is likely to have a very small impact on the wave climate and only within a localised area (<1 km) and therefore impacts are very limited.	No
Changes to local currents	No Impact	Low	No Impact	The limited number of demonstrator WTG units is likely to have a very small impact on the current and only within a localised area (<1 km) and therefore impacts are very limited.	No
Increases in suspended sediment	Low	No Impact	Low	During the installation and removal of the subsea cables and anchors there will be a limited, localised increase in suspended sediment at the base of the water column. There will be no suspended sediment generated during the O&M phase. Therefore	No

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
				there is limited impact from this on the local environment.	
Changes to seabed morphology	Low	Positive Impact	Low	During the installation and decommissioning of export and array cables there will be very limited localised changes to the seabed morphology. During the O&M phase there will be a positive impact as there will be no anthropogenic impacts on the seabed during this period (trawling) and therefore this will allow stable seabed morphology to be established.	No
Seabed scour	Low	Low	No Impact	Localised scour is likely to form around anchors and any seabed obstructions. The impact of this scour will only extend to a maximum of 25 m from any structure due to the low profile of all objects. There will be no region scale impacts from scour. Scour is unlikely to occur along the export cable route as the cable will be buried. This will be review as part of a desk based assessment.	Yes
Changes to Coastal process	No Impact	No Impact	No Impact	There will be little or no impact on the coastal process at the cable landing point as the cable will be directionally drilled.	No
Disturbances to contaminated sediments	No Impact	No Impact	No Impact	There is one known dredge disposal site in the vicinity of the export cable (option 1) and this is used by the Port of Aberdeen. The cable route will not enter this area and therefore there is very limited chance of disturbing contaminated sediments.	No

10.1.2.6. Justification for Removal from Assessment

Due to the small scale of the project the potential impact on the physical environment is very low. As the site is located 8-10 nm offshore from the Scottish coastline and the number of WTGs proposed is small, the potential to impact on the wave / wind / sediment climates for this coast are insignificant. Any potential impact would also be mitigated by the coastline itself as the adjacent section of coastline is of rock and cliff lines and therefore the potential for impact is also very low. Therefore additional works on the physical process sections, other than a desk based scour assessment noted above, have been scoped out of the EIA process at this stage.

10.2. Water and Sediment Quality

The potential for effects of the project on water and sediment quality and the strategy to assess the impact of such effects will be based on the following:

Table 10-4 Summary of Water Quality Strategy

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	10.2.1
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	10.2.1 10.2.2

The effects of cable laying on sediment dynamics at the site will only impact during the act of cable laying and burial and will not result in a long term bed form changes at site. Therefore there is not a significant ongoing operational issue in terms of sediment plumes being generated from the site and the impact from the use of floating offshore platforms will have very limited impact, when compared to fixed structure wind farms, on the suspended sediment and water quality in the area surrounding the site.

An assessment of the potential water quality and sediment disturbance will be undertaken for the burial of the export cable and the sea bed termination of the directional drill borehole. This will be in the form of a desk based assessment which will review the available onsite data and assess the impacts that such operations could have on the localised environment during the limit construction phase.

10.2.1. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 10-5 Baseline information- Water Quality and Sediments

Type/description of data	Source	Status
Existing sediment quality e.g. disposal sites	Marine Scotland UKHO Bathymetric charts	Obtained
Bathing waters and Scottish Water discharge locations	SEPA	Obtained

10.2.1.1. Sediment Quality

There are no known sediment quality issues associated with the KOWL site or within the identified export cable routes. Localised dredge disposal sites for the Port of Aberdeen have been avoided. Currently MS are not aware of any other disposal locations in the location to the cable landing site and therefore there is a very low risk of remobilisation of contaminated sediments.

10.2.1.2. Water Quality

There are no known water quality issues associated with the KOWL site or within the identified export cable route. The closest bathing water beaches are located to the north of Aberdeen (Aberdeen) and to the south at Stonehaven. A long sea outfall (Scottish Water) is located to the south of Nigg bay and this extends out approximately 300 m offshore (its installation geotechnical data is useful for near shore assessment of surface layer assessment and underlying hard rock geology).

10.2.2. Impact Assessment

10.2.2.1. Proposed Survey

As part of the geotechnical survey for the cable route, sediment cores will be obtained to inform the cable route assessment. Surface sediment samples will be obtained for an appropriate number of cores and these will undergo a full FEPA contamination and sediment class assessment as outlined within the Marine (Scotland) Act 2013 in relation to sediment movement.

10.2.2.2. Consultation

No additional consultation has been undertaken at this time as the data review has indicated limited impact from the development on the water and sediment quality at the site and associated cable route.

10.2.2.3. Data Gaps

No data gaps have been currently identified, with the onsite survey fulfilling the remaining data requirements for the site.

10.2.2.4. Identification of Potential Impacts

Possible impacts relating to the potential changes to the water and sediment quality of the area are considered in Table 10-6 below.

Table 10-6 Potential impacts on water and sediment quality.

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Pollution of the water and sediment through disturbance of the existing contaminated sediments	Low	No Impact	Low	There is a very low potential for remobilisation of older existing contaminated sediments, as there are no known dredge disposal sites in the area of either the site or the proposed cables routes.	No
Pollution of water and sediments from unplanned leaks and spills (WTG systems or vessels)	Low	Low	Low	Accidental pollution events at site from either the floating systems or vessels will be limited due to the small number of turbines, the installation methods, and the small number of O&M visits to site. Maritime safety good practices and procedures will be used to mitigate any emergency spill procedures and will be covered with the emergency response plans put in place.	No

10.2.2.5. Justification for Removal from Assessment

A review of the potential impacts on water and sediment quality from the development have identified no potential significant impacts, with the limited impacts being associated with very localised scour issues that are unlikely to have any impact on the surrounding seabed or water column. Any potential release of contaminants during the life of the development would be expected to be limited and controlled by emergency response plans associated with each activity (to be developed as part of the overall project).

Therefore all above elements have been scoped out of further investigation.

10.3. Air Quality

The potential for effects of the project on air quality and the strategy to assess the impact of such effects will be based on the following:

Table 10-7 Summary of Air Quality Strategy

EIA Process	Overview of approach	Relevant Section
Baseline Information	No potential for air quality impacts have been identified for this development. Due to the construction methodology there is limited on site activity during construction phase, when compare to other offshore wind farms. O&M impacts will be limited and with the close proximity of the Port of Aberdeen it will not significantly increase total vessel emissions for the area.	10.2.1

10.3.1. Justification for Removal from Assessment.

During the construction and decommissioning phase, effects to air quality would be slight and temporary due to the location of the site and the relatively low amount of construction work offshore. During operation of the

wind farm there would be no atmospheric emissions as a direct result of the energy generation. There will be some atmospheric emissions associated with the operational and maintenance period of the site as vessels will be used to transport staff to the platforms. However the impact of this long term use is still considered to be insignificant due to the small scale of this demonstrator development and therefore air quality is not specifically assessed in the environmental statement.

Table 10-8 Potential impacts on air quality.

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Emissions from vessels	Low	Low	Low	Vessel emissions will be low due to the size of the demonstrator project, and due to the construction and decommissioning approach there will be limited onsite activity of large vessels.	No
Production of electricity	N/A	Positive	N/A	The demonstrator site will have up to 48 MW of installed generating capacity, which will be produced with zero emissions and therefore this is will be of significant benefit to air quality in Scotland.	No
Construction methods	Positive	Low	Positive	As a significant percentage of the construction effort is undertaken away from site and there will be a significant reduction of onsite construction vessel emissions, when compared to a fixed offshore wind farm development.	No

10.3.1.1. Approach to the Assessment of Impacts

As no potential impacts on the air quality have been identified as part of the initial assessment no impact assessment strategies are required as part of this EIA. Therefore air quality has been scoped out of further investigation.

10.4. The Biological Environment

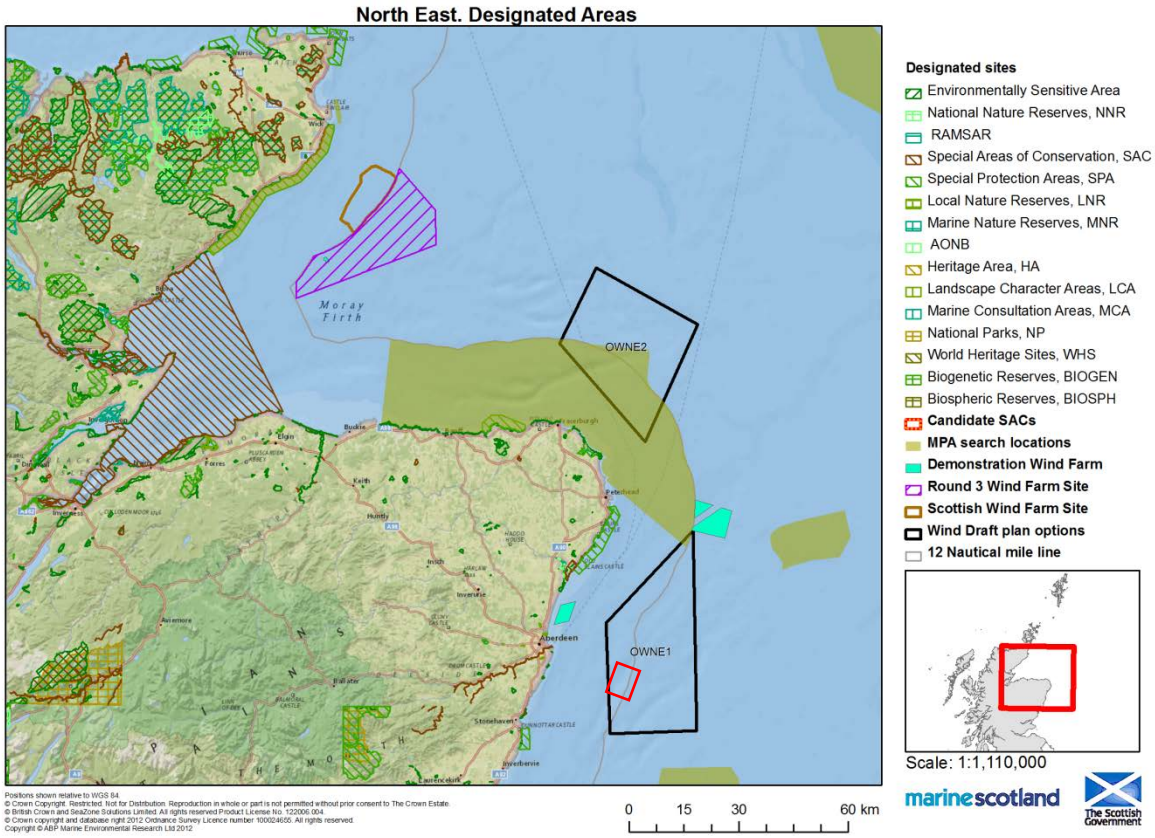
A study of the biological environment for offshore wind farm development (turbine locations, inter-array cables, and cable route to shore) considers potential ecological effects on both marine species including marine ecology (benthic organisms, fish, seabirds and marine mammals). Marine Scotland as part of their support of the offshore renewable sector has already undertaken a significant video, still photo and grab sample survey of the site and therefore this data will be reviewed as part of the site assessment. It is currently assumed that this data is of sufficient quality and quantity to remove the requirement to undertake additional on site sea bed biological surveys as part of the consenting process.

10.5. Site Description

As described in Section 2 above the site is located inside the Scottish Territorial Waters, to the east of Stonehaven and south-east of Aberdeen. The water depth ranges from 45 to 145 m across the site, with a distinctive deep channel running through the site in a NE/SW orientation.

As noted in Section 2.7 and Figure 10-2, the site is not located within a marine protected area and the nearest protected area is the Fowlsheugh SPA bird reserves to the south of Aberdeen. The indicative grid connection route currently proposed will make land fall at Nigg Bay, which is located to the north of the Fowlsheugh SPA site. Local site information will be collated and assessed and consultation with statutory nature conservation organisations will be undertaken (SNH and JNCC) to ensure that the export cable route is assessed for potential ecological impacts.

Figure 10-2 Designated Areas



10.6. Fish, Shellfish and Benthic Ecology

10.6.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the fish, shellfish and benthic ecology will be based on the following:

Table 10-9 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	10.6.1
Impact assessment	Assessment of desk based data and potential impacts Impact assessment	10.6.3

10.6.1. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 10-10 Baseline information – Fish, Shellfish and Benthic ecology

Type/description of data	Source	Status
Review of literature and analysis of Marine Scotland benthic survey data and additional fish catch data.	Marine Scotland; CEFAS, literature; SFF, local fishing federations	Obtained and undergoing review

10.6.1. Desk Based Review of Existing data

Information describing offshore fish and shellfish benthic habitats within or in the vicinity of the project area is relatively high due to the recent Marine Scotland survey and this will form the main input into the benthic ecology review of the site (18 sites with 36 video and over 200 still photos of the sea bed). Additional local data sources will be used i.e. local fishing data to complete the overall site assessment which is currently collated by Marine Scotland. The following are relevant sources of data for this area:

- Marine Scotland;
- DECC
- MESH (Mapping European Seabed Habitats);
- NBN (National Biodiversity Network);
- DASSH (Data Archive for Seabed Species and Habitats);
- Fisheries Research Services / Marine Scotland
- DECC SEA5 [40];
- MarLIN Marine Life Information Network;
- OSPAR Convention for the Protection of the marine Environment of the North-East Atlantic;
- JNCC Habitat Classification

The proposed export cable corridor is still to be confirmed and therefore there are currently no site data available at present. Following the completion of the side scan survey work the sea bed will be reviewed for any significant biological areas these will be identified and selected to future survey work as part of the detailed cable route design which will take place after consent.

10.6.1.1. Elasmobranch Species

Elasmobranchs are fish species which include sharks, rays and skates. All elasmobranchs are cartilaginous fishes, whose skeletons are composed of cartilage, rather than bone. These animals are collectively referred to as elasmobranchs because they are in the Class Elasmobranchii. Shark species expected to be present in the proposed AfL Area and along the export cable route corridor include basking shark (*Cetorhinus maximus*), tope (*Galeorhinus galeus*), spurdog (*Squalus acanthias*), lesser spotted dogfish (*Scyliorhinus canicula*) and porbeagle (*Lamna nasus)*, kitefin (*Dalatias licha*), shortfin mako (*Isurus oxyrinchus*), blue (*Prionace glauca*) and nurse hound (*Scyliorhinus stellaris)* (Faber Maunsell, 2007 [41], MarLIN www.marlin.ac.uk).

The basking shark (*Cetorhinus maximus*) is the second largest fish in the world, potentially reaching up to 11m in length, and a weight of up to 7 Tonnes. The shark is a K-selected species, typified by slow growth, large size, late sexual maturity (at 16-20 years), and produces irregular litters of up to six living pups of around 1.5m in length after a long gestation period (1-3 years) (SNH 20095[42]).

The basking shark is currently protected within the 12 nm limit of Scotland under the Wildlife and Countryside Act 1981, as amended. In addition, the species has been included as a priority species in the Scottish Marine Wildlife Watching Code (SMWWC) that was introduced in 2006. It also has legal protection in England and Wales under the Wildlife & Countryside Act (1981) and the Countryside and Rights of Way Act (2000). The majority of basking sharks sighted (70%) in Scottish Waters were solitary animals (Nicholson 2000[43]) and the majority of sightings are on the west coast of Scotland, with very limited numbers reported on the east coast of Scotland.

10.6.1.2. Diadromous Species

Diadromous fish spend part of their life at sea, but migrate up rivers in order to breed. These include the following commercial sensitive species Atlantic salmon (*Salmo salmo*), sea trout (*Salmo trutta*) and the European eel (*Anguilla anguilla*).

[40] Eleftheriou, A. Basford, D. & Moore, D.C. (2004). Synthesis of information on the benthos area SEA 5. Report for the Department of Trade and Industry, SEA 5, 145 pp.
[41] Faber Maunsell (2007) Marine renewables SEA environmental report. Section C7 Fish and shellfish.
[42] SNH 2009 Basking Shark Hotspots on the West Coast of Scotland: Key sites, threats and implications for conservation of the species. Report 339.
[43] Nicholson, D., Harris, E. & Pollard, S. (2000). The location and usage of sites in Scotland by the basking shark Cetorhinus maximus.Scottish Natural Heritage Commissioned Report F99AA402.

Atlantic salmon are listed on Annexes II and V of the European Union's Habitats Directive and the Rivers Dee, Spey and South Esk have all been designated as SACs for their Atlantic salmon populations. The potential for the development to impact these important SACs will be assessed as part for HRA that will be undertaken as part of this EIA and consent process and the review will be undertaken by Marine Scotland, with consultation with SNH.

10.6.1.3. Shellfish, Crustaceans and Spawning Grounds

The seabed within the KOWL zone is characterised by water depths of between 45 m and 145 m below CD and is dominated by sand, sandy gravel and gravelly sand substrates. Such sedimentary habitats, due to their dynamic nature, are generally species of low biodiversity and tend to be characterised by a mobile fauna of polychaete worms, bivalve molluscs, crustaceans and starfish. This is supported by the findings of Jennings *et al.* [44] Marine Scotland data will be used to establish the detailed characteristics of this area from the recent survey data (2013). In 1982, Dyer *et al.* [45] recorded, in the central North Sea between latitudes of 57° and 55°, a community dominated by the king scallop (*Pecten maximus*) and white sea urchin (*Echinus acutus*). Currently the site is believed (from review of Marine Scotland data) to have a lack of cold water reefs (Annex 1 of the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) and as the site has historically been trawled and is a mobile sand environment it is unlikely that any reef systems are currently present at the proposed site.

Extensive seabed mapping of datasets exists through Marine Scotland, comprising coastline and administrative areas, physical data (bathymetry, seabed geology), validation samples, seabed images, modelled outputs, seabed habitat data and biological sample data.

The report on fish sensitivity in British waters by Coull *et al.*[46] provides a series of maps describing the approximate spatial extent of individual fish spawning and nursery grounds around the UK. Digital data layers available from CEFAS which replicate this information have been used within a Geographical Information System (GIS) to determine those species which may potentially be found within or in proximity to the site. These are shown in Figure 10-3 and Figure 10-4 below.

[44] Jennings *et al.* (cited in Eleftheriou *et al.* 2004).

[45] Dyer *et al.* (cited in Eleftheriou *et al.* 2004)

[46] Coull, KA, Johnstone, R, and Rogers SI. (1998). Fisheries Sensitivity Maps in British Waters.

Figure 10-3 Kincardine Offshore Windfarm site fish spawning grounds

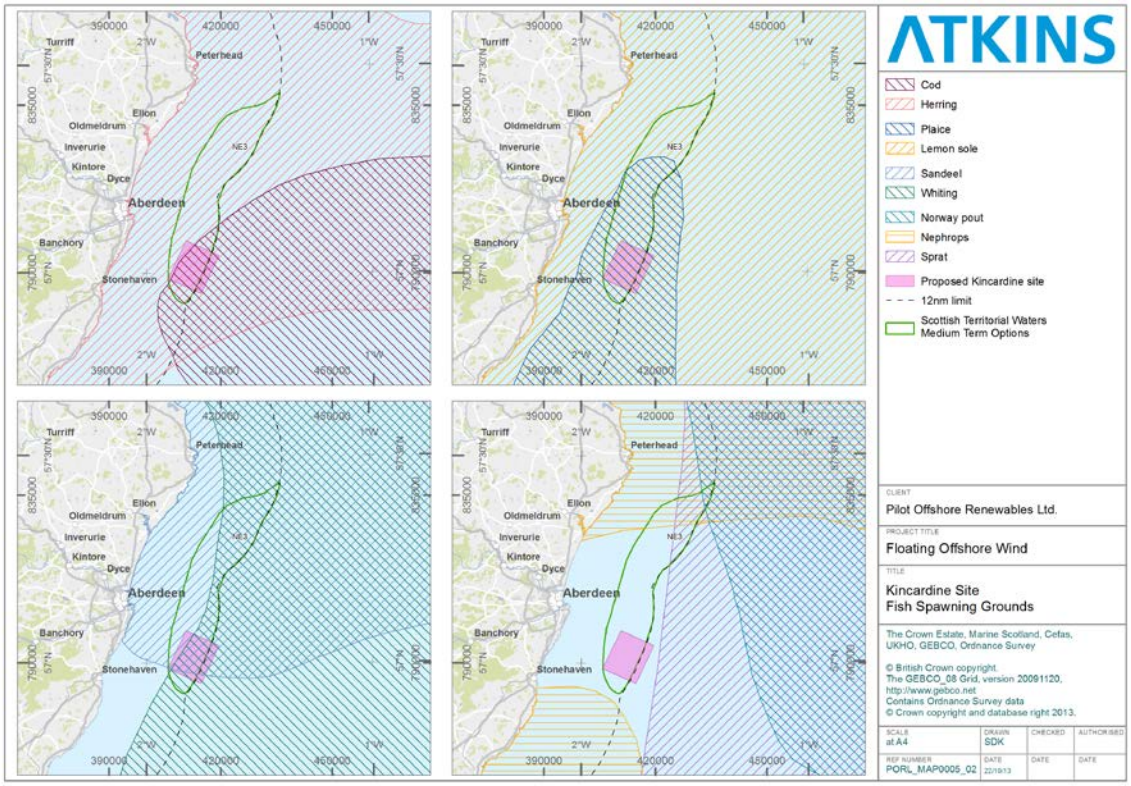
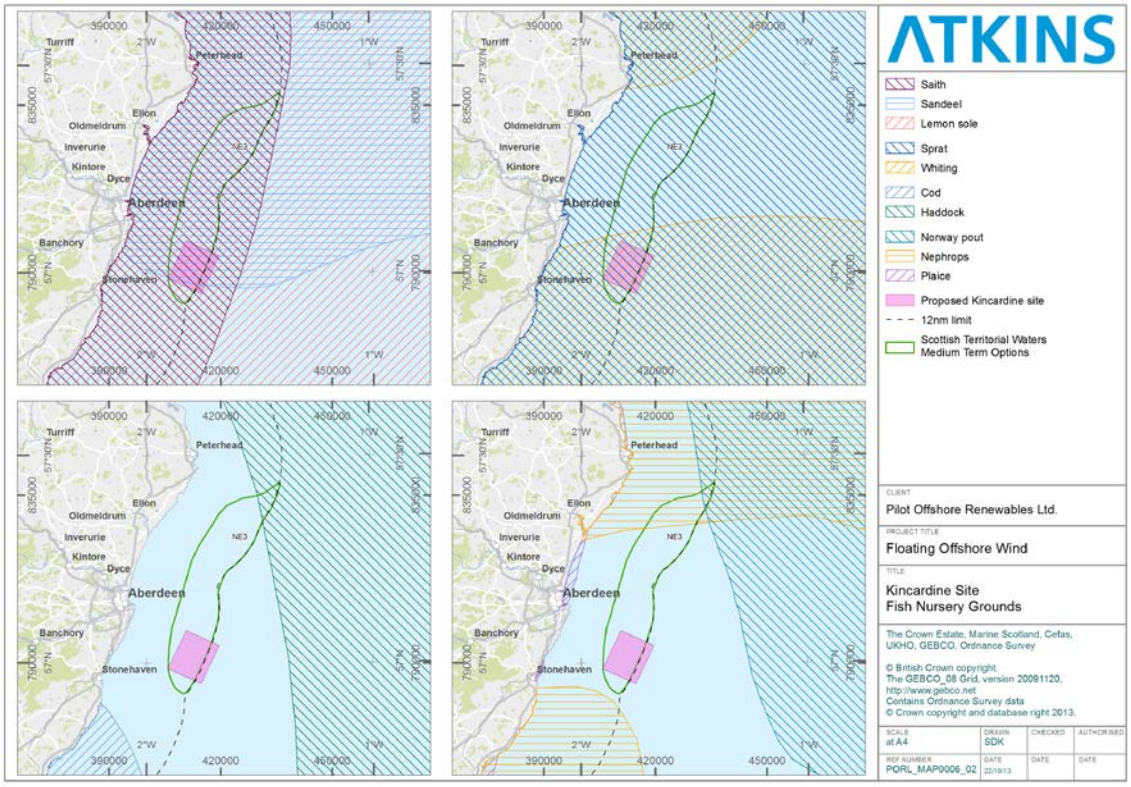


Figure 10-4 Kincardine Offshore Windfarm Site fish nursery grounds



It is proposed that the study area will be based upon the International Council for the Exploration of the Seas (ICES) rectangles that cover the territorial waters in the vicinity of the site. The spatial extent of the wind farm study area will provide sufficient ecosystem coverage in order to provide a robust and scientifically valid assessment of impacts.

Fisheries data collected will be used to help determine the relative abundance, distribution and use of the offshore area by fish and shellfish species as well as developing an understanding of any specific linkage to terrestrial catchments, cable corridors, inter-array cables and landfall. Data will be sought to determine important spawning areas, nursery areas and migration routes. Particularly sensitive species and of conservation importance will be highlighted (e.g. UK Biodiversity Action Plan species/UK Priority species).

Surveys of fish and shellfish may be carried out as part of the baseline information and to assess any potential impacts identified for specific species and influences on their lifecycle ecology.

The potential direct and indirect impacts from offshore wind farms on fish ecology and resources (see for example Cefas[47], Ospar[48]) may include:

- Disturbance and/or displacement from spawning, nursery, feeding grounds and migratory routes due to noise from pre-construction acoustic surveys and construction activities including the placement of turbines, piling and scour protection and specifically for floating turbines – anchor placement.
- Disturbance, displacement and or physical injury from construction/installation noise.
- Changes to the ecosystem (e.g. a decrease in water quality due to sediment disturbance during installation).
- The creation of electromagnetic fields associated with inter-array and export cabling of the operational wind farm.
- Changes in biodiversity due to habitat changes associated with cable of the operational wind farm.
- Changes to the foraging areas of fish predators (birds and mammals) due to the habitat changes mentioned above.

Impacts will be evaluated as part of the EIA process and monitoring programmes review

The booklet 'Fishery Sensitivity Maps in British Waters'[49] contains maps compiled from data collected by the Fisheries Research Service (FRS, now Marine Scotland) and CEFAS which show the approximate spatial distribution of spawning and nursery grounds for individual species of fish in UK waters. These data are also available as GIS layers which have been used to identify the species that are present within the site which include; cod, herring, lemon sole, and plaice, saith, sandeel, sprat and whiting. Herring spawning and nursery grounds in particular are considered sensitive and vulnerable to anthropogenic influences. Activities that have an impact on the seabed (such as sand and gravel extraction or construction activities) may be expected to impact on herring spawning[50]. The International Council for the Exploration of the Sea (ICES) HAWG report advises that "no gravel extraction occurs in areas with spawning grounds during the spawning season or within 1 month before or after this period, as this coincides with herring spawning in the area and larval egg development"[51]. It is believed that the wind farm installation periods can be designed to take into account important fish species in the area and in particular herring spawning periods to minimise impacts.

10.6.2. Electromagnetic Fields

SNH (2010c) and COWRIE (2009) have both undertaken significant reviews of the currently available data on the potential impact that sub-sea electrical cables, which are associated with offshore renewable developments, could have on key conservation species, namely Atlantic Salmon (*Salmo salar*), sea trout (*Salmo trutta*) and European eel (*Anguilla anguilla*). Both reviews indicated that current knowledge suggests that EMFs from subsea cables and cabling orientation may interact with migrating eels (and possibly salmonids) if their migration or movement routes take them over the cables, particularly in shallow waters (<20 m) (SNH 2010c), which should mean the KOWL cabling should not impact on movements.

[47] Cefas (2004). Offshore Wind Farms – Guidance note for Environmental Impact Assessment in respect of FEPA and CPA requirements, Version 2 – June 2004
[48] Ospar (2010). Assessment of environmental impact of offshore wind-farms
[49] Coull KA, Johnstone R, and Rogers SI. (1998). Fisheries Sensitivity Maps in British Waters.
[50] ICES (2012). Report of the Herring Assessment Working Group for the Area South of 62 N (HAWG). ICES HAWG Report 2012, ICES CM 2012/ACOM:06
[51] ICES (2012). Report of the Herring Assessment Working Group for the Area South of 62 N (HAWG). ICES HAWG Report 2012, ICES CM 2012/ACOM:06: 73

As part of the COWRIE work, onsite assessments have concluded that the subsea cables have an impact, but that the response is not predictable and that impacts are species-dependent and individual-specific. Both of these detailed, current reviews put forward additional programmes of work to gain a greater understanding of the potential impacts of subsea cables, but it is clear that all species interact with cables during their transit to deep ocean and that the this does not appear to impact on their migration cycles or the current knowledge base does not allow any detail conclusive findings to observe evidence of impact.

It is apparent that the potential impact of EMF from subsea power cables is an ongoing research topic and that as part of the EIA process any additional research conclusions will be used to help inform the cable design and burial options and the project development.

10.6.3. Impact Assessment

10.6.3.1. Survey Requirements

The SFF have provide the project with significant data associated with catch details for the area of the development, and although this will not be disseminated within the EIA report, this data will provide valuable information that will negate the need for additional fish based survey. This information will be then assessed against the available data which has been obtained from Marine Scotland, SNH and SEPA.

Surveys of the benthos have already been undertaken as part of the recent Marine Scotland survey and this data will be used to assess the extent of any impacts during the construction, operation and decommissioning phases in and around the development site. It should be noted that the demonstrator project is firstly of limited size and secondly as they are floating structures there is limited impact on the sea bed and the associated benthos from their presence.

The Marine Scotland survey data will be used to assess the benthic habitats and species of the site and these will be compared to the wider environment. Additional survey work could be required in the cable route areas, but this will only be confirmed following detailed cable route design and this will not take place until the detailed engineering phase following consent.

10.6.3.2. Consultation

Additional consultation and data will be gathered or requested from the following sources to provide more site specific information on the benthic ecology of the site. These will include:

- Marine Scotland – Marine and Fisheries - http://www.scotland.gov.uk/topics/marine
- Marine Scotland Science - http://www.scotland.gov.uk/Topics/marine/science
- DECC Offshore Energy SEA (OESEA & OESEA2) – Regional Sea 1 - https://www.gov.uk/offshore-energy-strategic-environmental-assessment-sea-an-overview-of-the-sea-process
- Centre for Environment, Fisheries and Aquaculture Science (Cefas)
- Universities (e.g. University of Aberdeen, University of St. Andrews)
- Scottish Environmental Protection Agency (SEPA)
- SNH

10.6.3.3. Data and information Gaps

No data gaps have been currently identified for the site, as the onsite data obtained by Marine Scotland (drop camera, video and grab sample data) is sufficient to determine the benthic ecology of the sea bed at the site.

10.6.3.4. Identification of Potential Impacts

Possible impacts relating to the potential changes to the fish and shell fish and benthic ecology in the area are considered in Table 10-11and Table 10-12 below.

Table 10-11 Potential impacts on fish and Shell fish

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Reduction in fishing activity around development.	No Impact	Positive	No Impact	The installation of the turbines and their associated mooring systems will limit the fishing activity within the development area, which could result in a net increase in fish stock within the development area.	Yes
Colonisation of structure and seabed features	No Impact	Positive	No Impact	The infrastructure associated with the project will over time act as an additional habitat for colonisation. This will generate a positive impact for the site development. A review of older offshore installations could be undertaken to estimate positive benefit to site.	Yes
Protection of seabed from destruction by trawling activities.	No Impact	Positive	Low	The closure of the area to trawling activities would potential allow the seabed to stabilise and encourage development of the benthic environment. This will be assessed in more detail as part of the EIA.	Yes
Introduction of new species to local ecosystem	No Impact	Low	No Impact	There is a potential for non-native species to be transported to the site in the ballast water of the WTG structures. However it is expected that construction will occur within Scotland and therefore there is a very limited potential for this to occur.	No
Smothering of the seabed	Low	No Impact	Low	During the installation of the subsea cables there is a potential for limited smothering of the surrounding seabed from the trenching work. The impact will be very localised and short term and therefore the potential impact is low.	No
Direct loss of seabed habitat	Low	Low	Low	The installation of the mooring systems (anchors) and array cabling will require disturbance of the seabed but this will be very limited in scale and therefore the potential impact to the benthic environment will be low. Relative to the positive benefit of the no trawling area generated by the project this represents a small fraction of the seabed disturbance.	Yes
Accidental release of contaminants	Low	Low	Low	Due to the small scale of the project and the number of vessels required to undertake the construction/O&M/decommissioning there is a limited potential for release of contaminants. Construction industry good practices will be used to mitigate any incident and will be covered within the site emergency procedures.	No
Seabed scour due to changes in sediment/scour potential at site.	Low	Low	Low	The water depth of the site and the size of the installed sea bed features will have a low potential to impact local scour/sediment regimes. Any additional scour will be very localised to objects on the sea bed and therefore this has been scoped out of the EIA process.	No

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Electromagnetic fields (EMF)	No Impact	Low	No impact	The presence of the electromagnetic field associated with the WTG and the subsea cables could impact on the behaviour, distribution and abundance of certain commercial fish species.	Yes

Table 10-12 Potential impacts on benthic ecology

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Colonisation of structure and seabed features	No Impact	Positive	No Impact	The infrastructure associated with the project will over time act as an additional habitat for colonisation. This will generate a positive impact for the site development. A review of older offshore installations could be undertaken to estimate positive benefit to site.	Yes
Protection of seabed from destruction by trawling activities.	No Impact	Positive	Low	The closure of the area to trawling activities would potential allow the seabed to stabilise and encourage development of the benthic environment. This will be assessed in more detail as part of the EIA.	Yes
Introduction of new species to local ecosystem	No Impact	Low	No Impact	There is a potential for non-native species to be transported to the site in the ballast water of the WTG structures. However it is expected that construction will occur within Scotland and therefore there is a very limited potential for this to occur.	No
Smothering of the seabed	Low	No Impact	Low	During the installation of the subsea cables there is a potential for limited smothering of the surrounding seabed from the trenching work. The impact will be very localised and short term and therefore the potential impact is low.	No
Direct loss of seabed habitat	Low	Low	Low	The installation of the mooring systems (anchors) and array cabling will require disturbance of the seabed but this will be very limited in scale and therefore the potential impact to the benthic environment will be low. Relative to the positive benefit of the no trawling area generated by the project this represents a small fraction of the seabed disturbance.	Yes
Accidental release of contaminants	Low	Low	Low	Due to the small scale of the project and the number of vessels required to undertake the construction/O&M/decommissioning there is a limited potential for release of contaminants. Construction industry good practices will be used to mitigate any incident and will be covered within the site emergency procedures.	No
Seabed scour due to changes in sediment/scour	Low	Low	Low	The water depth of the site and the size of the installed sea bed features will have a low potential to impact local scour/sediment regimes. Any additional scour will be very	No

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
potential at site.				localised to objects on the sea bed and therefore this has been scoped out of the EIA process.	
Electromagnetic fields (EMF)	No Impact	Low	No impact	The presence of the electromagnetic field associated with the WTG and the subsea cables could impact on the behaviour, distribution and abundance of certain commercial fish species.	Yes

Table 10-13 Impact assessment strategy for benthic ecology, fish and shell fish

Potential impact	Assessment method	Relevant guidance
Colonisation of structure and seabed features	Review of literature on previously installed installations in northern North Sea.	Marine Scotland JNCC SNH OSPAR, 2006 Review of current state of knowledge of the environmental impacts of the location, operation and removal/disposal of offshore wind farms. OSPAR 2010 Assessment of environmental impact of offshore wind farms.
Protection of seabed from destruction by trawling activities.		
Direct loss of seabed habitat		
Electromagnetic Fields	Review of recent research undertaken on offshore wind farms and review of guidance	COWRIE Electromagnetic Fields (phase 1 &2) SNH

10.7. Ornithology

10.7.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the ornithology will be based on the following:

Table 10-14 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	10.7.2
Impact assessment	Assessment of desk based data and potential impacts Impact assessment	10.7.3 - 10.7.15 10.7.16

10.7.2. Baseline Information – desk based

There are a number of sources of ornithological data covering the coastal, inshore (<12NM) and offshore (>12NM) areas of south-east Scotland and north-east England, obtained from offshore seabird surveying, seabird colony monitoring, Non-Governmental Organisation (NGO e.g. RSPB, BTO & Forth Seabird

Monitoring Group) recording.[52],[53] The search area for the project includes ornithological populations of interest from Fowlsheugh to the south, and the Ythan Estuary and Sands of Forvie in the north.

The following baseline data has been collected from the following sources:

Table 10-15 Baseline information – Ornithology

Type/description of data	Source	Status
WWT Aerial Survey Data	WWT	Obtained
European Seabirds at sea (ESAS) database	JNCC http://jncc.defra.gov.uk/page-4469	Obtained
National Seabird Census (Seabird 2000)	JNCC website http://jncc.defra.gov.uk/page-1548	Obtained
Seabird Monitoring Programme	JNCC website http://jncc.defra.gov.uk/page-1550	Obtained
RSPB species-specific surveys	RSPB	Obtained
BTO Data records	BTO	Obtained
Regional database (North-east Scotland, Angus & Dundee, Fife Bird, Isle of May, Lothian, Borders and Northumberland &Tyneside)	Various sources	Obtained
SPA Citations	SNH	Obtained
Bass Rock Gannets – satellite telemetry studies	Hamer et al (2000, 2001)	To be obtained and reviewed

10.7.3. Desk Based Review of Existing data

North of Aberdeen, the Ythan Estuary and Sands of Forvie are particularly sensitive and hold numerous designations including: the Ythan Estuary, Sands of Forvie and Meikle Loch SPA, Ramsar and Important Bird Area (IBA) (important for three species of tern and large numbers of waders, ducks and geese); the Sands of Forvie SAC (several Annex I dune habitats) as well as SSSIs, GCRs, Forvie Biogenetic Reserve and National Nature Reserve (NNR). The Buchan Ness to Collieston Coast SPA and Buchan Coast to Collieston SAC are found just to the north of Forvie. The SPA is an important nesting area for a number of seabird species (gulls and auks) which feed outside the SPA in nearby waters as well as more distantly.

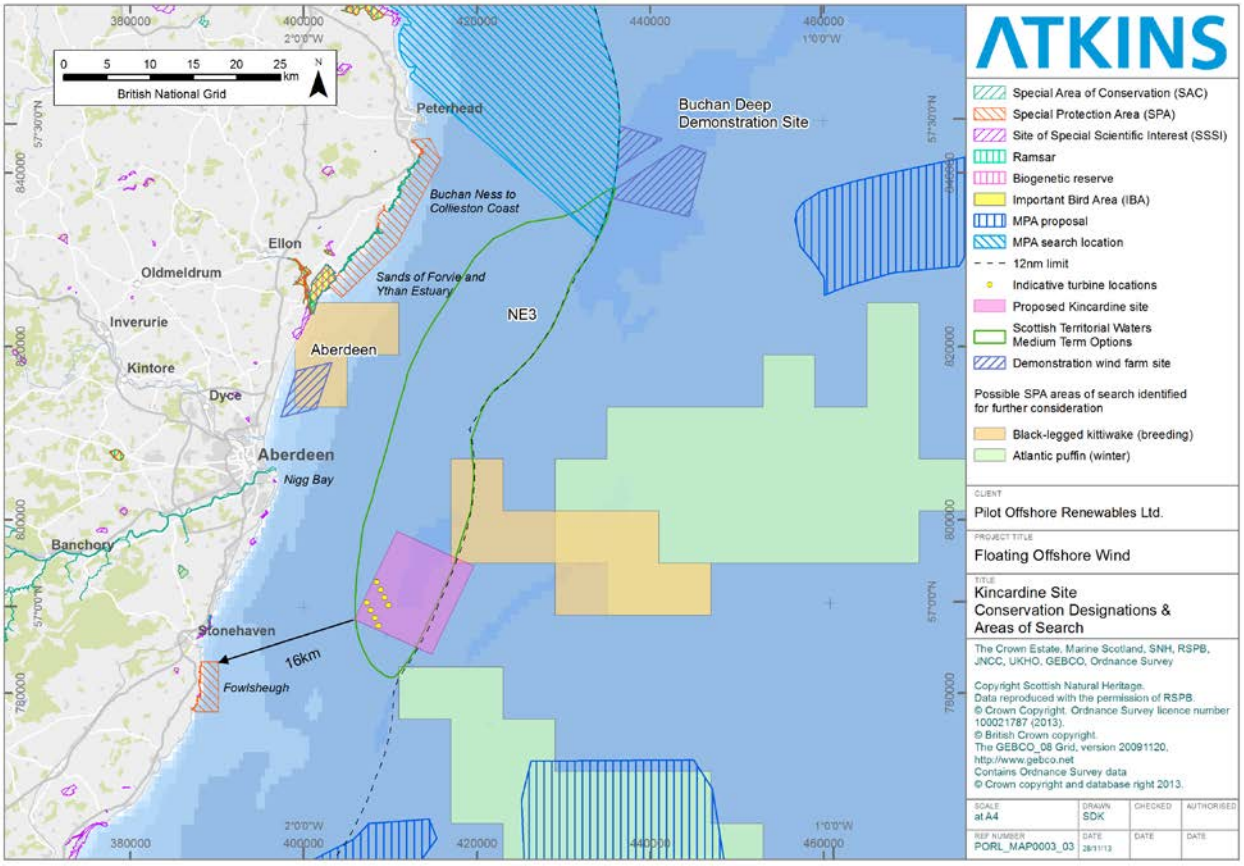
Fowlsheugh SPA to the south west is an area of sheer cliffs 30-60m high providing nesting sites for seabirds and supporting major numbers of breeding birds especially gulls and auks which feed outside the SPA in nearby waters and the North Sea. From Fowlsheugh north to Aberdeen there are a number of other sites including Garron Point SAC, several Sites of Special Scientific Interest (SSSI) (Crawton Bay, Fowlsheugh, Garron Point, Findon Moor, Cove and Nigg Bay) and a number of Geological Conservation Review sites which also include Nigg Bay. The River Dee, designated as an SAC enters the North Sea at Aberdeen Harbour. It is important for the Annex II species Freshwater pearl mussel (*Margaritifera margaritifera*), Atlantic salmon (*Salmo salar*) and Otter (*Lutra lutra*).

[52] Dean, B.J., Webb, A., McSorley, C.A., Schofield, R.A. & Reid, J.B. (2004) Surveillance of wintering seaducks, divers and grebes in UK inshore areas: Aerial surveys and shore-based counts 2003/04. JNCC Report No. 357

[53] Lewis, M., Wilson, L.J., Söhle, I., Dean, B.J., Webb, A. and Reid, J.B. (2008). Wintering sea ducks, divers and grebes in UK inshore areas: Aerial surveys and shore-based counts 2006/07. JNCC Report, No. 41448 http://www.thecrownestate.co.uk/round3-announcements - Aerial bird surveys

Although the proposed site is not within a designated marine protected area, it was recognised from the outset that the coastal waters surrounding it are abundant in marine life, supporting a rich biology and internationally important bird and marine mammal populations.

Figure 10-5 Bird conservation designations and areas of search



The project developers considered from the outset that an Appropriate Assessment may be requested by SNH for sensitive species, so data and information to inform this process will be collected during the relevant baseline surveys.

10.7.4. Fowlsheugh (Overview)

Fowlsheugh, southwest of the proposed site, is designated for large numbers of breeding seabirds (RSPB). Fowlsheugh is a major seabird site with 170,000 birds nesting on the cliffs, including Kittiwakes (*Rissa tridactyla*), Guillemot *(Uria aalge)*, Razorbills (*Alca torda*), and smaller numbers of Fulmars (*Fulmarus glacialis*), Herring Gulls (*Larus argentatus*), Shags (*Phalacracorax aristotelis*) and Puffins (*Fratercula artica*). Smaller numbers of Lesser Black-backed Gull (*Larus fuscus*) and Great Black-backed Gull (*Larus marinus*) are also to be found. Passerine species such as Skylarks (*Alauda arvensis*), Meadow Pipit (*Anthus pratensis*), Rock Pipits (*Anthus petrosus*), and Linnets (*Carduelis cannabina*) also breed on the reserve. Grey and common seals, bottlenose and common dolphins can be regularly seen offshore. Harbour porpoises, white-beaked dolphins and Minke whales are seen occasionally. Designated as a Site of Special Scientific Interest (SSSI) by Scottish Natural Heritage, the property is owned by the Royal Society for the Protection of Birds.

International recognition of Fowlsheugh has been established primarily due to the large and productive seabird colonies present. On August 31, 1992 SPA status was conferred with the EU code designation of UK9002271. The Fowlsheugh extent has been recorded as an area of only 10.15 hectares in size, making the seabird density one of the greatest in Europe.

In excess of 170,000 birds inhabit Fowlsheugh at the peak breeding season between April and late July. This value places Fowlsheugh as the second largest seabird colony in Britain and surpasses the criterion of

20,000 birds to qualify as a protected area of international seabird importance under European Union Directive 79/409. Bird species present are primarily auks and gulls, which feed in nearby offshore waters as well as more distant North Sea reaches. Most of the nests are constructed on precarious perches nestled in the virtually vertical cliffs of the basalt and conglomerate. During breeding season the bluffs are dense in birds arriving, departing and feeding in the waters below.

10.7.5. Key Species at Fowlsheugh

10.7.5.1. Kittiwake (*Rissa tridactyla*)

As of 2005, about 18,000 breeding pairs of Kittiwakes return to Fowlsheugh each year, making their nests on some of the most vertical parts of the landscape from muck, seaweed and local grasses. This population level significantly decreased from the 1992 count of 34,870 breeding pairs. The 1992 value represented 1.1 percent of all North Atlantic breeding pairs of Kittiwakes. This population level caused the site to qualify under Article 4.2 of the European Union Directive 79/409 by supporting populations of European importance of this migratory species.

Kittiwakes can be found breeding almost continuously along the North east coast between Inverbervie and Stonehaven and from Newtonhill to the city of Aberdeen, and from Forvie to Boddam.30m high cliffs afford the greatest protection from predators and abundance of nesting sites. Decreases in the population are thought to be linked to food availability during the breeding season.

10.7.5.2. Guillemot (*Uria aalge*)

Fowlsheugh is notable for its large numbers of breeding Guillemots, and is one of 13 Guillemot colonies that support greater than 1% of the international breeding population.

Under the 1992 bird count there were 40,140 breeding pairs of Guillemot, representing at least 1.8 percent of this breeding East Atlantic seabird population.

Guillemots are coastal, cliff-nesting species that will use open nest-sites[54]. At sea, Guillemots prefer continental-shelf waters of 51–100 m depth[55]. Outside the breeding season, Guillemots occur widely in the seas off north-west Europe. Chicks leave the colonies in July before they can fly, and swim out to sea to fledge. During July to September, large numbers occur in inshore areas. In midwinter, Guillemots are more widely distributed in the North Sea, the English Channel and the Western Approaches, reflecting a general southward movement of most northerly breeding birds[56]. In spring, they move northwards towards their breeding colonies.

10.7.5.3. Razorbill (*Alca torda*)

Most Razorbills breed on the east coast between Boddam and Collieston and between Cove and Inverbervie. The largest colony, the 5th largest in Scotland, is at Fowlsheugh. South of Aberdeen the numbers of Razorbills have doubled and have extended their distribution in general since 1980s.

The Razorbill population of the north East Scotland in 1998-2002 totalled 18,070 individual birds or approximately 12,100 pairs[57]. This represents a substantial increase of over 10,044 birds counted in 1969-70[58]. More recently however, colony numbers have declined. At Fowlsheugh numbers fell from 6,362 in 1999 to 4,280 in 2006 [59], and at Troup Head there has been a decline of 70% from 3523 birds in 2001 to 1069 in 2007 (RSPB colony count 2007) This decline may be due to reductions in the availability and quality of food[60]. Conversely, the numbers along the Boddam to Collieston coast increased by 37% from 3044 individuals to 4179 in 2001-2007.

Razorbills breed on the cliffs around the coast of north east Scotland, nesting on ledges, and under boulders in loose colonies. Birds return to colonies from February and lay a single egg late April and may be

[54] Francis,I and Cook,M. 2011(Eds.)The Breeding Birds of North –East Scotland . Scottish Ornithologists' Club .Aberdeen
[55] Francis,I and Cook,M. 2011(Eds.)The Breeding Birds of North –East Scotland . Scottish Ornithologists' Club .Aberdeen
[56] Stone *et al.* 1995
[57] Seabird 2000
[58] Cramp *et al.* 1974
[59] North-east Scotland Bird Report, 2006
[60] Harris and Wanless in Forrester *et al.* (2007) The Birds of Scotland. Scottish Ornithologist's Club

incubated for 34 days. The chicks leave the cliffs at 19 days accompanied by the parents. Most birds have left the cliffs by the end of August although remain offshore in the vicinity of the cliffs during winter.

10.7.5.4. Puffin (*Fratercula arctica*)

Puffins breed between Kinneff and Cove, Fowlsheugh and can be observed at Dunnottar Castle[61]. Puffin numbers are likely to be affected by the problems responsible for the recent decline in numbers of Guillemots and Razorbills.

Puffins breed exclusively on coastal cliffs, nesting in burrows on step grassy slopes or in cracks on cliffs amongst other breeding auks in colonies in the north east. Nests are usually located near the cliff tops. A single egg is laid from early April with an incubation time of 6 weeks, with chicks leaving the nest from June. Most Puffins have left colonies by late July.

10.7.5.5. Black Guillemot (*Cepphus grylle*)

Comparison between the Aberdeenshire/Aberdeen City maps of 1981-1984 and 2002-06 reveals little change in population[62].

Black Guillemots breed at low density along cliff lined costs often away from large colonies of other seabirds. They nest in cracks in rocks at relatively low level. Sites may be in inlets or caves or rock boulder areas. In April, birds from a colony will gather on the sea and undertake displays, diving and pairing. The clutch of two eggs is laid between mid May and late June and fledging may take place in mid July or until the end of August. A few pairs (2-4) breed on the cliffs at Muchalls, south of Newtonhill.

10.7.5.6. Fulmar (*Fulmarus glacialis*)

Fowlsheugh, with its tall sea cliffs, support the greatest number of breeding pairs. Numbers of Fulmar in the Kincardine Offshore Windfarm area rose from 1171 to 4273 (up 264%)[63]. The increase is spread of Fulmars is generally attributed to the rise in the fishing industry. Fulmars breed primarily on sea cliffs and range within 15 km (8 nm) of the coastline. Most breeding colonies occupy nest sites from January. A single egg is laid in May, hatches in June and the young depart in August or September. Few return to breed before ten years old. Outside the breeding season, Fulmars have an oceanic distribution

10.7.5.7. Shag (*Phalacracorax aristotelis*)

Shags are exclusively marine species frequenting coastal cliffs especially those with sheltered inlets and caves during the breeding season. Most foraging is undertaken during the breeding season close to the breeding colonies and up to 16km (8.5 nm) from along the coast. Suitable habitats are available along the NE Coast. Numbers of Shags in Aberdeenshire have increased from 293 pairs in 1968-70 (Operation Seafarer) to 697 pairs in 1998-2002 (Seabird 2000) Colonies have expanded between Aberdeen and Gourdon.

10.7.6. Buchan Ness to Collieston Coast

This area regularly supports 95,000 individual seabirds including: Guillemot, Kittiwake, Herring Gull, Shag, Fulmar

10.7.7. Montrose Basin

Further south along the Scottish coast is Montrose Basin - a tidal basin which contains a varied mixture of mudflats, fresh, sea and brackish waters, saltmarsh, reedbed, unimproved grassland and arable land. The Montrose Basin regularly supports 54,000 individual waterfowl including: Dunlin, Oystercatcher, Eider, Wigeon, Shelduck, Redshank, Knot, Greylag goose, Pink-footed Goose

10.7.8. Firth of Tay & Eden Estuary

Regularly supports 34,000 individual waterfowl including: Common Scoter, Velvet Scoter, Long-tailed duck, Pink-footed Goose, Greylag Goose, Shelduck, Eider, Redshank, Bar-tailed Godwit, Black-tailed Godwit, Goldeneye, Red-breasted Merganser, Goosander, Oystercatcher, Grey Plover, Sanderling, Dunlin. The Tay Estuary supports the largest flock of wintering Eider in the UK as well as notable numbers of other autumn

[61] Francis,I and Cook,M. 2011(Eds.)The Breeding Birds of North –East Scotland . Scottish Ornithologists' Club .Aberdeen
[62] Francis,I and Cook,M. 2011(Eds.)The Breeding Birds of North –East Scotland . Scottish Ornithologists' Club .Aberdeen
[63] Lloyd,C.Tasker,M.L.& Partridge K.1991 The status of seabirds in Britain and Ireland .Poyser Ltd London

passage species. The Eden Estuary supports a notable number of passage Bar-tailed Godwits *(Limosa lapponica)* and the most northerly wintering flock of Black-tailed Godwit (*Limosa limosa*) in Britain.

10.7.9. To the north of the site

The Ythan Estuary (Sands of Forvie) and Don Mouth to Blackdog are important for breeding Eider (*Somateria mollissima*), the former of which supports one of the largest breeding populations of Eider in Britain (Scottish Natural Heritage, Forvie National Nature Reserve information booklet). The area also holds large tern colonies, including Sandwich, Arctic, and Common Terns, with smaller numbers of Little Terns.

10.7.10. South of the Site

Species characteristic of shingle, sand dunes and dry coastal grassland such as Ringed Plover, Oystercatcher and Shelduck (*Tadorna tadorna*) utilise the sand dunes and bays along this coastline including those at Montrose Basin and the Forth Estuary.

Between Montrose and Eyemouth, the four coastal Wetland sites (Montrose Basin, Tay, Eden and Forth Estuaries) support nationally important numbers of one or more over-wintering waterfowl species, some of which occur in internationally important numbers[64] .

10.7.11. Sites of international Importance

Buchan Ness to Collieston SPA /IBA – breeding Seabirds

Ythan Estuary Sands of Forvie and Meikle Loch- SPA/IBA RAMSAR - breeding waders Wintering Wildfowl.

Fowlsheugh –SPA/IBA – breeding Seabirds

Montrose basin - SPA/IBA/RAMSAR Wintering Wildfowl & waders

10.7.12. Risks to birds

Potential hazards to birds from offshore wind farms include mortality following collision with turbines, loss of habitat and the turbines creating a barrier between feeding and/or roosting areas or migration routes. Current available evidence suggests appropriately positioned wind farms do not pose a significant hazard for birds [65]. However due to the limited size of this demonstrator project, the risk to birds is significantly lower that the larger wind farm developments currently consented.

10.7.13. Displacement:

The significance of displacement of bird populations due to this project is expected to be very small as this is a small demonstrator project and therefore there is limited scope for displacement of the bird populations. Also as the construction process is mainly undertaken on land (structures towed to site and then moored) the onsite impact during the construction phase is significantly lower than a traditional fixed structure wind farm development and will result in limited/no bird displacement.

10.7.14. Barrier effects:

Birds may avoid flying through the proposed site and select to fly either over or around it. Should this occur then this might entail the birds flying further than would otherwise have been the case. However as the demonstrator site is very small, in comparison to the Scottish territorial watersor Round 1, 2 or 3 offshore wind farm developments, the barrier impact will be very limited and will not result in birds significantly altering their flight paths.

10.7.15. Collision Risk

The application of Natura regulations in the context of collision risk to birds is dependent on modelling of the interaction process. Most collision risk assessments make use of a model first published in 2000 (the ‘Band model’) which follows three broad stages:

[64] May and Law, 1997
[65] RSPB 2004

- an estimate is made of the number of birds which would fly through the wind farm rotors, assuming no change in flight behaviour;
- this is multiplied by the collision risk for a single bird transit through the rotor, averaged over the cross-sectional area of the rotor disc;
- allowance is made for changes in flight behaviour by including an 'avoidance rate' which takes account of avoidance of the wind farm as a whole, navigation through the wind farm to avoid rotors, or emergency avoidance of blades.

In the UK, the minimum clearance of the blades above the water is normally 22m above highest astronomical tide. Recent compilations of flight height information indicate that, for some species, most birds at risk of collision are flying in the lower part of the swept area. For such species, increasing the clearance above the water surface can significantly reduce the number of flights exposed to collision risk. Modelled distributions of flight heights for a range of species have been used to estimate the reduction in collision risk achieved by increasing clearance of turbine blades above the water[66].

Not all species are a significant risk of collision. The level of risk seems to depend upon whether birds fly at the rotor height. Flight height varies according to weather and behaviour. Collision risk modelling has been undertaken by Cook *et al*. (2012)[67] and Johnston *et al.* (2013)[68]. The level of collision depends on the location and size of the development and the species present. Birds such as auks (e.g. Guillemots, Razorbills, Puffins), divers and scoters, fly predominantly below rotor height, whereas other species such as gulls (e.g. Herring Gulls, Kittiwakes) may fly more frequently at rotor height and therefore be at a greater risk. The recent study by Johnston *et al*. (2013) demonstrated that as hub height increased, the proportion of birds estimated to be at risk of collision declined; furthermore increasing turbine size (diameter) led to a lower proportion of the in-flight population at risk of collision for most species. Johnston *et al*. (2013) conclude that the use of higher hubs and larger turbines can be an effective mitigation measure with which to reduce the risk of collision in marine birds.

The project developers will consider bird collision risk together with the additional engineering and cost considerations involved in adopting greater clearance height and larger turbine size. Increasing the clearance in areas of importance to seabirds may reduce the constraints on wind farm development arising from concerns over potential collisions with birds in flight [69].

10.7.16. Impact Assessment – Aerial Survey

10.7.16.1. Survey Requirements

In April 2013, PORL commissioned a series of monthly aerial surveys of the site, to provide data on the birds and sea mammals present at the site, following consultation with Marine Scotland and SNH on the methodology and survey layout (Figure 10-7 - two additional lines included following consultation). The surveys have been carried out by HiDef Aerial Surveying Ltd., a contractor with extensive experience of conducting aerial surveys for offshore wind developments. Indeed, since 2008, HiDef has been the leading supplier of aerial ornithology and marine mammal surveys to the UK offshore renewable industry and the UK's Crown Estate.

The methods described have been discussed with MS, and the transect plan was amended after the first survey to incorporate two additional short transects in the "high interest area", following comments from MS in May 2013. The protocols and approach was also discussed with SNH during a meeting on 31st July 2013, and subsequent meetings with MS on 5th November 2013 and 7th February 2014.

10.7.16.2. Methods

Aerial survey data gathered during The Crown Estate's licensing rounds 1 & 2 has typically been carried out using a family of analysis techniques known as 'Design Based' estimators. More recently, following extensive

[66] USING A COLLISION RISK MODEL TO ASSESS BIRD COLLISION RISKS FOR OFFSHORE WINDFARMS, Band 2012a The Crown Estate as part of the Strategic Ornithological Support Services programme, project SOSS-02.
[67] A review of flight heights and avoidance rates of birds in relation to offshore wind farms. Cook, A S C P., Wright, L J,& Burton. N on behalf of the Crown Estate (2012). SOSS Website
[68] Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M., Burton, N.H.K., 2013. *Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines.* Journal of Applied Ecology. Accepted manuscript online 04 Nov 13.
[69] Davies I. & Band. B ICES ASC 2012/O.: Turbine height as a management tool for collision risk to birds at offshore wind farms

development work by CREEM at St. Andrews University and others, model-based analysis techniques have begun to be applied to offshore seabird data. Model-based analysis is particularly useful in 'Before-After-Gradient' (BAG) studies and have largely replaced the less powerful, traditional 'Before-After-Control-Impact' (BACI) studies for monitoring the effects of wind farm construction and operation.

The main characteristics of a model-based survey design is a relatively wide buffer around a potential wind farm site with variable spacing and orientation of transects. A design-based survey more typically contains a higher number of evenly-spaced transects within a study site, all of which should be oriented perpendicular to the most important environmental gradients at the site.

Both BACI and BAG approaches to survey design are applicable for site characterisation surveys, which are required to inform Environmental Impact Assessments. However, a model-based design within a BAG study is more powerful and thus more appropriate for the monitoring phase of a wind farm project.

The survey design for this study uses a wide buffer of 8km and variable transect spacing of 5km apart within the buffer zone and 2km within the site. This survey design fulfils two purposes: to provide good quality data for predicting potential impacts of the development on birds and marine mammals as part of an EIA; and to provide data suitable for enriching the baseline phase of a BAG study during the monitoring phase of an accelerated construction phase for the project if consented.

Surveys have been conducted by a single aircraft during one day on a monthly basis between April 2013 and March 2014. The details of the survey are described in Table 10-16, and shown in Figure 10-7.

Table 10-16 Summary of digital aerial survey effort at the Site between April 2013 and March 2014

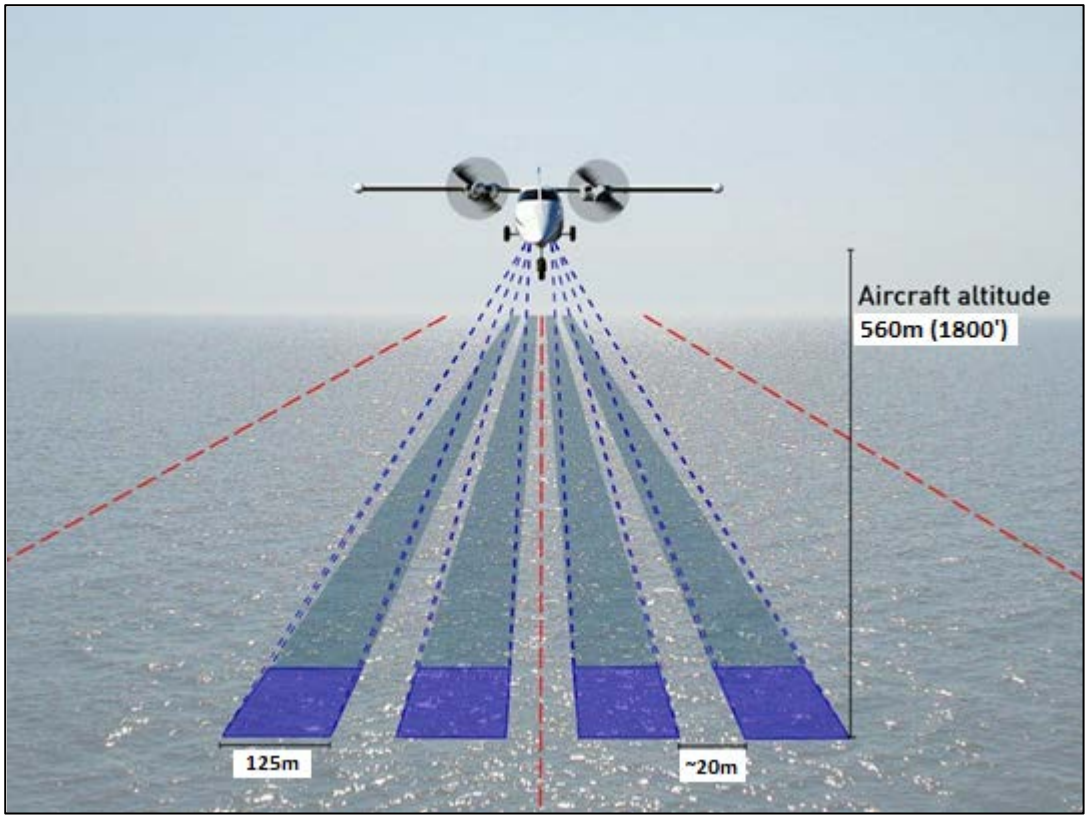
Sector	Survey day (flight)	Number of transects	Transect spacing (km)	Average transect length	Buffer size	% area covered
Kincardine	1	7	5 & 2	18.02	8km	23.0
Kincardine high interest area	1	5	2	7.72	N/A	26.4

The survey protocol has been specifically designed to inform anticipated EIA in the near future for the proposed Kincardine wind farm development.

The survey is typically flown at an aircraft altitude of either approximately 1250ft (~380m) or approximately 1800ft (550m) above sea level. More sensitive species, such as Common Scoter (*Melanitta nigra*) and Manx Shearwaters (*Puffinus puffinus*), which are known to be disturbed when sitting on the sea by aircraft flown at altitudes of less than 1500ft (450m) (HiDef, personal observations and A. Webb, personal observations) are rarely present in the identified survey sites (Stone *et al.*, 1995).

Throughout the surveys, HiDef operate a bank of cameras in a fixed forward looking position directed at a 30 degree angle. The cameras provide 2cm resolution gaining ~500m of coverage over a 560m swathe of water on each transect flown (Figure 10-6). There is no overlap between the cameras.

Figure 10-6 Representative view of camera arrangement and orientation and for HiDef digital video surveys

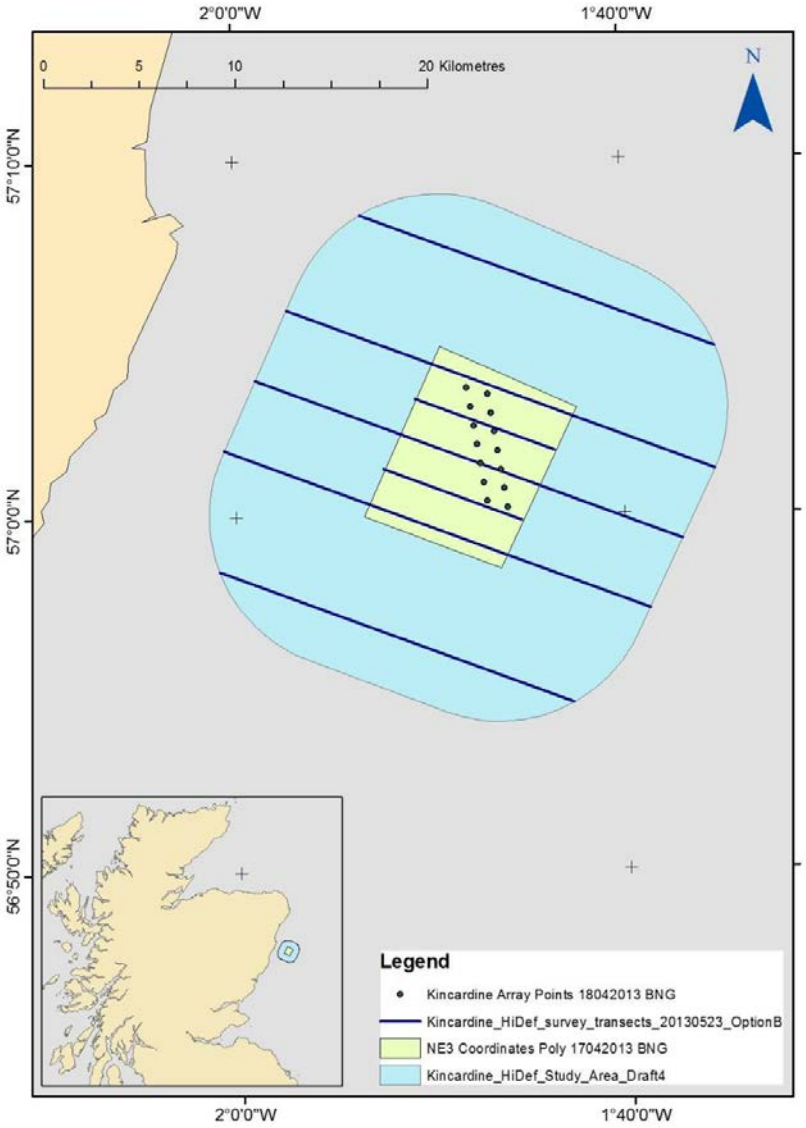


HiDEF Aerial Survey Limited were engaged by KOWL to undertake the aerial survey utilising the HiDef Gen II cameras to over fly the site on a monthly basis. Aerial surveys have the following key advantages over traditional vessel based surveys:

- Large area of survey;
- Increased weather operability;
- Species identification;
- Accurate flight height calculations;
- Abundance estimates;
- Density mapping over a large area;
- Direction of flight (without disturbance);
- Digital record of surveys for review/QA;
- Flight height selection ensures no flushing of species from survey area;

The aim of the HiDef surveys of the KOWL site is to establish the abundance, distribution and behaviour of the seabirds in the proposed site. The survey was design and adapted following comments from Marine Scotland to encompass a total area of 991 km^2 and seven transect lines. This area comprised of an inner site area and an 8 km buffer area around the site to ensure suitable coverage was obtained for the development site.

Figure 10-7 HiDef flight plan for KOWL (alternative site layout)



10.7.16.3. Consultation

Additional consultation and data will be gathered or requested from the following sources to provide more site specific information on the ornithology of the KOWL site. These will include:

- SNH
- Marine Scotland
- RSPB

10.7.16.4. Data and information Gaps

The initial one year aerial survey programme will be completed in April 2014 and this data will provide the most significant data source for the site assessment for ornithology and possible impacts associated with the small demonstrator project. The initial year of bird data will be followed up with additional aerial survey data as part of the Scottish Governments proposed expansion to the “Survey, Deploy and Monitor” programme. This will provide a comprehensive ornithological dataset for the site and will allow accurate estimates of potential impact and cumulative impact to be evaluated. Due to the small scale of the project it is assumed that radar studies for migratory wildfowl are not required and that any impacts on wintering wildfowl migrating through the area will be assessed on the basis of the information from desk studies only.

Following the completion of the initial year of aerial survey at site the collated data will be compared to the know data sources noted above to place the onsite data into context with the historical data. Currently there are no known data gaps currently identified and noted below is a summary of the current data from the aerial survey.

Survey summary (initial eight months):

- Eight months of data collection at KOWL site;
- 18,297 birds recorded over survey period – 19 bird species and 73 non-avian animals of size species were recorded;
- Large fluctuations in the density of all seabird species between months. It is suggested that these fluctuations may be related to differing effects of an oceanographic front that extends north to south off the coast of Aberdeenshire;

Table 10-17 Key conclusions from interim survey data

Species	Comments
Fulmar	Recorded in low density in survey area, but show evidence of connection with local colonies, as well as possibly with colonies to the south and north of the study area. Fulmars were recorded flying at low heights above the sea which would put them at low risk of collision with wind turbines.
Gannet	Gannets were also recorded at mostly low density in the study area. Their flying direction was mostly parallel to the coast, implying connection with the nearest major colony for the species at Bass Rock in the Firth of Forth. Gannets were also recorded flying high above the sea, with as many as about 30% flying over 20m above the sea, and therefore at risk of collision with wind turbines.
Kittiwake	Kittiwakes were the second commonest species in the study area and were present at moderately high density during the spring, summer and early autumn. While approximately 36% of Kittiwakes may have been flying to and from local colonies (likely to be Fowlsheugh) to feed in the study area, there was evidence that a greater proportion were likely to have been using other colonies to the north and south of the study area. While most Kittiwakes were recorded flying at sea level, 18.5% were recorded flying more than 20m above the sea, and thus likely to be at risk of collision impact with wind turbines.
Herring gull	Herring gulls were recorded at very low density in the study area, lower than in historical boat-based surveys of the region in the 1980s and 1990s. This is likely to be evidence of a decline in numbers of this species at sea. Although a number of Herring gulls were recorded flying at turbine height, their numbers were too low to provide reliable estimate of flying heights for the species.
Guillemot	Guillemots were the most abundant species with densities considerably higher than recorded in historical boat-based surveys of the area. With an estimated number of over 56,000 present in the study area in July, these were unlikely to have arrived in this area just from colonies on the adjacent coastline (likely to be Fowlsheugh). In the breeding season and post-breeding period, it is likely that birds from colonies further afield were using the site on an opportunistic basis. In spite of the large numbers, Guillemots were unlikely to collide with wind turbines on account of how little flying they do as a species and because of the very low percentage recorded flying above 20m.
Razorbill	Razorbills were present in the study area at moderately high density, and while the numbers present were consistent with the numbers breeding at local colonies (likely to be Fowlsheugh), there was evidence from the flight directions that a small proportion of birds using the study area originated from colonies to the north or south. Like Guillemots, this species spends very little of its time flying and all birds were found to be flying below a minimum turbine height.
Puffin	Moderate densities of Puffins were recorded and in numbers high enough to suggest that a proportion of the birds present were likely to be non-breeding birds from colonies outwith the coastline between Dundee and Peterhead. Flying heights were low for this species, and all below a minimum turbine height of 20m.

10.7.16.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the ornithology in the area are considered in Table 11-26 below.

Table 10-18 Potential impacts on ornithology

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Collision risk with WTG sub structures and underwater infrastructure	Low	Low	Low	There is a potential for birds to collide with the floating substructure (above and below water). However the small scale of the project (up to eight turbines) means that the collision risk is expected to be of low significance.	No
Vessel disturbance	Low	Low	Low	The potential for the onsite vessels to impact on the seabird populations is low due to the construction methodologies reducing time on site during the construction phase and the limited number of vessel transfers that the development site will have during the O&M phase. As this area is also near to the port of Aberdeen the local sea bird population is used to the presence of vessels and the impact of a limited number of vessels on site is unlikely to impact on the seabird habits significantly.	Yes
Collision risk – mortality due to collision with rotor blades	No impact	Medium (species depended).	No Impact	As noted above Gannets and gull species such as Kittiwakes could be exposed to moderate collision risk due to the height that they can fly at. The small scale of the project (up to eight turbines) means that the collision risk to these population is low (number of Gannets at site have a low population density). The collision risk to lower flying bird species such as Guillemots, Razorbills and Puffins (see above) is considered to be very low.	Yes
Barrier effect and displacement	No Impact	Medium	No Impact	The demonstrator project has the potential to act as a barrier and to displace seabird populations due it is presence. However this is likely to be of low impact because of the small scale of the project and the seabird densities currently monitored at site. Due to the possible cumulative impacts that this development may have on key species (Gannets) in combination with far larger developments in the Firth of Forth it is believe that further assessment should be undertaken to confirm the likely limited impact of the KOWL project.	Yes
Accidental release of contaminants	Low	Low	Low	Due to the small scale of the project and the number of vessels required to undertake the construction/O&M/decommissioning there is a limited potential for release of contaminants. Construction industry good practices will be used to mitigate any incident and will be covered within the site emergency procedures.	No

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Loss of potential foraging habitat	Low	Low/Positive	Low	The small scale of the project is likely to result in a very limited impact on potential foraging habitat for seabirds based on the current seabird densities and there could be a potential net benefit effect due to the reduced disturbance in the area from vessel traffic. This will be reviewed further upon the completion of the year survey, which will allow the impacts to be fully assessed.	Yes

It is proposed that the following impact strategies be applied to address these potentially significant impacts noted above.

Table 10-19 Impact assessment strategy for ornithology

Potential impact	Assessment method	Relevant guidance
Vessel disturbance	Review of construction, O&M and decommissioning vessel movements and comparison against species distribution from aerial survey data.	Assessing the cumulative impact of onshore wind energy developments (SNH, 2012) Use of avoidance rates in the SNH Wind farm Collision Risk Model (SNH, 2010). Assessing the significance of impacts from onshore wind farms on birds outside designated areas (SNH, 2006). Survey methods for use in assessing the impacts of onshore wind farms on bird communities (SNH, 2005a).
Collision risk – mortality due to collision with rotor blades	Collision rate modelling will be undertaken to assess the potential annual mortality of each specific seabird species identified from the aerial survey likely to fly at the rotor height of the proposed WTGs.	
Barrier effect and displacement	A review of the aerial survey data will be undertaken to assess the importance of the site for each individual seabird species identified and where possible, related back to their identified roosting or breeding locations.	
Loss of potential foraging habitat		

10.8. Cumulative Impact

The project developers have initiated a monitoring programme including aerial surveys of bird populations. The KOWL project developers will maintain communications and dialogue with other offshore wind developers in the region and be open to developing monitoring programmes to assess potential cumulative impacts based upon scientific data. This will include detailed discussions with Marine Scotland to establish the potential impacts from the other offshore wind farms on the east coast of Scotland.

10.9. Marine Mammals (including noise)

10.9.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project noise to the relevant receptors (principally marine mammals) will be based on the following:

Table 10-20 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	10.9.3
	Aerial Survey	10.9.5
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	10.9.6

10.9.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 10-21 Baseline information – Marine Mammals

Type/description of data	Source	Status
Marine mammal abundance data	Marine Scotland Small Cetacean Abundances in the North Sea (SCANS) Survey in July 1994 65, 66 and December 2006 (Scans II) North Atlantic Sightings Surveys (NASS) in 1989; Norwegian Independent Line Transect Surveys (NILS) in 1995 and 1998 SMRU & SMRU Ltd (The University of St Andrews) The University of Aberdeen JNCC & SNH The Seawatch Foundation UK Cetacean Stranding Investigation Programme NORCET cetacean survey data Moray Firth cetacean study 2009-2011	Obtained
Electromagnetic field	Marine Scotland, COWRIE	To be reviewed as part of EIA

10.9.3. Desk Based Review of Existing Data

The Aberdeen area is an important area for marine mammals, with up to 18 species having been recorded from sighting or stranding records in Aberdeen Bay and the surrounding area; including 12 odontocete species, three mysticete species and three pinniped species. Of these, Bottlenose Dolphins, Harbour Porpoises, White-beaked Dolphins, Minke Whales, Risso's Dolphins, Harbour Seals and Grey Seals occur regularly in the area, with other species only being recorded occasionally or rarely (according to EOWDC surveys).

There are a number of SACs on the east coast of Scotland for which marine mammals are an interesting feature. These sites are the Inner Moray Firth SAC for bottlenose dolphins (*Tursiops truncatus*); Dornoch Firth and Morrich More SAC and the Firth of Tay and Eden Estuary SAC for harbour seals; Faray and Holm of Faray SAC, the Isle of May SAC and Berwickshire and Northumberland Coast SAC for grey seals (*Halichoerus grypus*)[70].

Hammond *et al.* (2004) examined the distribution and abundance of cetaceans occurring to the north and east of Scotland during the Strategic Environmental Assessment (SEA) 5. Species that are known to occur regularly in this area are the Harbour Porpoise, White-beaked Dolphin, Atlantic White-sided Dolphin, Killer Whale, Bottlenose Dolphin and Minke Whale. In addition there are occasional at-sea records in the area of at least eight further cetacean species: Humpback Whale, Fin Whale, Sperm Whale, Northern Bottlenose Whale, Long-finned Pilot Whale, Risso's Dolphin, Short-beaked Common Dolphin and Striped Dolphin.

Hammond *et al.* (2004) reviewed quantitative information for this area from a variety of sightings surveys including the Small Cetacean Abundance in the North Sea (SCANS) survey in July 1994 (Hammond *et al.,* 1995; 2002), the North Atlantic Sightings Surveys (NASS) in July 1989 (Bjørge and Øien, 1995), and the Norwegian Independent Line transect Surveys (NILS) in July 1995 and 1998 (Schweder *et al.,* 1997; Skaug et al., 2003). There are also published cetacean observations made during seismic surveys in 1996 to 1999 (Stone, 1997; 1998; 2000; 2001; 2003a). Acoustic recordings have also been used to determine the general distribution and seasonal patterns of movement of some cetacean species by Cornell University, Aberdeen University and the Joint Nature Conservation Committee using the US Navy's SOSUS hydrophone array and low frequency sonar buoys (Swift *et al.,* 2002).

Information from Hammond *et al.* (2004) has been included in this review, with particular reference to the north-east coast of Scotland.

Sightings collated by JNCC and the Non-Governmental Organisation NGO Seawatch Foundation were combined with data from the SCANS 1994 to create a Joint Cetacean Database, on which the Atlas of Cetacean Distribution in North-West European Waters was based.

Information regarding pinniped (seal) populations in the North Sea is much more readily available, with large datasets of information regarding Grey Seals, *Halichoerus grypus* collected by the Sea Mammal Research Unit (SMRU) at St Andrews University, which include data from aerial surveys and data obtained from tagged individuals. A smaller dataset is also held by SMRU on the harbour seal, *Phoca vitulina*.

The North Sea is an important habitat for Minke whale, bottlenose dolphin, white-beaked dolphin and harbour porpoise. Minke whale population estimates for the North Sea from Norwegian surveys in July 1998 is 11,700, approximately 10% of the north Atlantic stock, making this region an important area.

10.9.3.1. The SCANS datasets

Existing data describing cetacean abundance in continental shelf waters of the UK are limited to the SCANS (Small cetacean abundance in the North Sea) and SCANS-II (Small cetaceans in the European Atlantic and North Sea) surveys. SCANS-II (completed during July 2005) provides the most precise broad-scale estimates of cetacean abundance in UK waters.

10.9.3.2. Cetacean Atlas (Joint Cetacean Database)

The JNCC-produced Atlas of Cetacean distribution in north-west European waters (Reid *et al.*, 2003) is based on the Joint Cetacean Database and incorporates sighting data from a number of sources (including SCANS, European Seabirds at Sea, and Sea Watch Foundation) spanning some 25 years.. Furthermore the

[70] AOWFL (2010). European Offshore Wind Deployment Centre – Request for an Environmental Impact Assessment (EIA) Scoping Opinion.

current available atlas is somewhat out of date. There is also the Atlas of Marine Mammal of Wales by Baines, M.E. and Evans, P.G.E. (CCW Marine Monitoring Report No.68).

10.9.4. Dolphins and porpoises

10.9.4.1. Harbour porpoise (*Phocoena phocoena*)

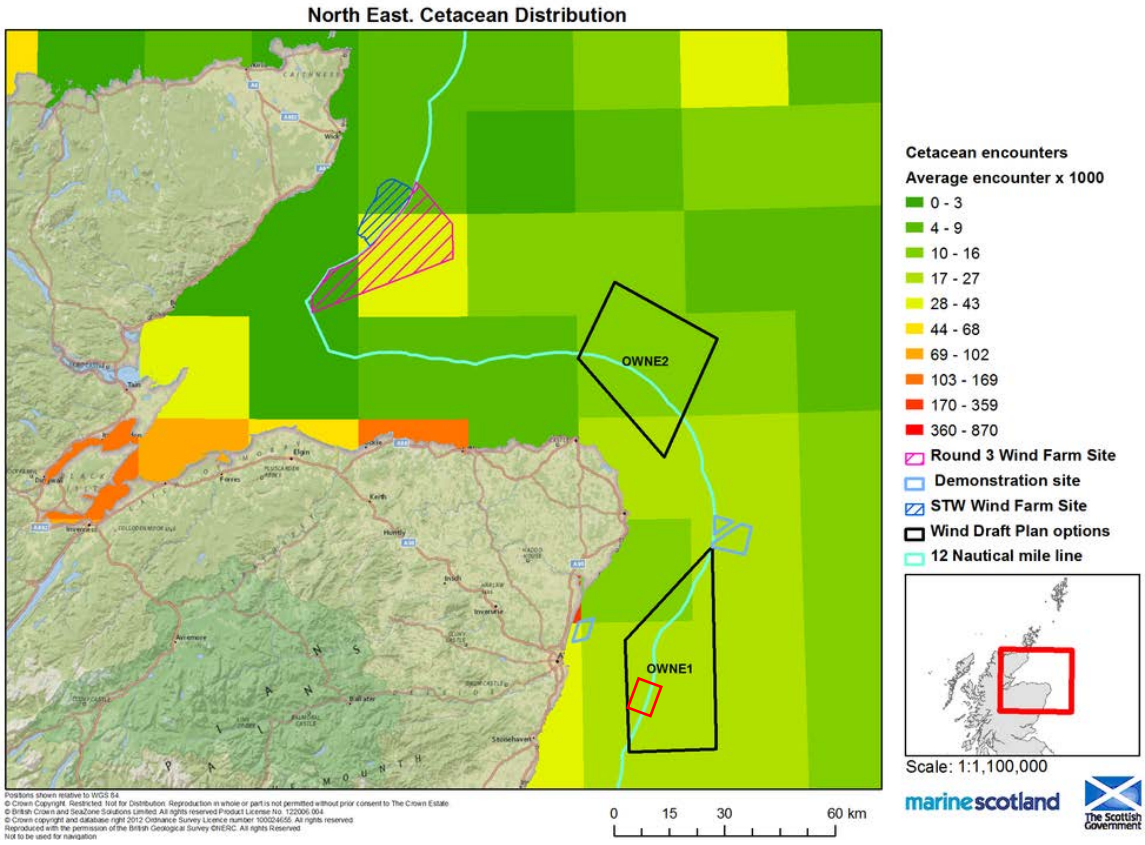
Harbour porpoise are the most common species of cetacean in the North Sea and have been found to regularly occur in the Aberdeen area throughout the year, with peak occurrence during August and September.

Harbour porpoises were the most recorded cetacean species during the EOWDC surveys with 390 observations consisting of 655 individuals recorded. Harbour porpoise sightings were higher to the north of the EOWDC lease area.

The harbour porpoise, as expected, was the most frequently detected cetacean species during the acoustic surveys. Harbour porpoise in Scottish waters feed on a wide variety of fish stocks including whiting, sandeels, haddock/saithe/Pollock and Trisopterus spp.

The peak calving period for harbour porpoises in Scottish waters is between April and June. Calves have been observed off Aberdeenshire between May and September, indicating a possible increased sensitivity to any potential disturbance during this time.

Figure 10-8 Cetacean Distribution



10.9.4.2. Bottlenose dolphin (*Tursiops truncatus*)

Bottlenose dolphins are generally found within coastal waters, although they have been observed in offshore areas off north-east Scotland. They have been observed off Aberdeen throughout the year, although there appears to be an increase in occurrence between November and May. Bottlenose dolphin were the second most frequently sighted cetacean species during the EOWDC surveys, with a total of 25 observations of 117 individuals being detected on effort. The majority of the sightings occurred in the spring and summer months. A higher number of bottlenose dolphins were in the vicinity of the entrance to Aberdeen harbour, which is a

known “hotspot” for dolphin sightings. Bottlenose dolphins were frequently recorded in close proximity to the harbour entrance; their presence here has been linked to salmon migration up the river.

Bottlenose dolphins in the Aberdeen area are part of the resident population from the Moray Firth Special Area of Conservation (SAC), which have a range extending from the Moray Firth to the Firth of Forth. There appears to be sub-groups within the population with one group spending most of their time within the inner Moray Firth (SAC) and the other group having a wider range and spending less time in the inner Moray Firth area.

Young bottlenose dolphin calves have been observed in the Aberdeen area during spring and early summer, indicating a possible increased sensitivity to any potential disturbance during this time. From the available information it is apparent that the Aberdeen area is important for bottlenose dolphins, however, it is unclear how reliant they are on the area in relation to other areas along the North-east coast of Scotland.

10.9.4.3. White-beaked dolphin (*Lagenorhynchus albirostris*)

White-beaked dolphins are present in the central and northern North Sea throughout most of the year. Sightings data suggests their presence in the coastal waters off Aberdeenshire is seasonal, with sightings recorded between June and August. In addition evidence from stranding data indicates they may be present in the area between February and October.

The movement of white-beaked dolphins into coastal waters during summer months is thought to relate to the calving period, with calves also being observed off Aberdeenshire between June and August. It is possible the seasonal movement of white-beaked dolphins is also related to the seasonal abundance or movement of prey species, such as herring or mackerel. Along the Aberdeenshire coast, white-beaked dolphins appear to have a preference for sections of the coast adjacent to deeper waters, with a higher incidence of sightings between Aberdeen and Stonehaven compared to the area between Aberdeen and Collieston.

A total of 29 observations, consisting of a total of 117 individual white-beaked dolphins were recorded during all the EOWDC boat surveys. Twenty eight of the observations, consisting of 114 individuals, were recorded in the surveys occurring between 2010 and 2011; these surveys also covered a region of deeper water. All observations of white-beaked dolphins 2010 and 2011 were recorded in water depths of 20 m or more.

According to EOWDC boat survey data supports the occurrence of white-beaked dolphin as a seasonal summer visitor that possibly moves to coastal waters following prey such as mackerel and for calving purposes. Although white-beaked dolphins are found throughout the central North Sea and generally in more offshore areas, it is apparent that the coastal waters off Aberdeen are important during the summer period.

10.9.4.4. Risso’s Dolphin (*Grampus griseus*)

In the northern and central North Sea, Risso’s Dolphins are primarily observed around Shetland and Orkney. However, there has been an increase in reported sightings along the north-east coast in recent years. Risso’s Dolphins have been recorded off Aberdeenshire since 2005 at various times of the year.

As part of the EOWDC surveys Risso’s Dolphins were detected during vantage point surveys, and in the July 2011 boat survey two observations consisting of 15 individuals were recorded. The increase in sightings of Risso’s Dolphins may point towards an increase in the use of the Aberdeen area in comparison to historic levels. Possible reasons for the apparent recent increase in observations in the area are unclear, but could be related to prey availability. It is not clear if Risso’s Dolphin frequents the proposed site, but this will be evaluated during the monitoring programme of the regions .Further monitoring surveys planned by the project developers will provide fundamental data on the distribution of this species.

10.9.4.5. Minke Whale (*Balaenoptera acutorostrata*)

The Minke Whale (*Balaenoptera acutorostrata*) is the commonest of the baleen whales around Scotland .Minke Whales occur throughout the central and northern North Sea, particularly during summer months. They are generally observed in offshore deeper waters, but appear to move into coastal waters along the north-east coast of Scotland from July.

Minke Whales have been recorded off the Aberdeenshire coast primarily during summer months (July – August); although observations and strandings indicate they may be present in the area throughout the year.

The seasonal movement of Minke Whales into coastal waters during the summer is thought to be related to prey availability. Minke Whales generally feed on a small pelagic fish, such as sandeels, herring and sprat.

There have been a total of 12 observations of Minke Whales in all the EOWDC boat surveys. One Minke Whale was recorded during 2007-2008, and 11 observations all being solitary individuals were recorded during 2010-2011.

Minke Whales are thought to have a preference for water depths of 40 m or more.

Although Minke Whales occur regularly in the area off Aberdeen, especially during summer, it is unclear how important the area is relative to other areas

In recognition of the importance and vulnerability of the Minke and its close relatives, there is a grouped species action plan for all baleen whales in the UK Biodiversity Action Plan now taken forward by the Scottish Government under the Scottish Biodiversity Strategy.

10.9.4.6. Grey and Harbour Seals (*Halchoerus grypus* and *Phoca vitulina*)

Grey and Harbour Seals are frequently sighted throughout the year in Aberdeen Bay, especially at the entrances to the rivers Dee and the Don. The Grey Seal was the most frequently recorded seal species, with a total of 21 individuals recorded on effort during the boat based surveys 2007 and 2008, and a further 41 individuals recorded in EOWDC surveys carried out between 2010 and 2011. The Grey Seal was sighted throughout the survey period with no apparent increase in frequency of sightings with any particular season. The majority of Grey Seal sightings were recorded in the northern half of Aberdeen Bay.

Almost equal proportions of Grey and Harbour Seals were recorded during boat surveys carried out during 2010 and 2011.

Harbour Seals increase in numbers at the estuaries of the Rivers Dee and Don in the winter and early spring. They use haul-out sites at the Donmouth, at the mouth of the Ythan estuary and at Catterline. Harbour Seals have been observed feeding on salmonids and marine fish at the estuaries of the Dee and Don. The pupping period for harbour seals occurs from June to July and moulting occurs from June to September, during these times they spend a higher proportion of their time ashore and in coastal waters.

Designated coastal SACs for harbour seals along the east coast of mainland Scotland are situated in the Dornoch Firth and Morrich Moore in the Moray Firth and Firth of Tay and Eden estuary. These are outside the proposed site for KOWL development

Grey Seals use haul-out sites at the Donmouth, at the mouth of the Ythan River, outside Peterhead harbour, Cruden Bay, Boddam and at Catterline. The most well established Grey Seal colony in the area is at Catterline, where up to five pups may be born each year. The pupping period for Grey Seals occurs from October to November and moulting occurs from February to April. During these periods they spend a higher proportion of their time ashore and in coastal waters. Catterline is adjacent to the proposed site.

Grey Seals have been observed feeding on salmonids and marine fish at the estuaries of the Dee and Don. Designated SAC's for Grey Seals along the east coast of Scotland include the Isle of May at the entrance of the Firth of Forth.

The Sea Mammal Research Unit at the University of St Andrews are currently undertaking a number of studies to determine the reasons for the decline including a study tracking Harbour and Grey Seals to see if they visit the same offshore feeding grounds.

Figure 10-9 Grey Seal at sea usage

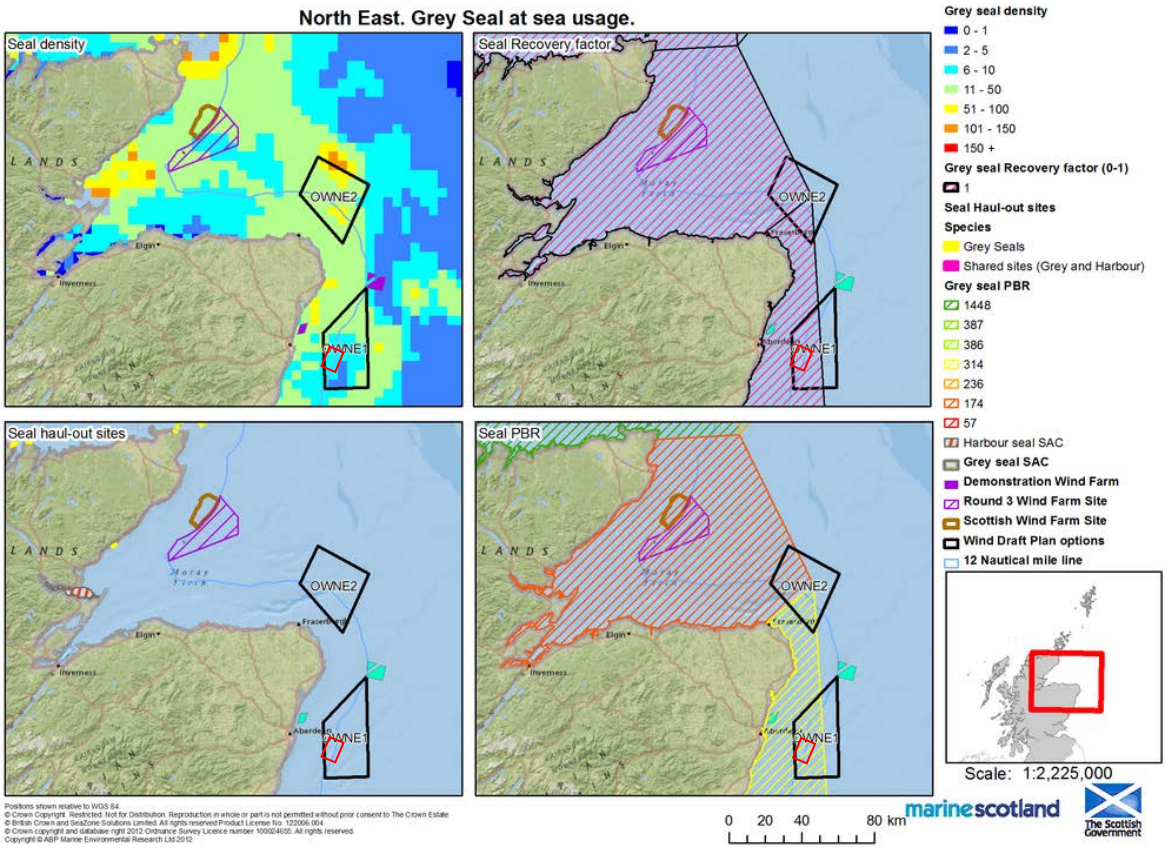
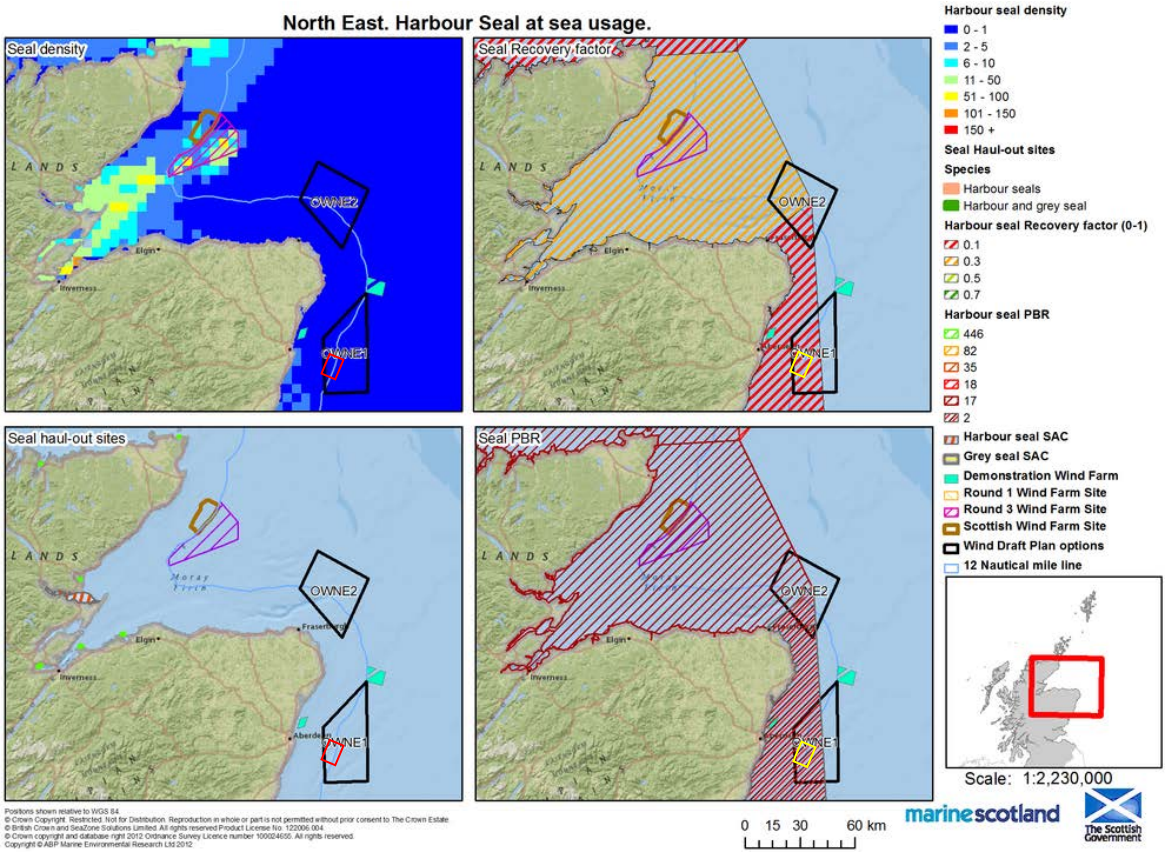


Figure 10-10 Harbour Seal at sea usage



10.9.4.7. Other species

For species such as white-sided dolphins, killer whales, common dolphins, striped dolphins, long-finned pilot whales, sperm whales, humpback whales, fin whales, northern bottlenose whales, Sowerby's beaked whales and other pinniped species, the area off north-east Scotland appears to be only a marginal part of their habitat, and is likely to be inhabited only during a restricted part of the year by relatively few individuals.

10.9.4.8. Summary

The most frequently sighted species within near-shore waters (within 60 km or 32 nm of the coast) are the Harbour Porpoise and the Bottlenose Dolphin, but White beaked Dolphins and Minke Whales also occur every summer (Anderwald, *et al.*, 2010). Atlantic White-sided Dolphin, Short-beaked Common Dolphin, Risso's Dolphin, Killer Whale and Long-finned Pilot Whale are uncommon with these species being recorded in the northern North Sea more or less annually (Anderwald, *et al.*, 2010). Other cetacean species recorded infrequent/rare in the region include Striped Dolphin, Northern Bottlenose Whale, Sowerby's Beaked Whale, Sperm Whale, Humpback Whale and Fin whale (Hammond *et al.*, 2001, 2002, 2004; Northridge *et al.*, 1995; Reid *et al*., 2003; Stone, 1997, 1998, 2000, 2001, 2003a, b; Weir and Stockin, 2001; Weir *et al.*, 2007; Wilson *et al.*, 2000). The abundance of marine mammal species that are known to occur, or have been previously recorded, in Aberdeen Bay area is shown in Table 10-22 below.

Table 10-22 Summary of abundance of marine mammals within Aberdeen Bay

Common name	Latin name	Abundance
Bottlenose dolphin	*Tursiops truncatus*	common/regular
Harbour porpoise	*Phocoena phocoena*	common/regular
White-beaked dolphin	*Lagenorhynchus albirostris*	common/seasonal
Minke whale	*Balaenoptera acutorostrata*	common/seasonal
White-sided dolphin	*Lagenorhynchus acutus*	occasional
Killer whale	*Orcinus orca*	rare
Common dolphin	*Delphinus delphis*	infrequent/rare
Risso's dolphin	*Grampus griseus*	occasional
Striped dolphin	*Stenella coeruleoalba*	rare
Long-finned pilot whale	*Globicephala melas*	infrequent/rare
Sperm whale	*Physeter macrocephalus*	infrequent/rare
Humpback whale	*Megaptera novaeangliae*	rare
Fin whale	*Balaenoptera physalus*	rare
Sowerby's beaked whale	*Mesoplodon bidens*	rare
Northern bottlenose whale	*Hyperoodon ampullatus*	rare
Harbour seal	*Phoca vitulina*	common/regular
Grey seal	*Halchoerus grypus*	common/regular

10.9.5. Review of Initial Aerial Survey Data

The initial one year aerial survey programme will be completed in April 2014 and this data will provide the most significant data source for the site assessment for marine mammals and possible impacts associated with the small demonstrator project. The initial year of sea mammal data will be followed up with additional aerial survey data as part of the Scottish Governments proposed expansion to the "Survey, Deploy and Monitor" policy. This will provide a comprehensive marine mammal dataset for the site and will allow accurate estimates of potential impact and cumulative impact to be evaluated.

At present there are no known data gaps currently identified and noted below is a summary of the current data from the aerial survey.

Survey summary (initial eight months):

- Eight months of data collection at KOWL site;

- 73 non-avian animals of size species were recorded – predominantly Harbour Porpoise;

Table 10-23 Key conclusions from interim survey data

Species	Comments
Harbour Porpoise	Harbour porpoise was the most abundant marine mammal recorded during the surveys, and in all months averaged a density of 0.10 animals/km² in the KOWL study area. The species was present in most months, including the winter period, but abundance peaked in survey 4 on 26th July with 0.26 animals/km². In the proposed project site, the density peaked at 0.21 animals/km² in survey 4 on 26th July and again in survey 6 on 5th October, with the population estimated to be 15 (± 95% confidence intervals of 0 – 38) and 15 (± 95% confidence intervals of 4 – 27) during respective surveys within the boundary. No correction can be made to these abundance estimates to allow for availability bias during the surveys because the proportion of harbour porpoise recorded at the surface (41.2% from a sample of 51) was lower than the best available published reference to surfacing rates for harbour porpoise of 43.4%. There were no strong or consistent patterns to the distribution of harbour porpoises in the KOWL study area, as might be expected given the low density of this species that was recorded.
Other species	In addition to Harbour Porpoise, there were rare sightings of white-beaked dolphin (9), Grey seal (2), Harbour Seal (1), Minke whale (1) and a basking shark (1).

10.9.6. Impact Assessment

10.9.6.1. Proposed Survey

Aerial surveys will continue following the completion of the initial year of onsite aerial survey and the aerial survey programme will follow the Survey, Deploy and Monitor methodology which is proposed to be extended to the floating offshore wind farm demonstrator programme by the Scottish Government. This will facilitate the more rapid development and deployment of these demonstrator projects and also ensure sufficient onsite data is collected as part of an ongoing monitoring programme.

10.9.6.2. Data Analysis

Following the completion of the initial year of aerial survey, the data will be assessed and utilised as part of the EIA process. It is proposed, following initial consultation with SNH and Marine Scotland that one years data will be used for the consent process as the data obtained is of high quality and the size and impact of the demonstrator project has a limited impact on marine mammals. The following information outputs will be used:

- Species occurrence;
- Temporal variation in occurrence;
- Distribution maps.

10.9.6.3. Consultation

Marine Scotland has provided additional data sources as part of the initial consultation process and this data (as seen above) will be used as part of the desk based studies. Additional consultation will be sort with SNH and other stakeholders to ensure suitable data are used as part of the EIA process and that one year's worth of survey data is deemed as suitable for this assessment process.

10.9.6.4. Data and information Gaps

No additional data gaps have been currently identified, with the onsite survey fulfilling the remaining data requirements for the site.

10.9.6.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the marine mammals are considered in Table 10-24 below.

Table 10-24 Potential impacts on marine mammals

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Floating offshore devices	Positive	Low	Positive	Due to the significant construction undertaken off site, there is limited on site time for large WTG installation vessels. This is therefore a benefit over traditional installation methods used for fixed structures. There is a limited potential impact from mooring lines during O&M that is not present with fixed structures.	No
Corkscrew injuries	Low	Low	Low	During the construction and decommissioning process there will be a requirement for large vessels to be on site which have the potential to impact on marine mammals. However the short onsite period for such vessels (days rather than weeks) reduces the possible impact significantly. The small number of WTG units means there will be limited O&M vessel movements, when compared to a Rd2-3 wind farm site, this is coupled with the large number of vessel movements from Aberdeen means the overall potential impact of the KOWL project will be very low.	Yes
Marine mammal entanglement	No impact	Unknown	No Impact	The potential for entanglement in the mooring lines for a floating offshore wind turbine is presently unknown, but the potential for impact is expected to be very low due to the design and number of the mooring lines. It should be noted that similar mooring designs are used in floating offshore O&G installations presently.	Yes
Indirect changes to habitat and distribution/abundance of prey	No impact	Low	No impact	The size and scale of the demonstrator project will have a limited impact on the local ecology and fish stocks. It could generate a limited local increase in fish stock due to the reduction in fishing effort and this may increase local numbers of marine mammals.	Yes
Noise disturbance	Low	Low	Low	Due to the construction methods and limited number of WTGs on site the noise impact will be minimal. The baseline noise level for the site is relatively high due to the presence of Aberdeen and all the associated vessel movements and therefore the potential impact is expected to be low. Therefore no additional surveys are required.	No
Pollution due to leaks and spills at site from vessels/WTGs	Low	Low	Low	Due to the limited number of WTGs, the construction methods and number vessels using the site there is limited potential impact from leaks/spills at site. Therefore the potential risk has been characterised as low.	No

It is proposed that the following impact strategies be applied to address these potentially significant impacts noted above.

Table 10-25 Impact assessment strategy for marine mammals (including noise)

Potential impact	Assessment method	Relevant guidance
Corkscrew injuries	Data from the aerial survey will be used to assess which species are present and determine the possible impacts that the demonstrator site could have on these species. This data will be combined with the additional desk base assessment (see above) and the potential impacts will be assessed. The entanglement potential will be reviewed against data (if available) for marine entanglement with floating semi-sub technology used in the O&G sector.	JNCC/SNH guidance note on ship strike (corkscrew injury) Discussions with SMRU in St Andrews (east coast specialist) Any other ongoing guidance currently in production eg SNH.
Marine mammal entanglement		
Indirect changes to habitat and distribution/abundance of prey		

Noise emissions generally associated with wind turbines are from two sources, aerodynamic and mechanical. Aerodynamic noise is the sound generated due to air passing over the blades of the turbine as they rotate. Mechanical emissions are those associated with the engineering components of the turbine such as the gearbox, the generator and the directional equipment that rotates the blade housing, or nacelle, with respect to the wind to optimise energy capture.

Due to the distance from shore of the proposed scheme, it is not thought that an assessment of the potential noise impact on residential properties in the nearest coastal areas, from operational noise would be necessary as part of the EIA. The project developers would therefore propose not to undertake such a study for human receptors.

Traditional offshore wind farm developments have been the subject of significant underwater noise assessments and regulation due to the impact of piling noise and vessel noise during the extended period of construction (installation of the piles, installation of the monopiles/jackets and the installation of the WTG). This noise generation covers an extended period of time (decades for the larger round three sites), where the impact of construction noise can have an impact on the surrounding marine environment.

The installation of floating offshore structures removes nearly all site construction noise as the units are constructed, towed to the site and then moored in position. This means that the normal construction related noise is either not generated or significantly reduced:

- No piling noise;
- No construction vessel on site installing monopiles/jackets;
- Limited time on site during construction;
- Small scale of development (six to ten turbines)
- Short construction phase (onsite).

Therefore as the potential noise impact is very limited for floating offshore wind installations it is not believed that a separate noise study is required during the consenting phase as the potential impacts are very limited in time and space.

10.9.7. Marine Mammal Protection Legislation

A summary of marine mammal protection legislation is given in Appendix C.

10.10. Cumulative Impact

The project developers have initiated a monitoring programme including aerial surveys to record marine mammals in the region and will periodically review marine populations with SMRU and SNH together with other research organisations and stakeholders, including other offshore wind developers in the region. Mitigation measures to reduce any potential environmental effects would be incorporated into the design of the wind farm from site selection through design of the layout of the turbines and the design of the individual components of the wind farm, and the selection of installation and decommissioning techniques.

11. The Human Environment and Other Marine Users

11.1. Landscape, Seascape and Visuals

11.1.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the landscape, seascape and visuals will be based on the following:

Table 11-1 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.1.2
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.1.4

11.1.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-2 Baseline information – Human Environment and other Marine Users

Type/description of data	Source	Status
Digital elevation model	Ordnance Survey	Obtained
Key receptors	SNH, Marine Scotland	Obtained
On site photos	KOWL	Obtained – to be used in stakeholder engagement

11.1.3. Desk Based Review of Existing data

The visual impact of larger wind farms results from both their physical presence and from the eye-catching nature of blade movement. These impacts are potentially greatest on land and near-shore where wind turbines are in closer proximity to visual receptors and their location scrutinised based on their proximity to landscape and seascape features of importance and sensitivity, as well as subjectively on aesthetic grounds. However the visual impact from this demonstrator project will be minimal due the limited number of wind turbines and the distance from shore and sensitive receivers.

Much of the coastal zone north of Inverbervie to Portlethen and from Balmedie to Peterhead is designated as Areas of Landscape Significance. This is a local designation which implies an increased sensitivity to visual receptors along this stretch of coast. Further inland, the Cairngorms are designated for the Cairngorms National Park which also includes two National Scenic Areas (NSAs) – the Cairngorm Mountains and Deeside and Lochnagar. The reasons for designating National Parks include the conservation and enhancement of the natural and cultural heritage of the area and to promote an understanding and enjoyment of the special qualities of the area by the public. NSAs are recognised for their ‘outstanding scenic value in a national context’. Although KOWL project will not have a direct visual impact within these sites, the higher elevation of the areas means that the wind turbines may be visible from them in certain conditions and therefore have an impact on them.

Although the KOWL site is about 15km (8 nm) from the coast at Altens, the size of the turbines and the height of the viewer on the cliffs along much of the adjacent coast south of Aberdeen will mean that the proposed wind farm will be visible when weather conditions permit. This will also be the case perhaps to a lesser extent from the lower coastal dunes north of Aberdeen at Balmedie and the cliffs from Collieston to Peterhead. Sections of the coastline are important for tourism and recreational interests such as golfing, walking, bird and sea mammal watching.

Important sites and features along the coast include:

- RSPB reserve at Fowlsheugh
- National Nature Reserve at the Sands of Forvie;
- Dunnottar Castle;
- Dounies Rare Breeds Farm;
- Balmedie Beach and Country Park,
- Aberdeen Beach and seafront;
- The harbours of Stonehaven, Collieston and Cruden Bay; and
- The North Sea Trail Aberdeenshire Coastal Path

It is recognised that views to the wind farm from the coast and these locations will be a primary consideration during the design process and that individuals experiencing these views are likely to have a high sensitivity to them. There may also be a concern from recreational users that their at-sea view will be adversely affected by the development.

However due to the small size of the demonstrator site and being located a significant distance offshore the potential visual impacts from land are limited.

11.1.3.1. Visual Impact Methods

The potential extent of the visual resource that could be affected can be broadly identified by using a GIS to produce a ZTV map based on Ordnance Survey digital elevation data. An example ZTV for the draft turbine layout (with a blade tip height of 200m) is shown in Figure 11-1. From the map it can be seen that the turbines will be potentially visible from most coastal/shoreline areas along the east Aberdeenshire coast and higher areas of ground further inland. The turbines will also be visible from a number of the major transport route corridors including the A90, A92, A93 and A96, and also the Aberdeen to Dundee mainline railway.

The study area for the cumulative and in-combination impact assessment will be 70 km (37.7 nm) radius from the footprint of the proposed KOWL site. Offshore and onshore wind farms which are operational, in construction, consented or within the planning system as a current application will be included. Offshore this will include the Buchan Deep demonstration site, the EOWDC, the Round 3 Firth of Forth and SeaGreen Alpha offshore wind farm and Inch Cape (Scottish Territorial Waters). Any other major projects that are within the same stages of development will also be considered in the assessment as agreed with SNH and the other statutory consultees.

A Zone of Theoretical Visibility (ZTV) map will be produced for all onshore and offshore wind farm projects that fall within the categories described above. The ZTVs will be over-lain with the Kincardine Offshore Wind Farm ZTV to establish areas of intervisibility. In consultation with SNH and other statutory consultees, suitable viewpoints will be decided upon which fall within these areas and from which the assessment will be conducted. The viewpoints will represent frequently visited destinations with an important seascape component, designated landscapes, coastal footpaths and footpaths with a hill component, residential properties and settlements. Recreational marine users will also be represented within the viewpoint selection.

The ZTV for the assessment will be produced at a scale of approximately 1:250,000 and will consider an area up to 60 km (32.4 nm) from the wind farm development area. It will model the theoretical visibility of the proposed turbines to both blade tip height (198m) and nacelle (hub) height. The ZTV will be used to identify zones from where the turbines could be seen.

Consultation with SNH will be undertaken to develop a further understanding of how the wind farm may impact the landscape and seascape in the vicinity of the development. The consultation will also be used to help determine the best viewpoints of the landscape and seascape to inform the visual assessment. The viewpoints will be chosen using the ZTVs and an initial desk study to identify sites of particular sensitivity or

those of representative locations. These will include areas of coastal settlement, areas that are frequently visited (e.g. Balmedie Beach, Sands of Forvie, Aberdeen Beach, Stonehaven), public footpaths (e.g. the North Sea Trail) and other frequently visited locations and potential marine based views. In addition, a number of viewpoints used in the EOWDC assessment may be used where they fall within the Kincardine Offshore Wind Farm ZTV. This will be used for comparison and also to assess potential in-combination effects of the visibility of turbines from both sites.

Guidance from SNH and other stakeholders, along with referral to best practice documents will be used to provide guidance on which viewpoints are represented by the use of photomontages, photos plus wireframes or wireframes only. A landscape, seascape and visual impact assessment will then be completed for each of these viewpoints. Example guidance and best practice documents include:

- Department of Trade and Industry (2005). Guidance of the assessment of the impact of offshore wind farms.
- Horner and MacLennan and Envision (2006). Visual representation of wind farms: good practice guidance. Prepared for Scottish Natural Heritage, The Scottish Renewables Forum and the Scottish Society of Directors of Planning.
- Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore wind farms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).
- The Highland Council (2013). Visualisation standards for wind energy developments.
- The Landscape Institute and Institute of Environmental Management (2013). Guidelines for landscape and visual impact assessment (3rd Edition).
- The Landscape Institute (2011). Photography and photomontage in landscape and visual impact assessment. Advice Note 01/11.
- Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore wind farms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).
- SNH (2012). Guidance: Assessing the cumulative impact of onshore wind energy developments.
- Wessex Archaeology for COWRIE (2007). Historic environment guidance for the offshore renewable energy sector

As a variety of different sized turbines are currently available for offshore wind farms, visual work will be completed using the maximum in relation to potential turbine size (height and rotor diameter). This will ensure that the worst case impact is assessed, even if a smaller turbine is chosen for the final site design. The initial visualisation has been undertaken for 200 (maximum blade tip) and 11 m for the floating base (relative to sea level) and can be seen in Figures 11-1 and 11-2

Figure 11-1 Kincardine Offshore Windfarm Blade Tip Viewshed (200 m above sea level)

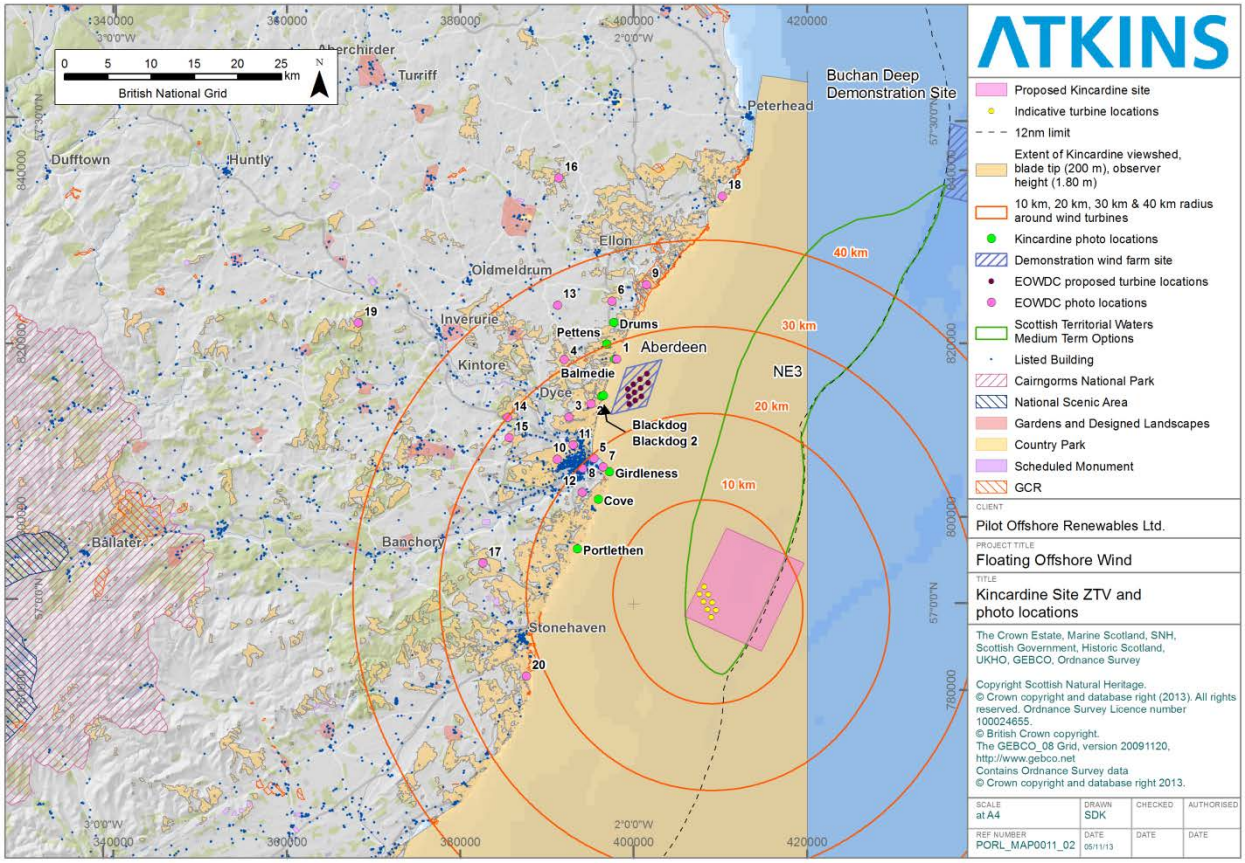
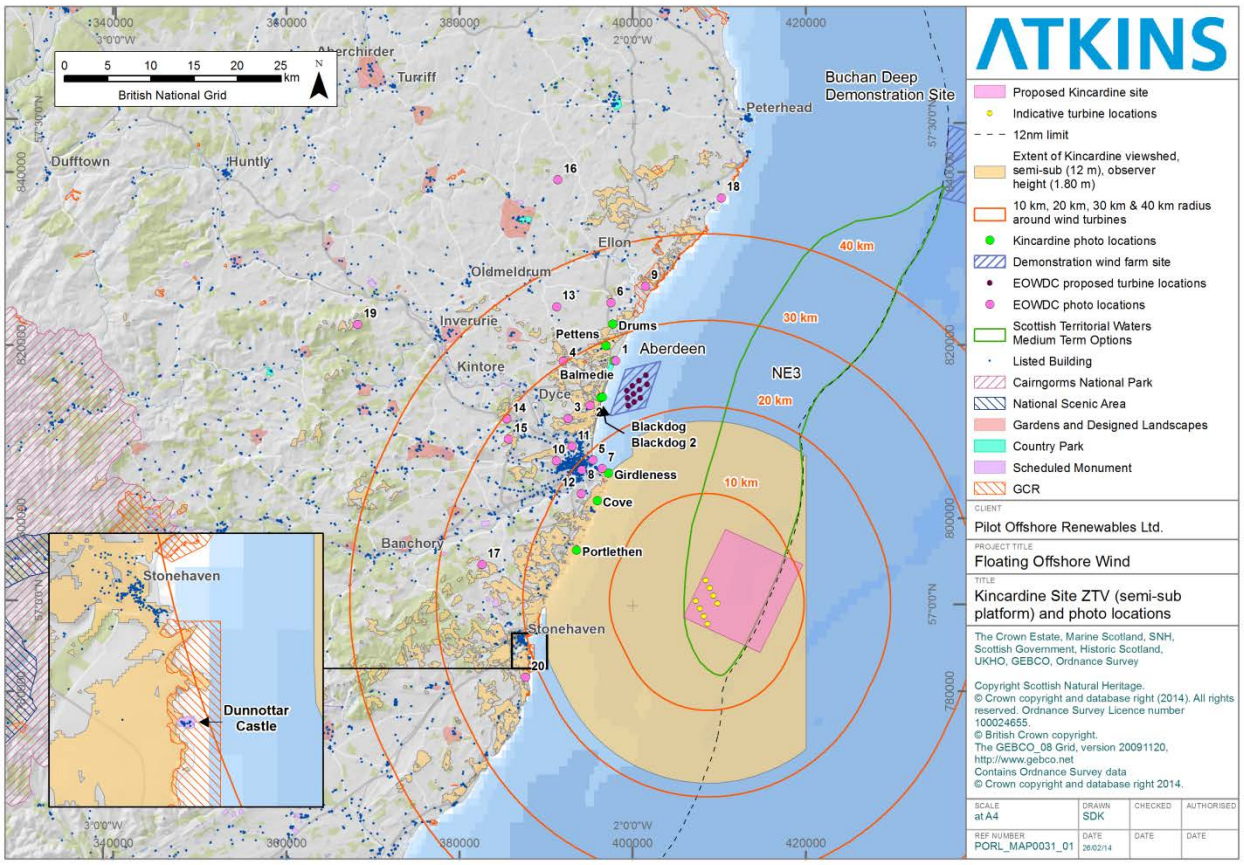


Figure 11-2 Kincardine Offshore Windfarm semi-sub base (11 m above sea level)



The types of cumulative and in-combination effects assessed will include:

- Simultaneous (or combined) visibility – where two or more sites are visible from a fixed viewpoint in the same arc of view
- Successive visibility – where two or more sites are visible from a fixed viewpoint, but the observer is required to turn to see the different sites
- Sequential visibility – where two or more sites are not visible at one location, but would be seen as the observer moves along a linear route, for example along a road or public right of way.

11.1.4. Impact Assessment

11.1.4.1. Proposed Survey

No additional field surveys are currently required, as detailed high resolution images have been obtained for key points along the coastline to allow visualisation of the development to be undertaken.

11.1.4.2. Data Analysis

The next stage of the process will be to undertake visualisation studies of the development which will then be used to stakeholder engagement.

11.1.4.3. Consultation

Additional stakeholder engagement will be undertaken as part of the EIA process to enable suitable representation of the site from the shoreline and key viewing locations in range of the development.

11.1.4.4. Data and information Gaps

No data gaps have been currently identified, with the onsite survey fulfilling the remaining data requirements for the site.

11.1.4.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the physical environment and the coastal sediment dynamics of the area are considered in Table 11-3 below.

Table 11-3 Potential impacts on landscape, seascape and visuals

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Effect on the landscape	Low	Low	Low	The impact of the terrestrial elements of the development will be low (installation of export cable and directional drilling location). It is expected that following installation that the export cable will be buried and that only limited above ground structures will be visible and these will be situated in current development areas.	No
Effect on the seascape	Medium	Medium	Medium	The visual impact of the WTGs will cover a large area of the Aberdeenshire and Angus coastline. This will require further investigation, visualisation and additional consultation with stakeholders.	Yes

Table 11-4 Impact assessment strategy for landscape and seascape

Potential impact	Assessment method	Relevant guidance
Effect on the Seascape	Visualisation of the development from key points of interest	SNH, COWRIE – Historic environmental guidance for the offshore renewable energy sector 2007

11.2. Tourism and Recreation

11.2.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on Tourism will be based on the following:

Table 11-5 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.2.3
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.2.4

11.2.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-6 Baseline information – Tourism

Type/description of data	Source	Status
Recreational data	Marine Scotland	Obtained
Visitor numbers	SNH	To be obtained as part of the consultation process
Site photos for visualisation	KOWL	Obtained

11.2.3. Desk Based Review of Existing data

As described in Section 11.1.1 above, there are a number of locations along the coastline adjacent to the site or within visible range, that are of high amenity value and support a number of recreational and tourist activities (Figure 11-3). The project developers propose to conduct a study into the potential impact of the wind farm upon the tourism and recreation interests within the ZTV of the KOWL site (see section 11.1).

The potential impacts on tourism from offshore wind developments may occur through:

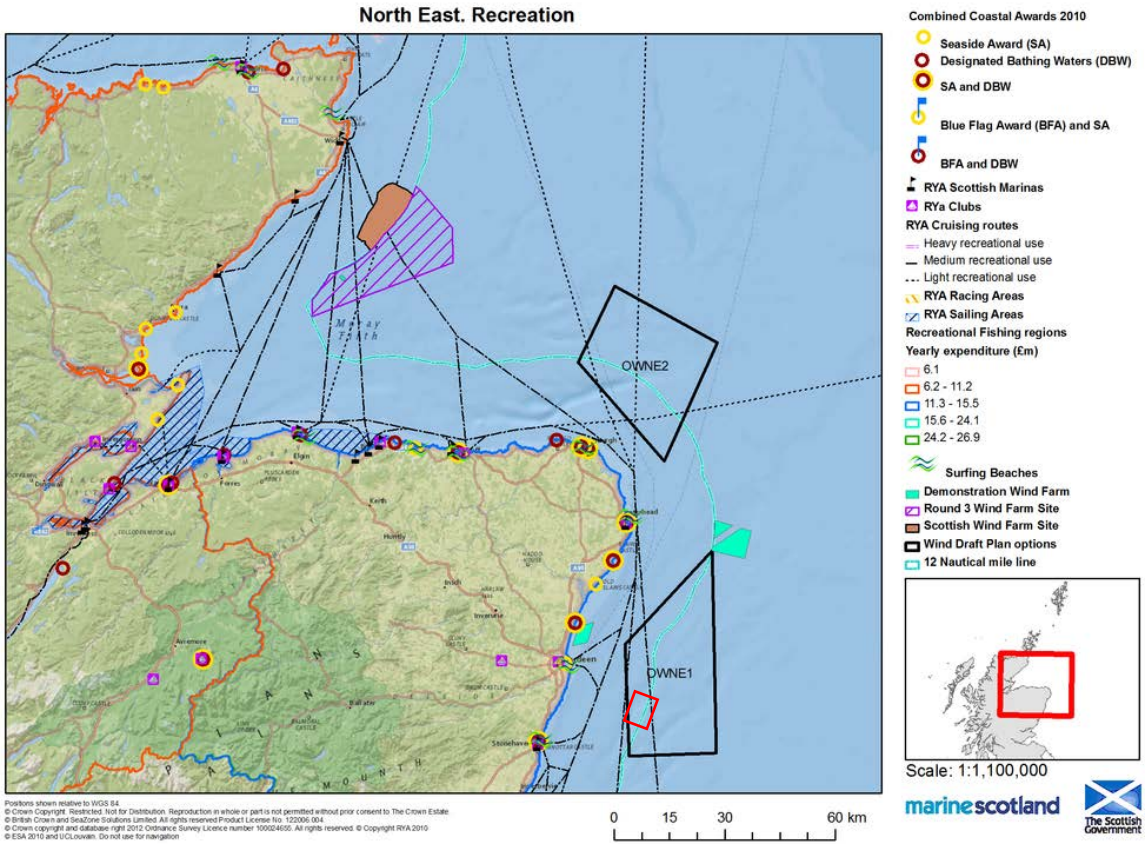
- Visual effects on the landscape and seascape deterring or attracting visitors to an area or deterring or enhancing tourism investment
- Disturbance or injury to coastal or marine wildlife interests during installation and operation
- Disruption to site access for tourism operations

The impact on tourism from visual effects may arise due to a visitor's perceived reduction in the attractiveness of 'quality' of the landscape (i.e. the important feature attracting tourists) due to the wind farm which may lead to reduced prices for tourism services and/or reduced numbers of tourists. There is also potential for offshore wind developments to adversely affect investment in new developments (where such development is promoted on the basis of a rural location and uncluttered seascapes), for example golf links and resorts.

Positive impacts on tourism may result from attraction to the sight of installation activities and operation of the wind farm creating new opportunities and add-on benefits to existing attractions in the area[71].

[71] Scottish Government (2011d). Economic assessment of short term option for offshore wind energy in Scottish Territorial Waters: costs and benefits to other marine users and interests.

Figure 11-3 Recreation



The assessment of the impact of the Kincardine Offshore Windfarm on local tourism and recreation will consider how the visual impact of the wind farm may change tourism expenditure and also how development of the wind farm may deter future investment. To do this, the following steps are proposed:

- Identify important existing tourism and recreation resources within the ZTV and establish the relative value of each. This will be done by:
- Establishing the importance placed on the resource by visitors to the area (through analysis of survey data)
- Analysing visitor use statistics for the identified resources
- Determining the profile of the resource in marketing and other published material about the resource that is made available to potential visitors.
- Perform an assessment of how the resource is dependent on the surrounding seascape and landscape for its attraction.
- Evaluate the magnitude of impact on the value of individual resources.

Having established the baseline value and sensitivity of individual tourism resources and magnitude of impact, the significance of impact can be evaluated.

In June 2007, Glasgow Caledonian University was commissioned by the Scottish Government to assess whether Government priorities for wind farms in Scotland are likely to have an impact (positive or negative) on Scottish tourism[72]. Part of the assessment included an intercept survey of 380 tourists at 4 study areas in Scotland that have wind farms and where tourism is a significant contributor to the economy. A 600 respondent Internet survey of 600 respondents exploring the value place on the landscape by visitors was also carried out. Although the surveys were based upon the perceived impact of Scottish onshore wind farms, the results provide an indication of the general acceptance or otherwise of wind turbines in the environment.

[72] Scottish Government (2008). Economic Research Findings: The economic impacts of wind farms on Scottish tourism.

The results from the survey indicated that three-quarters of tourists felt wind farms had a positive or neutral impact on the landscape (of these 39% were positive, 36% had no opinion and 25% were negative). Respondents that had seen a wind farm were less likely to be hostile than those who had not and the vast majority (93-99%) or tourists that had seen a wind farm in the local area suggested that the experience would not have any effect on their decision to return to that area, or Scotland as a whole. It was only when respondents were shown images of hypothetical extensions to existing wind farms that they became negative in their responses.

11.2.4. Impact Assessment

11.2.4.1. Proposed Survey

No additional surveys are currently proposed as part of the tourism impact assessment as there is currently sufficient data available to undertake this assessment

11.2.4.2. Data Analysis

Additional data analysis is currently not proposed as part of the EIA as sufficient data and assessments are currently available for the area.

11.2.4.3. Consultation

Additional consultation will be undertaken as part of the EIA process and this may generate additional assessments depending on the outcomes of such consultation.

11.2.4.4. Data and information Gaps

No data gaps have been currently identified, with the current data fulfilling the remaining data requirements for the site.

11.2.4.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to tourism to the area are considered in Table 11-7 below.

Table 11-7 Potential impacts on Tourism

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Disturbance of recreational activity	Low	Low	Low	During the construction and decommissioning phase there could be limited disruption to the coastal path due to site safety rules when the export cable is installed, but not during operation. There is limited potential impact to recreational activity on the site due to the distance from shore and depth of water.	No
Visual Impact	Medium	Medium	Medium	The potential for visual impact from the development is to be reviewed as part of the EIA process. There is potential for both positive and negative impacts on tourism for the development.	Yes
Opportunities for local tourism	Positive	Positive	Positive	Additional vessel tours could be undertaken as part of the development and this would lead to a positive benefit for the local community.	Yes

Table 11-8 Impact assessment strategy for shipping and navigation

Potential impact	Assessment method	Relevant guidance
Visual Impact	ZTV and photo visualisation	SNH, COWRIE – Historic environmental guidance for the offshore COWRIE and SNH.
Opportunities for local tourism	Review of other offshore wind farm development impacts	None presently identified

11.3. Navigation and Maritime Traffic

11.3.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on navigation and maritime traffic will be based on the following:

Table 11-9 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.3.2
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.3.3 11.3.4

11.3.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

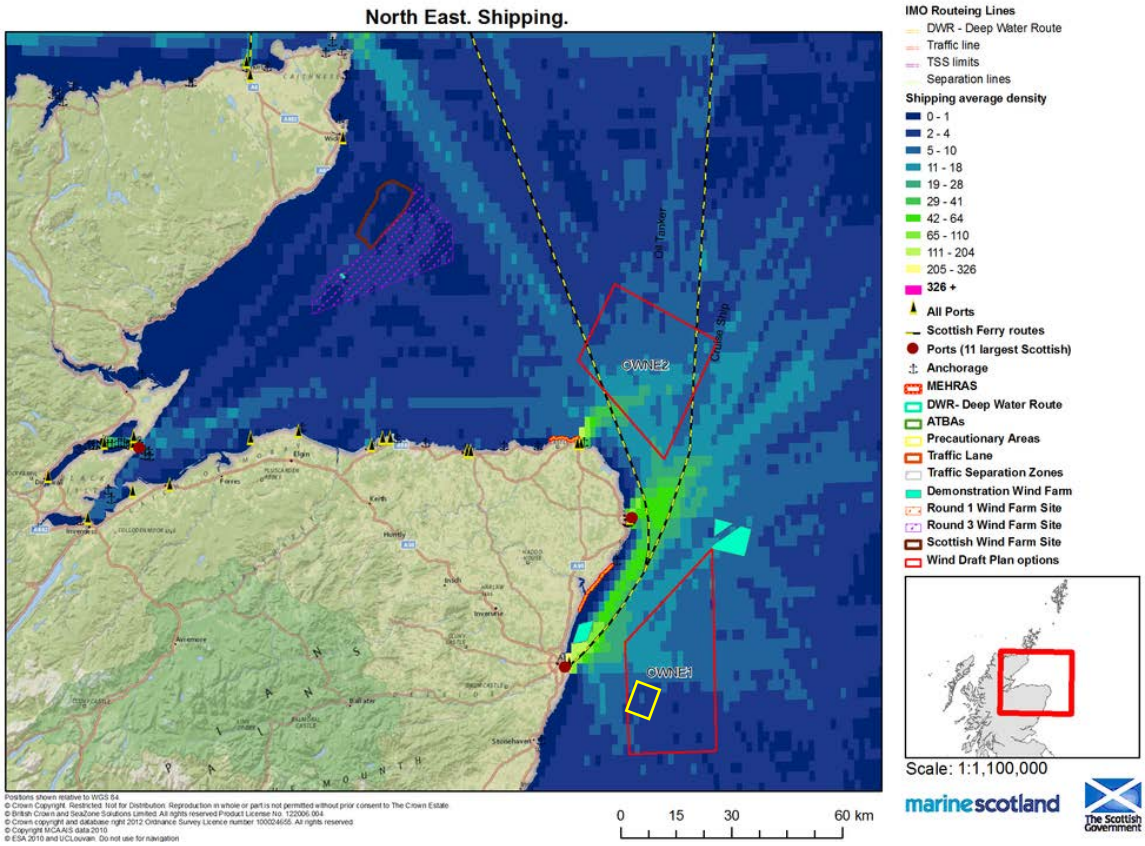
Table 11-10 Baseline information – Marine navigation and traffic

Type/description of data	Source	Status
Shipping movements	Marine Scotland, MCA, IMO	Data obtained from Marine Scotland
Fishing vessel sighting	Marine Scotland and SFF	Data obtained
Recreational vessel activity	RYA and Marine Scotland	Data obtained

11.3.3. Desk Based Review of Existing data

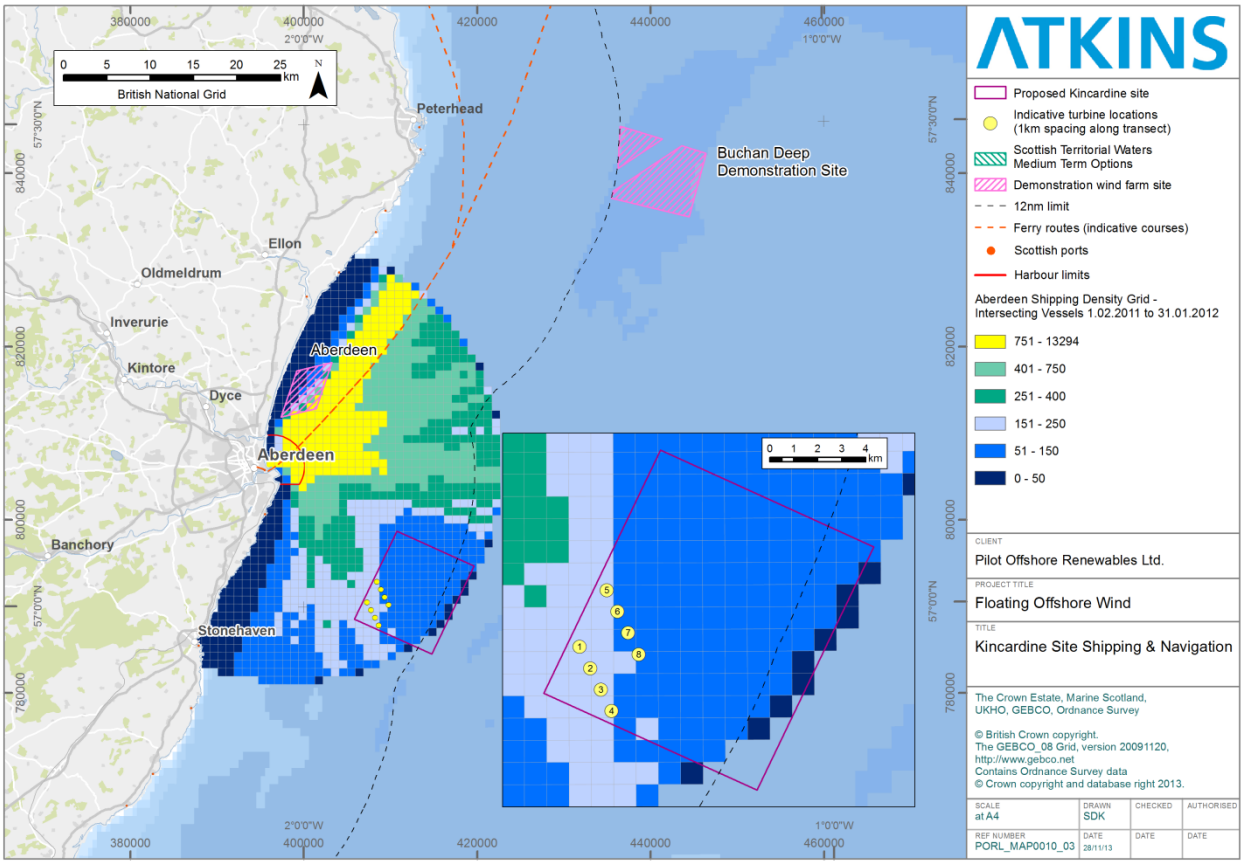
The commercial shipping activity (yearly average) is shown in Figure 11-4 and indicates that traffic to the north and west of the KOWL site is significant and centred around the port of Aberdeen (Oil and Gas/Passenger Ferry) and the fishing ports of Peterhead and Fraserburgh. The location of the site shows average shipping densities of between 5 and 18 transects per year. This shows that the site has a relatively low frequency of traffic and the installation of a floating offshore wind farm would have limited impacts on commercial shipping.

Figure 11-4 Shipping



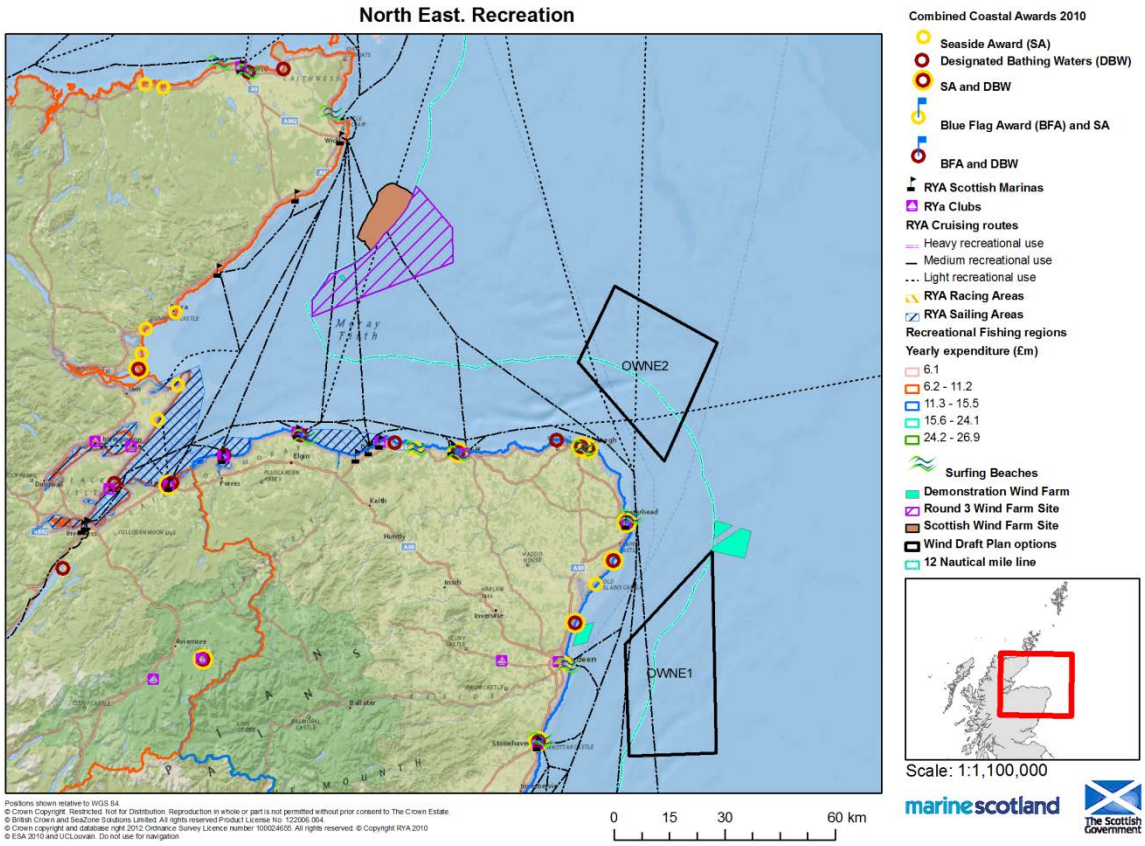
Further consultation will be undertaken with MCA, Chamber of Shipping, the Ports Authority (Aberdeen, Montrose and Stonehaven) and NLB with these results in order to establish likely significance of impacts upon shipping navigation.

Figure 11-5 Aberdeen Harbour Ship Traffic



Marine Scotland has gathered information from the Royal Yachting Association to assess the use of the site by non-commercial marine traffic (recreational use, cruising routs and races in the area. Figure 11-6 shows the main recreational pathways in the area of the KOWL site, with light to medium recreational use pathways noted to the east and west of the site and this will require additional consultation with the RYA.

Figure 11-6 Recreational shipping use



11.3.4. Impact Assessment

11.3.4.1. Proposed Survey

A desk based navigation hazard assessment will be undertaken as part of the EIA process to determine the shipping and navigational activities in the KOWL area. This will review the available marine traffic data and assess the potential impact the development could have on the local and regional shipping. As this is a desk based assessment, no additional survey will be required.

11.3.4.2. Data Analysis

The detailed navigational and shipping assessment will be undertaken to gain a detailed understanding of risk associated with the development. This will be submitted to the MCA for further consultation as part of the assessment process and additional data requirements could be requested as part of this process.

11.3.4.3. Consultation

Additional consultation will be undertaken with the MCA, Northern Lighthouse Board, RYA and the Port of Aberdeen as the key stakeholders for the area. Additional local consultation will be undertaken as part of a wider stakeholder engagement process.

11.3.4.4. Data and information Gaps

The known data gaps (that will be obtained as part of the detailed navigational assessment) are:

- Detailed AIS data from the Port of Aberdeen (one month of data);
- Marine Accident Investigation Branch (MAIB) records for area;
- Royal National Lifeboat Institution (RNLI) records for area;

11.3.4.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the physical environment and the coastal sediment dynamics of the area are considered in Table 10-1 below.

Table 11-11 Potential impacts on navigation and maritime traffic

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Increased to navigational and collision risk	Medium	Medium	Medium	During installation additional vessels will be located on site and the floating installations will lead to a larger surface collision risk and obstruction.	Yes
Increased navigational risk if device mooring breaks free.	Low	Medium	Low	During construction and decommissioning suitable vessels will be available to limit this risk. During O&M no vessels will be on station and therefore the risk is greater.	Yes
Rotor blade and sailing vessel interaction	No impact	Medium	No Impact	There is a potential for the rotor blades to impact on sailing vessel masts and this will depend on vessel clearance and WTG blade tip height.	Yes
Vessel rerouting due to presence of demonstrator WTGs.	Medium	Medium	Medium	During construction and decommissioning additional vessels will cause vessel rerouting and during operational phase there will be an exclusion zone around the site which will require vessel rerouting.	Yes
Interaction between WTGs and marine electronic equipment.	No Impact	Medium	No Impact	There is potential for operation WTGs to effect marine electronic equipment e.g. ship and port radar.	Yes
Effect on submerged landscapes	No impact	Medium	No Impact	The mooring systems have potential to impact on submerged navigation and therefore are likely to restrict navigation for submarine activity.	Yes

It is proposed that the following impact strategies be applied to address these potentially significant impacts noted above.

Table 11-12 Impact assessment strategy for navigation and maritime traffic

Potential impact	Assessment method	Relevant guidance
All impacts on shipping and navigation	Full navigational risk assessment to review the above impacts. Detailed discussions with the MCA, Northern Lighthouse Board and other key stakeholders.	DECC Methodology for assessing the marine navigational safety risks of offshore wind farms (2005) MCA Marine guidance notice 371 – Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice,

Potential impact	Assessment method	Relevant guidance
		Safety and Emergency Response Issues.

11.4. Commercial Fisheries

11.4.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the commercial fisheries and the strategy to assess the impact of such effects will be based on the following:

Table 11-13 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.4.2
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.4.3 11.4.4

11.4.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-14 Baseline information – commercial fisheries

Type/description of data	Source	Status
Fishing Intensity	Marine Scotland	Obtained –see below
Fishing vessel sightings	Marine Scotland	Obtained
Consultation	The Crown Estate, Marine Scotland, Scottish Fishing Federation, Fish Producers; Salmon boards and trusts etc	On-going – to be collected and assessed as part of EIA.

11.4.3. Desk Based Review of Existing data

With the introduction of Marine Scotland's new GIS tool (NMPi – see figures below) it is now possible to extract significant relevant information on the regional fishing activity directly from one source. This data is freely available and will be used to assess the commercial fishing activity within the proposed site. However additional data sources will be assessed to identify the local, regional and international commercial fishing activities and these will be acquired from a range of sources.

Additional high level, commercially sensitive fishing data from the SFF will be used to provide an overview of the sites. However this data cannot be included into the EIA process due to its high commercial sensitivity. KOWL are thankful to SFF for allowing access to this data to provide valuable knowledge in our site selection and to allow KOWL to reduce the impacts on the fishing effort within the area.

11.4.4. Impact Assessment

11.4.4.1. Proposed Survey

No additional survey has been identified at this time, as sufficient data sets are currently available to undertake a suitable assessment.

11.4.4.2. Data Analysis

The DECC Strategic Environmental Assessment (SEA) of UK waters for offshore wind and oil and gas exploration provides information upon important fishing interactions. Consultation with the Scottish Fishermen's Federation and local fishermen will confirm the significance of particular fisheries.

The North Atlantic has been split up into rectangles for mapping of human activity by The International Council for the Exploration of the Sea (ICES). Fishing activity data is available in both effort and landing categories for these rectangles, and data from both categories confirm that prawns (classified as Nephrops or Norway lobster caught primarily by otter net trawling) are major catches along the southern region of the east coast of Scotland.

The DECC SEA states that there is significant fishing effort within the 6-12NM waters offshore all around the UK, and that much of this activity is poorly understood due to the presence of foreign fishing vessels within these waters.

Site specific surveys will not be required to determine the occurrence of fish and shellfish species within the site as sufficient data sets are currently available to undertaken a detailed assessment. A radar plot study will be required to establish the use of the site by vessels under 300 gross weight tonnes that are not required by law120 to carry AIS systems, such as small commercial fishing vessels. Fish spawning grounds, key commercial species, electromagnetic field- sensitive species and conservation species will need to be identified from key data sources including:

- Scottish Inshore Fishery Group: North -east Scotland and member organisations
- Scottish Fishermans Federation (SFF) which includes Anglo Scottish Fishermen's Association for this area.
- DECC SEA
- http://www.offshore-sea.org.uk/site/scripts/downloads_index.php
- Association of Salmon Fishery Boards (Forth, Tweed & Tay - Scotland) – Population Data
- COWRIE - http://www.offshorewindfarms.co.uk/Pages/Publications/Latest_Reports/Fish___Shellfish/
- ICES data Centre for Fisheries, Agriculture and Science (CEFAS)
- Marine Fisheries Agency / Marine Management Organisation (MMO) (on trans-boundary issues)
- Scotland River Basin District Eel Management Plan (December 2008) Marine Scotland
- http://www.scotland.gov.uk/Topics/Fisheries/Salmon-Trout-Coarse/EMP

For an assessment of the potential impacts on commercial fisheries, data will be required to complete a fisheries activity study, including an assessment of species landed, scale of fishery, seasonality of effort, and economic value. This will involve spatial analysis and presentation of data for assessment and planning purposes. Information on the local ports linked to fishing grounds will need to be incorporated. The potential direct and indirect impacts of the Array wind farm site on commercial fishing activity within the site boundary is expected to be very limited due to the size of the demonstrator site

The results from the National Fish Ecology data review and survey work will be incorporated into the consultation with commercial fisheries interests and assessment of potential impacts on the activities from the installation activities and infrastructure of the array.

The project developers will engage with the fishing community to gather relevant data and information and explore and discuss appropriate mitigation measures.

The following section provides an overview of the current commercial fishing activity within the Phase 1 area and export cable corridor, based on preliminary assessment of fisheries data (MMO landings and values statistical data, 2000-2008, MMO VMS data, 2005-2009).

Fishing intensity is summarised in Figure 11-7, Figure 11-8 and Figure 11-9.

Figure 11-7 Fishing Intensity 1

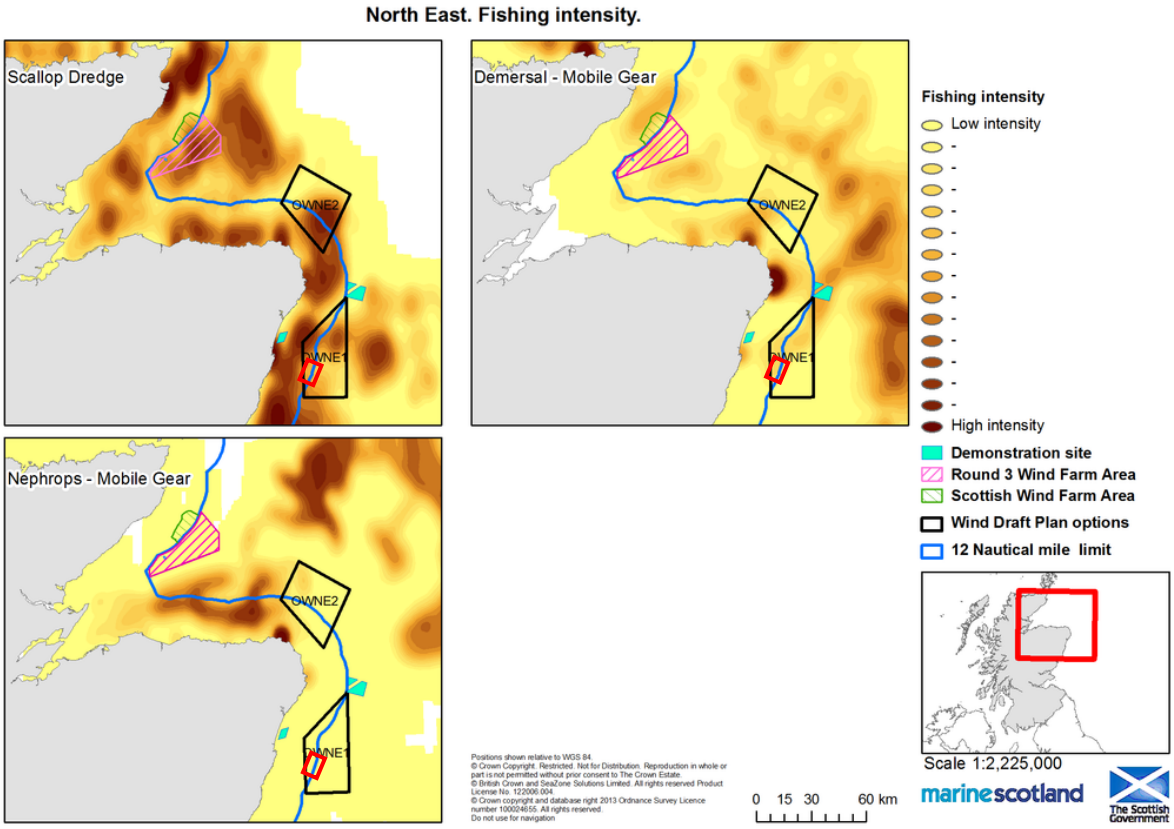


Figure 11-8 Fishing Intensity 2

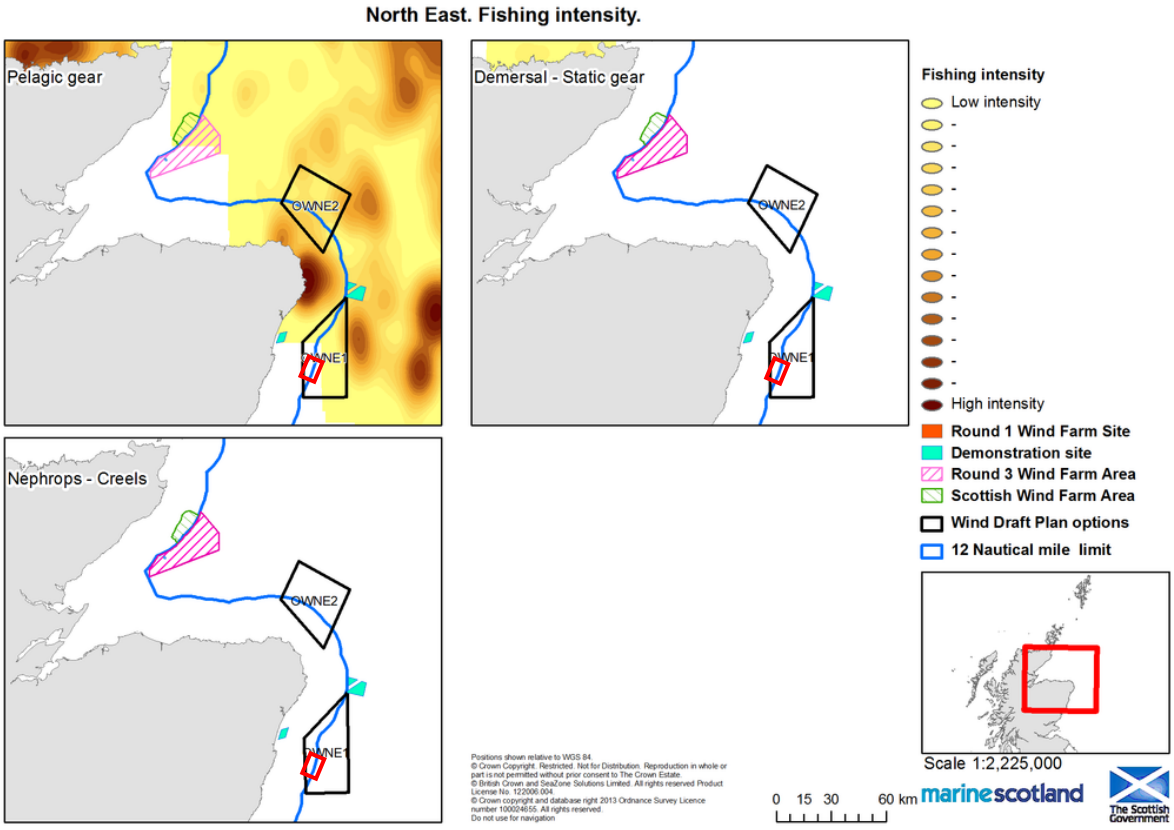
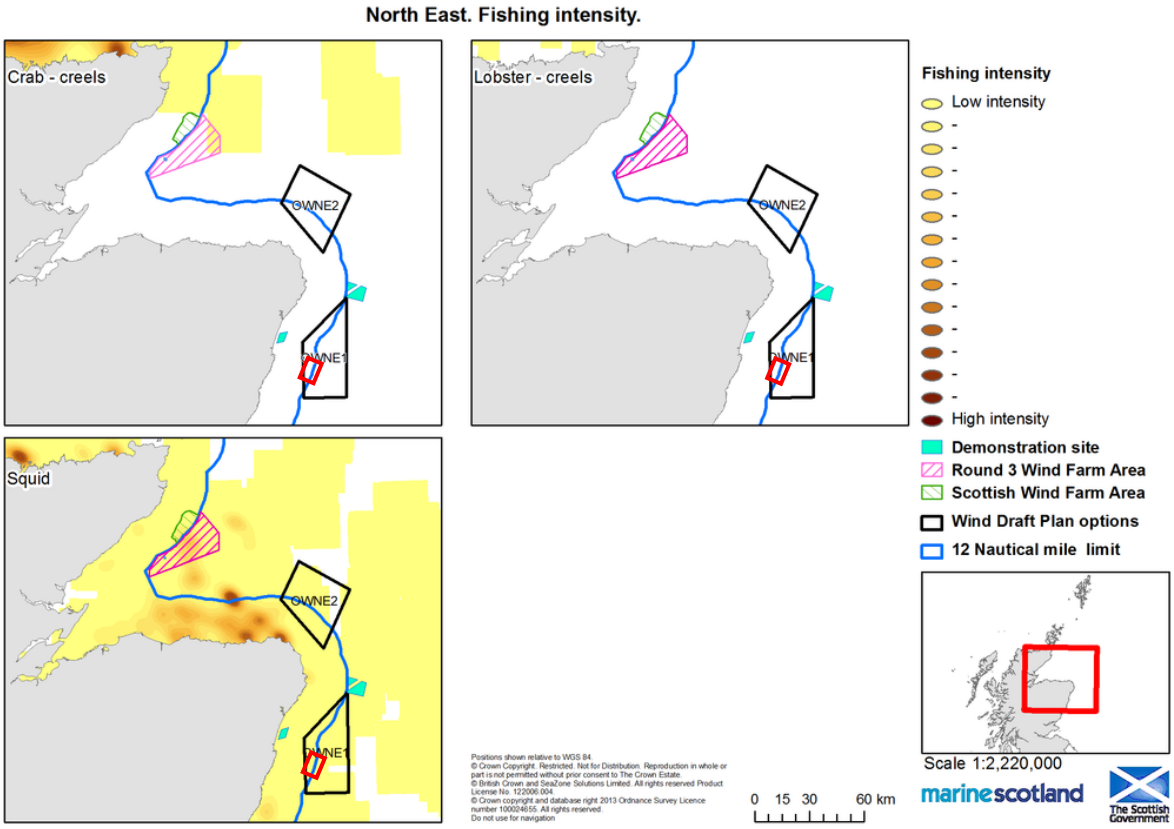


Figure 11-9 Fishing Intensity 3



ICES statistical rectangles are currently the smallest area statistical units used for collating fisheries data. Rectangle boundaries align to 1° longitude and 30' latitude and for the most part have sea areas equating to approximately 900 nautical miles. The majority of the R3 zone Phase 1 Area is located within ICES rectangle 42E8, with a smaller section and the export cable corridor falling within rectangle 42E7 In Rectangle 42E8 the majority of landings by value (average 2000-2008) are from scallop dredging (76.8%). Haddock, principally caught by Scottish seines, is the second most valuable species (15.5%).

Scallop dredging represents a high percentage of the landings by value (42.8%) in Rectangle 42E7, although potting for crustaceans, such as lobster, edible crab and velvet crab, also has a high combined value (41.8%). Nephrops, targeted by both trawlers and creelers, has the third highest landings values (10.5%) of an individual species.

Landing values for 42E* and 42E are summarised in Appendix D.

It is considered that the majority of vessels operating in Rectangle 42E8 are greater than 15m in length (96.7%) and hence fitted with VMS. The satellite densities illustrated in Figure 11-7, Figure 11-8 and Figure 11-9 therefore give a good indication of the fishing intensity in this rectangle.

In Rectangle 42E7 however, where potting and nephrops trawling account for a significant proportion of the landings values, and the vessels engaging in these activities are often less than 15m in length (59.4% under 15m), it is expected that the satellite densities given below underestimate the actual levels of fishing.

Identification of the levels and locations of fishing activities within this Rectangle will be will be undertaken as part of assessing potential cumulative impacts during the EIA process as it is possible that a safety exclusion zone could be applied to the site due to the anchor cables and risk to navigation that these could cause.

11.4.4.3. Consultation

Marine Scotland has provided additional data sources as part of the initial consultation process and this data (as seen above) will be used as part of the desk based studies. Additional data is available from the SFF and this will be used as a assessment check against the Marine Scotland data, although it is not proposed to use this commercial sensitive data within the Environmental Statement.

11.4.4.4. Data and information Gaps

No data gaps have been currently identified, with the onsite survey fulfilling the remaining data requirements for the site.

11.4.4.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the commercial fisheries in the area are considered in Table 10-3 below.

Table 11-15 Potential impacts on commercial fishing

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Loss of fishing grounds	High	High	Low	During installation and operation phases there will be a limited access to the site for fishermen using moveable fishing gear. The impact of this will be assessed as part of the EIA and navigation risk assessment.	Yes
Navigation and collision risk	Medium	Medium	Medium	The installation of the floating offshore wind farms will increase the risk of collision in the area (there is nothing moored there at present). A detailed navigation risk assessment will be undertaken for this and additional risk associated with O&M operations and fishing effort (limited potential impact).	Yes
Fishing gear and anchoring system	Medium	High	Low	There is a potential risk that fishing gear could become entangled with the floating offshore structure mooring system. This could lead to damage to fishing gear or loss. This will be assessed as part of the navigational risk assessment.	Yes
Electromagnetic fields (EMF)	No Impact	Medium	No impact	The presence of the electromagnetic field associated with the WTG and the subsea cables could impact on the behaviour, distribution and abundance of certain commercial fish species.	Yes
Protected fish take zone	No Impact	Positive	No Impact	The presence of the floating offshore wind farm will mean fishing effort is significantly reduced in the area and therefore the seabed and presence of the structures could have a positive impact on the species and the commercial stocks.	Yes

The scope of the assessment of potential impacts from the installation operation and decommissioning upon commercial fisheries interest will be informed by the guidance issued by the following sources.

Table 11-16 Impact assessment strategy for commercial fishing

Potential impact	Assessment method	Relevant guidance
All impacts on commercial fishing	Full risk assessment to review the above impacts of fishing activity in the area, in conjunction with SFF. Detailed discussions with the MCA, Northern Lighthouse Board, SFF and other key stakeholders.	BWEA Best Practice Guidelines for Consultation and Recommendations for Fisheries Liaison The COWRIE commissioned report Development of spatial information layers for commercial fishing and shell fishing in UK waters to support strategic sitting of offshore wind farms, by ABPmer (2009) OSPAR (2008) Guidance on Environmental Considerations for Offshore Wind Farm Development. Reference number:2008-3 Offshore Wind Farms (2004), Guidance note for Environmental Impact Assessment in respect of FEPA and CPA requirements, version 2 – June 2004

11.5. Archaeology

11.5.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on archaeology and the strategy to assess the impact of such effects will be based on the following:

Table 11-17 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.5.2
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.5.3 11.5.4

11.5.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-18 Baseline information – Archaeology

Type/description of data	Source	Status
Marine archaeology and cultural heritage	Historic Scotland – Scheduled Ancient Monuments (12NM limit)	Initial review and overview data obtained and detailed information

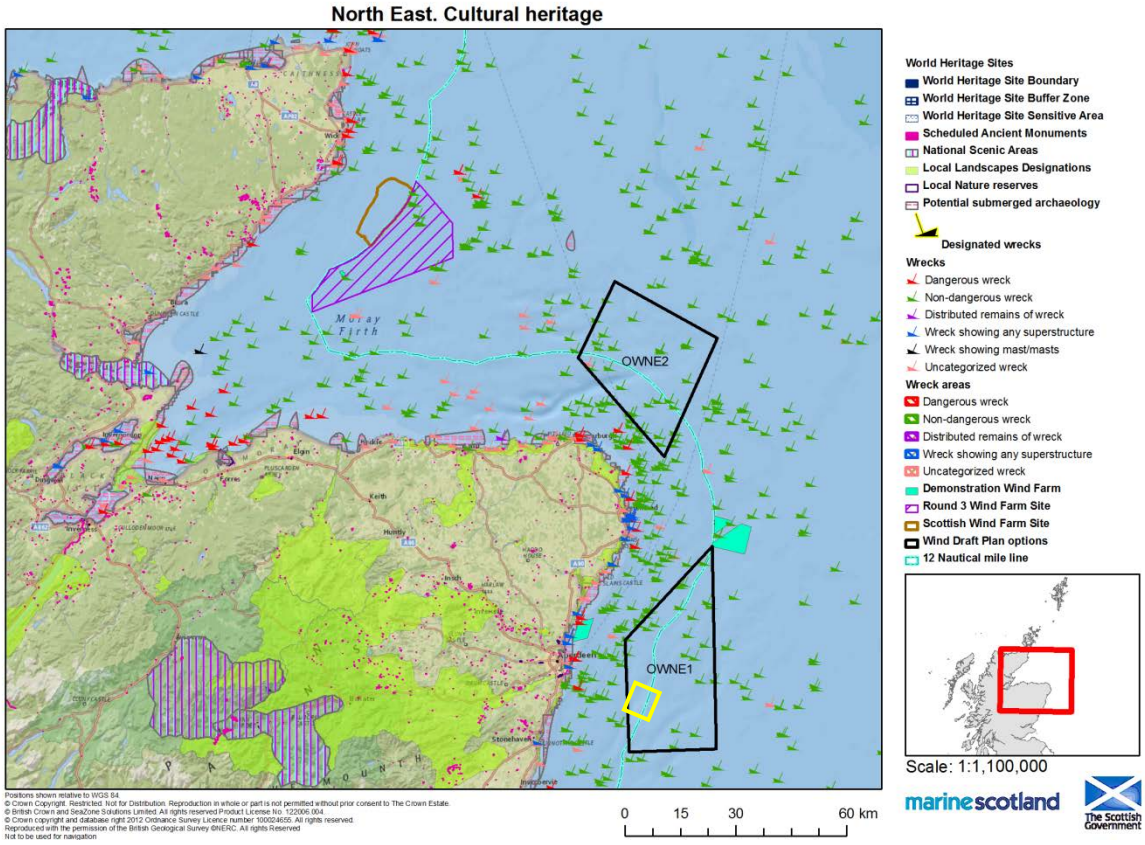
Type/description of data	Source	Status
	via CANMORE or Pastmap databases Statutory lists, registers and designated areas, including designated wrecks and HMPAs UKHO charts The Receiver of wreck, MOD and UKHO MCA	collected as part of EIA. Figure 11-10and Figure 11-11 show current known wrecks in area and site (+cable route). Additional data sources may be identified as part of this review process.
Terrestrial cultural heritage	SNH	To be obtained

11.5.3. Desk Based Review of Existing data

The Archaeological assessment will cover both marine and terrestrial archaeological elements. Historic Scotland is responsible nationally important onshore Scheduled Ancient Monuments and for the preservation of the marine archaeological resource out to the 12NM. They will be consulted to obtain detailed information on the archaeological resource of the area, as will local archaeological societies for information on the regionally important archaeology on shore when the proposed grid landing point, on-land cable routes and substation infrastructure is established.

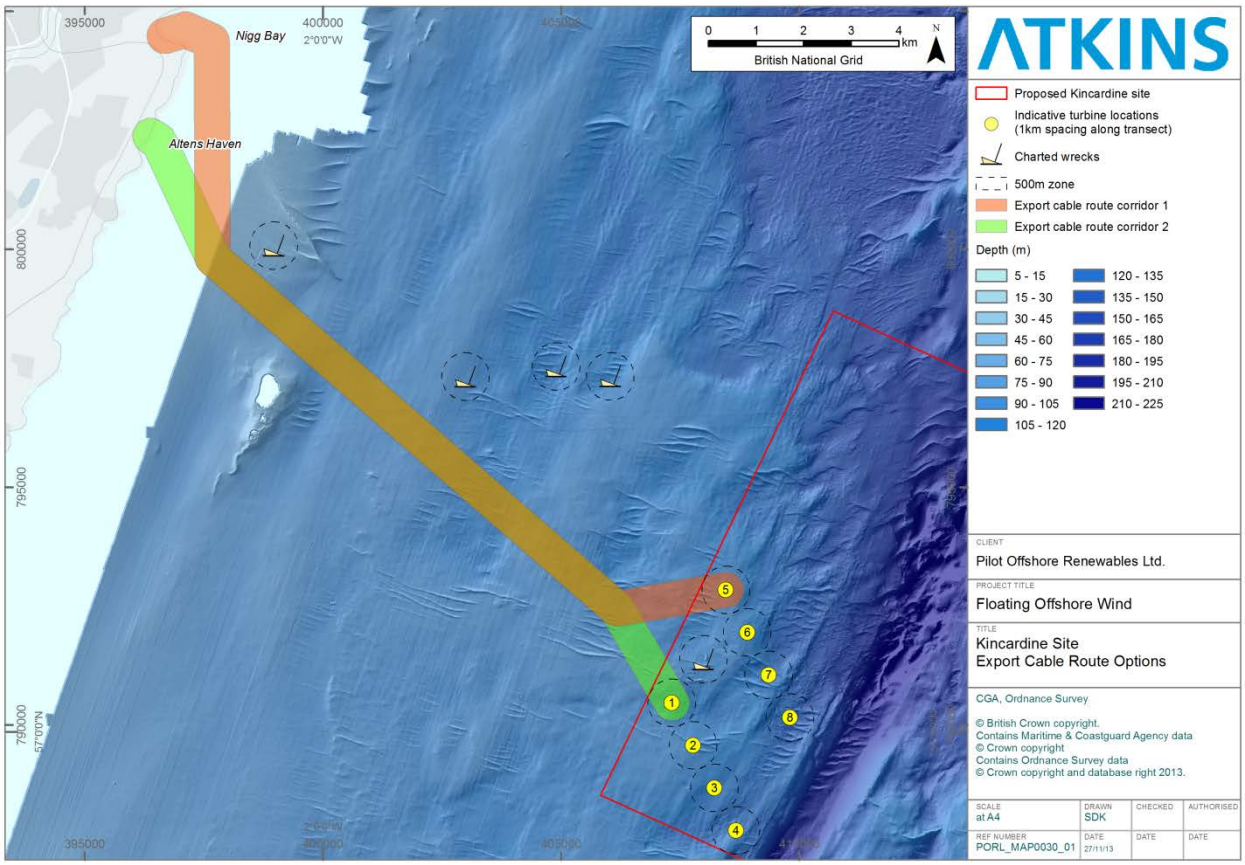
Under the Protection of Wrecks Act 1973 and Protection of Military Remains Act, 1986, designated wrecks and surrounding seabed must be preserved. Figure 11-10 shows the identified cultural heritage sites located in the North East of Scotland and Figure 11-11 shows the currently identified wrecks within the project area and potential cable route. There appears to be two known, non-dangerous wrecks within the area of the KOWL site, with one of them being located in the vicinity of the array.

Figure 11-10 Cultural Heritage



Known wrecks and artefacts would be identified from wreck data obtained from the Wrecks Officer of the Hydrographic Office. Any anomalies identified on the seabed would require verification (and potential diver proofing / video surveys) and would be subject to further consultation with Historic Scotland, who have responsibility for marine archaeology out to the 12NM limit. COWRIE has commissioned best practice guidelines for these methodologies, and this best practice, along with the Joint Nautical Archaeology Policy Committee (JNAPC) seabed code, will be followed.

Figure 11-11 Current wrecks identified on site and on possible cable route



The baseline archaeology study would comprise the following elements:

- A broad overview of the maritime history of the North-east Scotland area;
- A brief background to UK policy and statutory protection given to wrecks in UK waters;
- A desktop study identifying any recorded wrecks and other features of maritime interest within the Outer Survey Area;
- A desktop examination of any potential wrecks sites found during geophysical surveys;
- An estimate of the historical importance of each recorded feature;
- Definition of a suggested exclusion zone around each suspected wreck site.
- Identification of any wrecks and other features of maritime interest within the coastal study area (to cover possible cable routes);
- Identification of features of archaeological interest in the foreshore zone and its immediate hinterland within the cable
- Route and coastal study area (to cover possible landfall infrastructure);
- Consideration of the potential for deposits, former land surfaces and features of prehistoric date in the site area and cable route and coastal study area (to cover possible impacts from piling/trenching on buried material).

11.5.4. Impact Assessment

11.5.4.1. Proposed Survey

In the event that the side scan survey work identifies new elements of potential archaeological interest which are not charted, the project developers will liaise with Historic Scotland and local archaeological interest groups to decide if the area should be avoided for the purpose of the wind farm development or if further group truthing by diver inspection is required to quantify the find and importance. This additional survey work (divers), if required, would be expected to be carried out during detailed design and not during consenting

11.5.4.2. Data Analysis

As noted above a number of known wrecks have been identified as part of the initial review process, site selection and amendments to the export cable route options. Any onsite data collected as part of the site geophysical survey will be carefully inspected for potential archaeological or anthropogenic anomalies by an experienced marine archaeologist and findings included with the EIA process.

11.5.4.3. Consultation

Additional direct consultation will be undertaken with Historic Scotland, MCA, UKHO and The Receiver of wrecks as part of the EIA process. However it is presently assumed that the main known sites of interest are currently identified from both the marine and terrestrial sites.

11.5.4.4. Data and information Gaps

As part of the sidescan and sub-bottom profiling along the export cable route, a review of any unknown anomalies will be undertaken and where practical a more detailed onsite assessment will be undertaken. However it is expected that any such studies would be undertaken post consent and would form part of the project milestones and management of risk strategy.

Additional analysis will be required to assess the onshore cable route once a suitable route has been identified (from the current list). As this land is currently developed it is unlikely that additional archaeological sites are identified during site investigation for this route. However it is expected any such studies would be undertaken post consent and would form part of the project milestones and management of risk strategy.

11.5.4.5. Identification of Potential Impacts

Possible impacts relating to the potential changes to the physical environment and the coastal sediment dynamics of the area are considered in Table 10-3 below.

Table 11-19 Potential impacts on physical archaeology/cultural history

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Potential disturbance of unknown cultural and historic features	Medium	No impact	Medium	During the cable laying and removal of the anchor systems there is a possible risk of disturbing unknown cultural or historic features. The risk of this will be significantly reduced with the review of geophysical data.	Yes
Potential loss of unknown cultural and historic features	Low	No impact	Low	During the cable laying and removal of the anchor systems there is a possible risk of disturbing unknown cultural or historic features. The risk of this will be significantly reduced with the review of geophysical data.	No

The scope of the assessment of potential impacts from the installation operation and decommissioning upon possible cultural heritage assets will be informed by the guidance issued by the following sources.

Table 11-20 Impact assessment strategy for archaeology/cultural heritage

Potential impact	Assessment method	Relevant guidance
Possible disturbance or loss to an known or unknown asset of historical importance	Review of all known records for the site and possible cable routes and review of the geophysical survey data.	Historic Scotland March 2012 – The Marine Historic Environment: Strategy for the Protection, Management and Promotion of Marine Heritage 2012-2015 COWRIE Historic Environment Guidance for the Offshore Renewable Energy Sector (2007) JNAPC Code of Practice 2006

11.6. Potential Socio-economics

11.6.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the potential socio-economics of the project and the strategy to assess the impact of such effects will be based on the following:

Table 11-21 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.6.2
Impact assessment	Assessment of desk based data, consultation, and possible data gaps.	11.6.3

11.6.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-22 Baseline information – Socio-economics

Type/description of data	Source	Status
Importance of area for recreation and tourism	Tourism data for key locations and regional context e.g Visit Scotland or Historic Scotland	To be completed as part of the EIA process
Local supply chain and Scottish business infrastructure	KOWL economic assessment	To be completed as part of the EIA process
Local employment rates	Census data	To be completed as part of the EIA process
Key recreational activities (onshore and offshore)	Tourism data for key locations and regional context e.g Visit Scotland or Historic Scotland and consultation groups for local sporting groups.	To be completed as part of the EIA process

11.6.3. Impact Assessment

11.6.3.1. Proposed Survey

No additional surveys are planned, as sufficient data is currently available to undertake the socio-economics assessment.

11.6.3.2. Consultation

No additional consultation will be undertaken as part of the socio-economic assessment as sufficient data is currently available to support this element of the EIA.

11.6.3.3. Data and information Gaps

No data gaps have been currently identified.

11.6.3.4. Identification of Potential Impacts

Possible impacts relating to the potential changes to the socio-economics of the area are considered in Table 11-23 below.

Table 11-23 Potential impacts on socio-economics

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Direct Employment (all levels)	Positive	Positive	Positive	The KOWL project will create a number of employment opportunities within Scotland as part of the construction, installation O&M and decommissioning activities. Although a demonstrator site the potential for Scotland wide employment is significant due to the technology type and the construction methods used to build them. The demonstrator site aims to provide a sound technology foundation for larger, deeper water installations which would provide significant job creation and sustainability.	Yes
Supply Chain Impacts	Positive	Positive	Positive	As above, the construction process is likely to have a short term positive impact on the supply chain system throughout Scotland and this will be a positive benefit.	Yes
Increase in demand for local private services/goods	Positive	Positive	Positive	During the O&M period there will be a requirement to have a small workforce to undertake servicing of the WTGs and this will therefore provide long term demand for local services and goods (vessels, work space and contractors).	Yes
Interference with planned infrastructure improvements in the local area	Low	Low	Low	Consultation with Marine Scotland , Aberdeen City Council and Aberdeenshire Council will identify any additional planned infrastructure issues and will be included within the planning of the project to minimise any possible impact.	Yes
Nuisance Impacts e.g noise, lighting	Low	No Impact	Low	Due to the distance offshore the WTGs will not generate any nuisance impacts. However during construction and decommissioning the terrestrial section of the export cable may have an impact on the local area, for a short term period. This will be minimised by optimising the route for least practical disturbance.	Yes
Impact on recreational activities e.g. coastal path walking	Low	No Impact	Low	During the construction and decommissioning process of the export cable (at the directional drilling site) there is likely to be a short term amendment to the coastal path for site safety reasons. This will be limited and will not block the coastal	Yes

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
				pathway.	
Increased tourism/business interest to Scotland and local area	Positive	Positive	No Impact	During the construction process (site visits to yard) and the O&M phase the development site is likely to attach a significant amount of interest which will result in additional boat trips to site from local harbours ie Stonehaven. This will be a positive benefit to the local community as these visitors are likely to spend time and money in such areas outwith the boat trips.	Yes

There is no specific guidance identified to assess the socio-economic impacts of the project, but as part of the project development a number of documents will be generated to estimate the expected cost of the project and the likely injection of funds into the Scottish economy as a result of this offshore demonstrator site. It is likely to provide employment across a large number of sectors of Scottish industries during the construction phase and a positive impact during the O&M phase of work.

11.7. Other Sea Users

11.7.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on other sea users and the strategy to assess the impact of such effects will be based on the following:

Table 11-24 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.7.3
Impact assessment	Assessment of desk based data and potential impacts	11.7.4

11.7.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

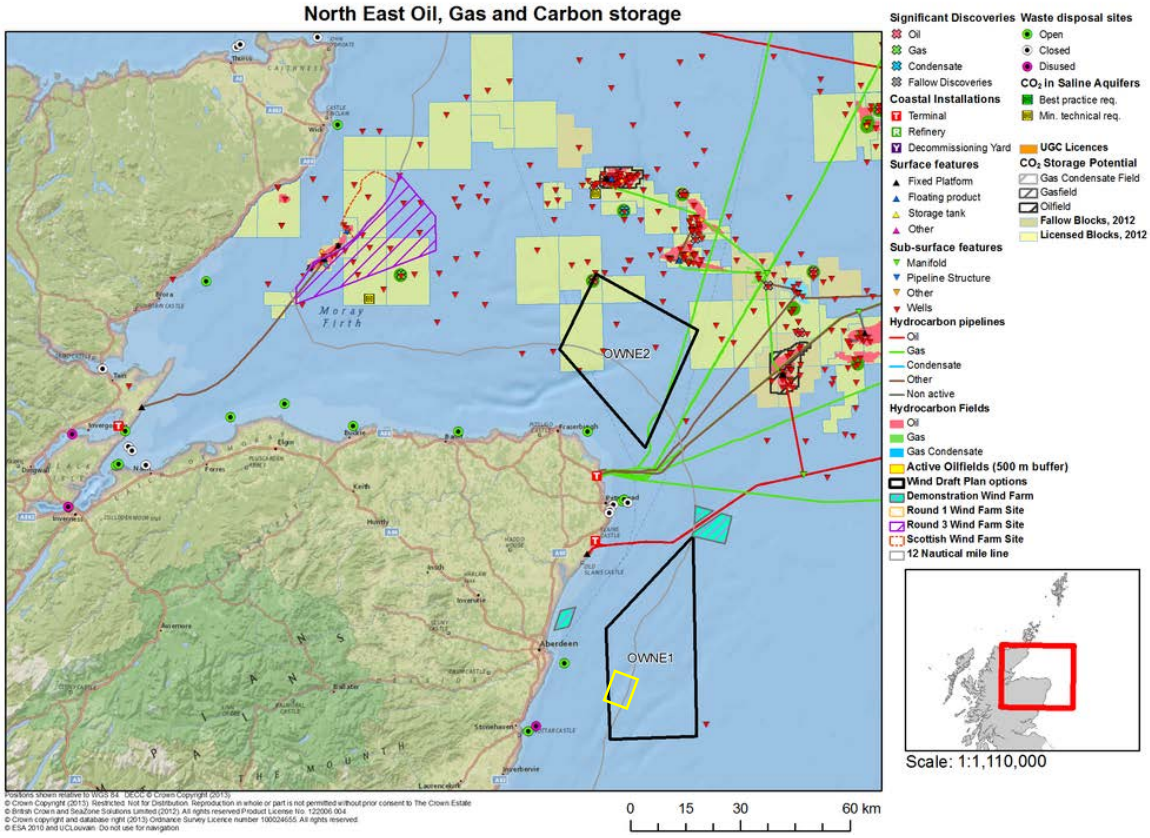
Table 11-25 Baseline information – Other Sea Users

Type/description of data	Source	Status
Review of subsea O&G installations	UKHO, UKDeal	Obtained
Review of O&G installation flight paths	Marine Scotland, NATS	Obtained
Aggregate Extraction	Marine Scotland	Obtained
Disposal zones (dredge material)	Marine Scotland, UKHO, MOD	Obtained
Renewable energy projects	TCE	Obtained
Existing cables	UKHO	Obtained
Sea angling sites	Local ports and harbours	To be obtained as part of EIA process

11.7.3. Desk Based Review of Existing data

The UKDeal website and online GIS indicates that there are no current oil and gas licences within the vicinity of the KOWL site and no pipelines or other infrastructure (subsea or surface) within or crossing the site.

Figure 11-12 Oil, Gas and Carbon Storage



Traditionally the marine aggregate extraction industry in Scotland has been very small due to an adequate land supply and lack of suitable and easily accessible resources on the seabed[73]. There are currently no marine aggregate extraction licences within or in proximity to the KOWL site. It is proposed that the impact upon marine aggregate extraction is not addressed within the EIA and is scoped out of the process.

Data available on the Marine Scotland National Marine Plan Interactive web site[74] shows that a marine waste disposal site for dredge material (CR110 Dee River) exists approximately 3.5km (1.9 nm) south east of Nigg Bay. The site is used for the disposal of dredged material from the maintenance of Aberdeen Harbour, with 131,518 metric tonnes disposed of in 2010[75]. Two further disposal sites (FO003 – closed and FO007) lie to the east and south east of Stonehaven harbour. If metocean modelling indicates that sediment transport from the disposal sites could be present across the seabed of the KOWL site it will be necessary to establish the nature of the sediment to ensure that contaminated sediment will not be encountered or associated impacts can be mitigated. Site CR110 lies on or in close proximity to one of the potential export cable routes. Aberdeen Harbour Authority will be consulted on the nature and size of the disposal site and cable routes planned to avoid the area.

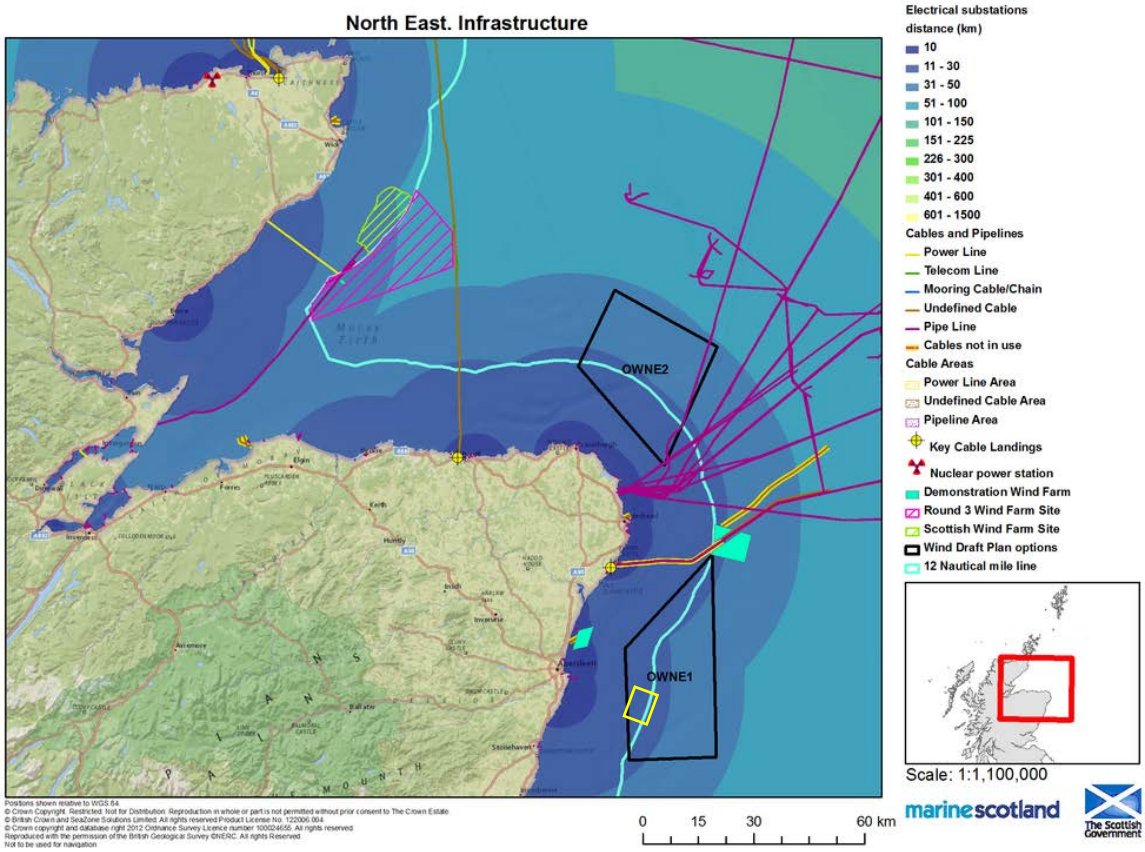
Historically, munitions have been disposed of at sea in several locations around the British Isles. Documents available on an archived MoD website[76] show that a disused dumping ground is located east of Aberdeen at 56 30 00 N, 05 37 00 W. This site is not within close proximity to the proposed Kincardine Offshore

[73] Scottish Government (2011). Scotland's National Marine Plan: Pre-Consultation Draft.
[74] Scottish Government Interactive Marine Planning Tool http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome/nmpi
[75] OSPAR (2010a). Annual OSPAR report on dumping of wastes or other matter at sea 2010
[76] Ministry of Defence Disposal of Munitions at Sea
http://webarchive.nationalarchives.gov.uk/20121203135425/http:/www.mod.uk/DefenceInternet/AboutDefence/CorporatePublications/HealthandSafetyPublications/DSEA/DisposalOfMunitionsAtSea.htm

Windfarm area; however, it may be within the vicinity of a potential export cable route. Cable route corridor surveys will be used to assess any potential impact on the disposal site.

The Kingfisher Information Service – Offshore Renewable & Cable Awareness project (KIS-ORCA) website and interactive map indicates that there are no subsea cables within the immediate vicinity of the KOWL site. Consultation will be initiated with operators of any future potential cable routes planned and routing undertaken to avoid any unacceptable impacts.

Figure 11-13 Infrastructure



No know sea angling takes place at the KOWL development site, but as part of the EIA process and consultation with stakeholders this will be identified to as part of the Environmental Statement.

11.7.4. Impact Assessment

11.7.4.1. Consultation

No additional direct consultation is presently required.

11.7.4.2. Data and information Gaps

No data gaps have been currently identified for the site.

11.7.4.3. Identification of Potential Impacts

Possible impacts relating to the potential changes to the other sea users in the area are considered in Table 11-26 below.

Table 11-26 Potential impacts on other sea users

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Disruption or damage to subsea O&G assets	No Impact	No Impact	No Impact	No assets are to be impacted by the KOWL development	No
Disruption to flight paths for O&G installation	No Impact	No Impact	No Impact	No assets are to be impacted by the KOWL development	No

Review of this data therefore indicates that no additional work is required as part of the EIA process.

11.8. Civil and Military Aviation and Unexploded Ordnance

11.8.1. Proposed Strategy for Assessment of Potential Impacts

The potential for effects of the project on the civil and military aviation and the potential of unexploded ordnance will be based on the following:

Table 11-27 Summary of Approach

EIA Process	Overview of approach	Relevant Section
Baseline Information	Desk based study	11.8.3
Impact assessment	Assessment of desk based data, consultation, and possible data gaps. Potential impacts Approach to assessment of impacts	11.8.4

11.8.2. Baseline Information – desk based

The following baseline data have been collected from the following sources:

Table 11-28 Baseline information – Civil and military aviation and unexploded ordnance

Type/description of data	Source	Status
Aviation and Radar	Marine Scotland	Obtained
Military sites and activities	Marine Scotland	Obtained
Potential for unexploded ordnance	UKHO Web based archives	To be undertaken as part of the EIA process and cable route survey.

11.8.3. Desk Based Review of Existing data

Consultation / advice from CAA/NATS/Aberdeen International Airport/MoD will be undertaken after the Crown Estate lease has been issued for the site and it is likely this will continue throughout the consultation and detailed design phase.

Figure 11-14 Kincardine Offshore Windfarm Site Aviation and Radar

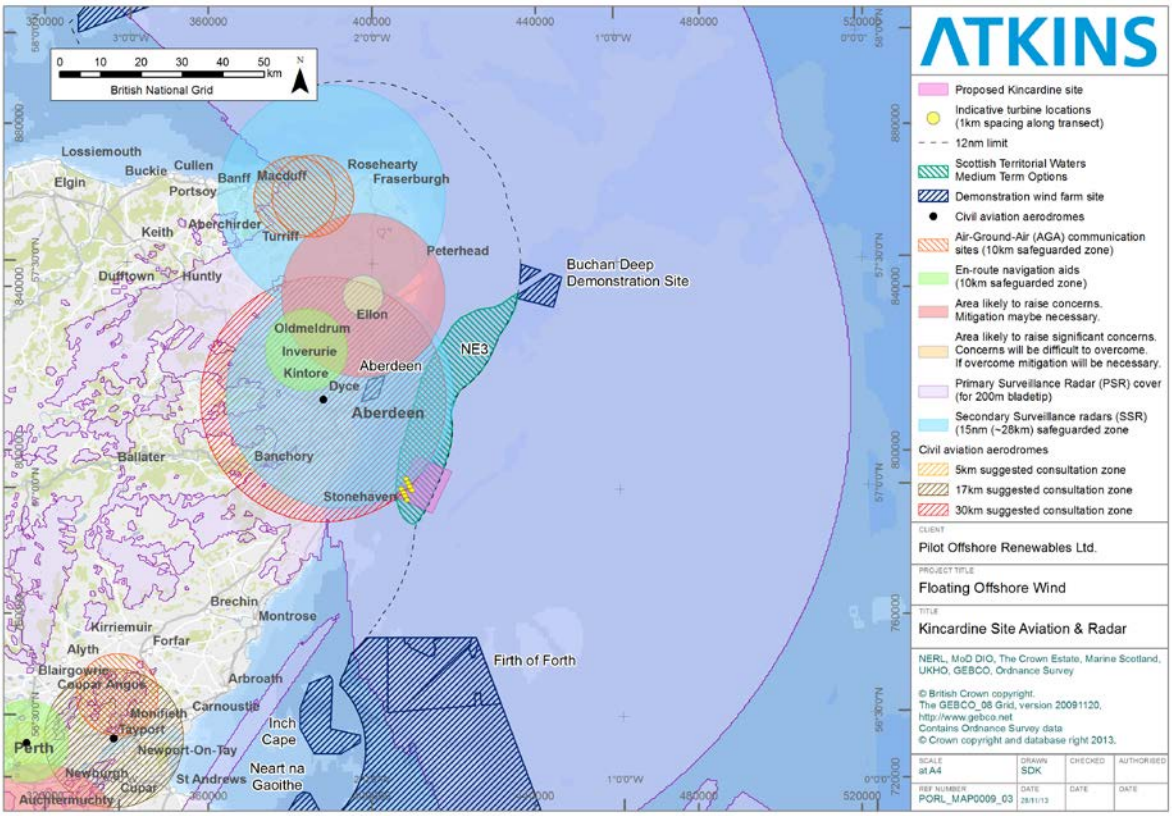


Figure 11-15 Aviation

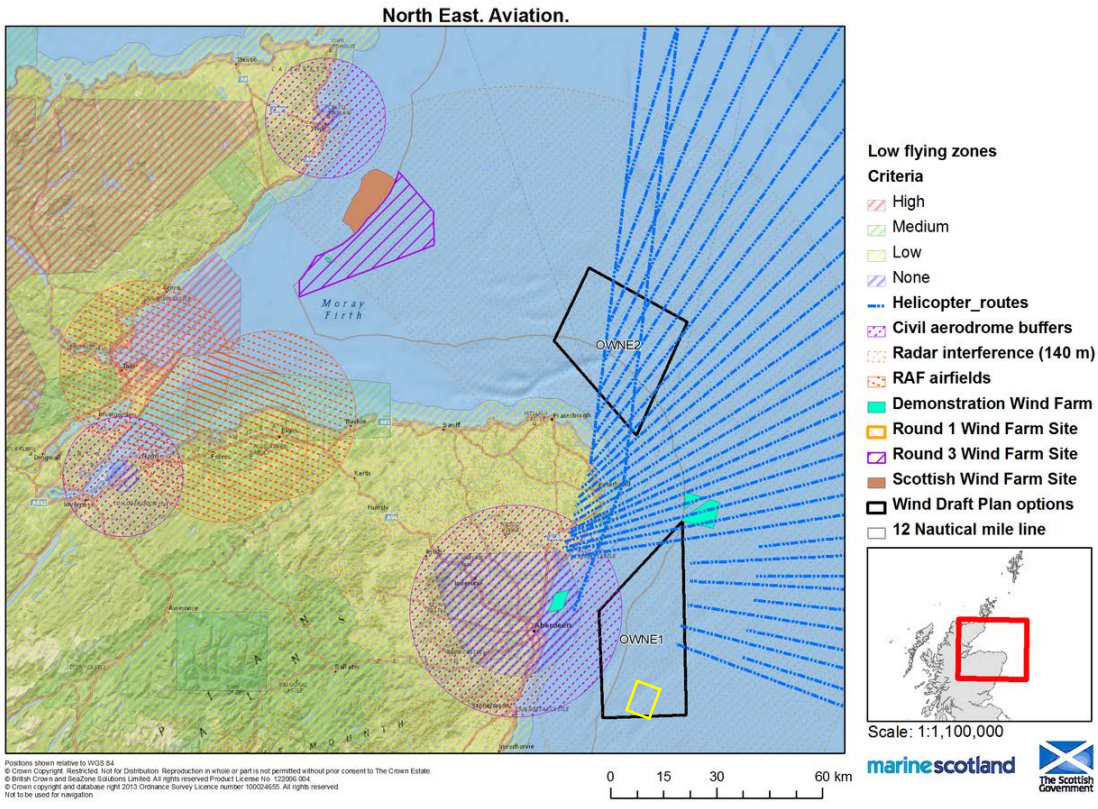
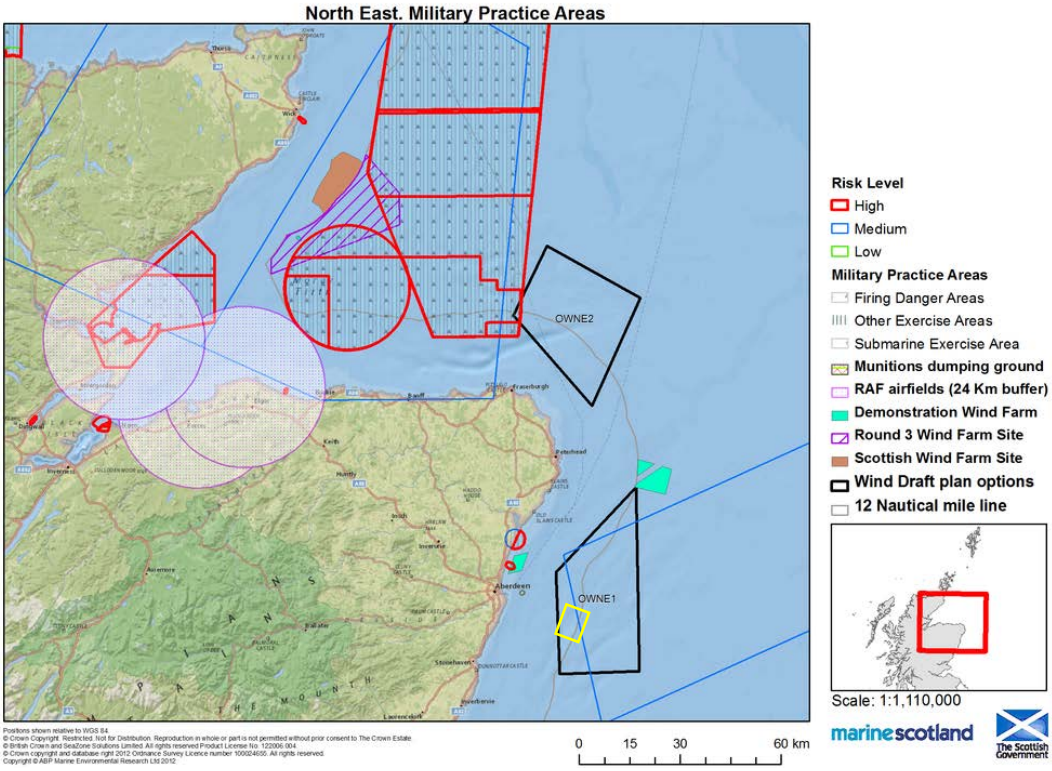


Figure 11-16 Military Practice Areas



North of Aberdeen there are two MoD live firing ranges at the coast. On the UKHO military Practice and Exercise Area (PEXA) chart 9.19 these are denoted as the Black Dog rifle range (X5703) and the Drums link firing range (X5722). Air force PEXAs lie to the east and south east of the KOWL site within area adjacent to the wind farm site boundary.

North of Aberdeen there are two MoD live firing ranges at the coast. On the UKHO military Practice and Exercise Area (PEXA) chart 9.19 these are denoted as the Black Dog rifle range (X5703) and the Drums link firing range (X5722). Air force PEXAs lie to the east and south east of the KOWL site within area adjacent to the wind farm site boundary.

The potential for unexploded ordnance (UXO) within the KOWL site and the export cable is limited due to location within the UK. However, this location does have the potential for UXO within the site and along the cable route, as demonstrated by the location of the World War II wreck located within the site (torpedoed). It is expected that UXO risk is low, but a detailed UXO survey will be undertaken as part of the geophysical survey of the site and the cable route to determine possible risk. As this will take place during/following consent it is expected that this will not be included within the EIA process at this stage and will therefore be removed from the scope at this time.

11.8.4. Impact Assessment

11.8.4.1. Proposed Survey

The UXO assessment will be undertaken as part of the geophysical survey of the site, but this will not be undertaken within the consenting period and will therefore fall outside the scope of the EIA process at this stage. It is not expected to have any impact on the extent of the project as buffer zones have been built into the cable routes to account for any such issues. Therefore no additional survey requirements are required for this section of the EIA.

11.8.4.2. Data Analysis & Consultation

Review of the data above indicates there is a limited impact from the KOWL development on civil and military aviation with the site being located outside the main airway routes to the O&G installations. However the site

is located on the edge of the Aberdeen airport exclusion zone and therefore additional review and consultation will be required with CAA and Aberdeen airport in regard to this.

The site is located within the MOD PSR search radar, with the site being a significant distance from this installation. However additional consultation will be required with the MOD on this potential issue.

Additional review of the UXO will be undertaken as part of the EIA process and will be included in the Environmental Statement, but it is presently believed UXO risk is low for this site.

11.8.4.3. Data and information Gaps

Other than the review of the UXO data, no additional data gaps have been currently identified, with the current data being suitable for the purposes of the EIA. Therefore no additional surveys are planned.

11.8.4.4. Identification of Potential Impacts

Possible impacts relating to the aviation and military are considered in Table 11-29 below.

Table 11-29 Potential impacts on aviation and military installations and UXO risk

Potential Impact	Potential significance			Comment/justification	Scoped into EIA
	C	O&M	D		
Interference with long term military exercises	No Impact	Low	No Impact	The site has potential to cause minor disruption to military exercises due to its small size and location. It is not located near to any current military exercise zones and therefore the risk is low and has been scoped out of the EIA.	No
Interference with aviation	No Impact	Low	No Impact	The location of the KOWL development is on the outer edge of the Aberdeen airport exclusion zone and therefore it could impact on aviation. Additional consultation will be undertaken with CAA/NATS and Aberdeen airport as part of the EIA process.	Yes
Interference with radar	No impact	Medium	No Impact	There is potential for the WTG to interfere with local and military radars in the area (as noted above). The potential interference will be assessed following further consultation with CAA/NATS and MOD.	Yes
UXO potential	Unknown	Unknown	Unknown	There is a low potential risk of UXO at the site and on the potential cable routes. However the exact risk is currently unknown until the completion of the geophysical survey which will take place after consent and therefore this has been scoped out of the EIA process at this stage.	No

Table 11-30 Impact assessment strategy for civil and military aviation

Potential impact	Assessment method	Relevant guidance
Interference with aviation	Consultation will be undertaken with CAA/NATS and Aberdeen airport. Where required an airspace assessment will be undertaken for the WTG locations	No specific guidance identified at this stage.

Potential impact	Assessment method	Relevant guidance
	and layout. The scope for which will be defined following consultation.	
Interference with radar	Consultation will be undertaken with CAA/NATS, MOD and Aberdeen airport. Where required a radar assessment will be undertaken for the WTG locations and layout. The scope for which will be defined following consultation.	No specific guidance identified at this stage.

12. Draft Outline of the Environmental Statement

The EIA Directive (97/11/EC) stipulates that a draft outline of the Environmental Statement is included as part of the Environmental Scoping report and the outline of this document is listed below. The Environmental Statement will be produce as a comprehensive technical report and a second non-technical summary document. Where specialist reports are produced i.e. vessel collision, these will be included as Appendixes to the main technical report. All reports will be made available on the project website (in development) and as digital copies on DVD format.

The Environmental Statement will be split into two distinct chapters as noted below.

12.1. Part 1 - Introduction and Context

Part 1 will consist of six chapters laid out in the following sequence:

12.1.1. Introduction

The introduction chapter will outline the KOWL development and concept of floating offshore wind power systems. It will outline the benefits of this demonstrator technology for UK and future of offshore wind farm developments in deeper, more distant offshore locations which would significantly reduce the impact of future wind farm developments.

12.1.2. Overview of Methodologies

Chapter two will review the impact assessment methodologies used within the EIA process for this project and highlight the key environmental effects this development would generate.

12.1.3. Stakeholder Consultation

Within this chapter stakeholder input will be recorded and how these comments have been addressed within the scope of the project. The results from the pre-consultation will be recorded within a separate appendix for clarity.

12.1.4. Detailed Site Selection

Chapter four will focus on the process of site selection and optimisation of the demonstrator technology for the site (water depth, seabed conditions and consultation input).

12.1.5. Construction, Operation and Decommissioning

This chapter will focus on the construction, operation and decommissioning of the floating offshore systems (including onshore works). This will be a key chapter as the methodologies for construction and decommissioning vary significantly from traditional offshore wind developments, with most of the construction effort undertaken offsite, resulting in a substantial reduction in onsite construction time (days rather than months).

12.1.6. Overview of Statutory Planning Guidance

The final chapter of Part one will be the overview of statutory planning guidance that is required as part of this development.

12.2. Part 2 – The Environmental Impact Assessment

Part two will focus on the environmental impact chapters and will consist of the following chapters:

12.2.1. Ecology

12.2.2. Ornithology

12.2.3. Coastal Processes and Morphology

12.2.4. Fish and Shellfish

12.2.5. Commercial Fisheries

12.2.6. Maritime Navigation

12.2.7. Landscape and Seascape

12.2.8. Noise (underwater and onshore)

12.2.9. Socio-economics

12.2.10. Cultural Heritage; and

12.2.11. Other Issues (including MOD, water quality and other marine users)

Part two will be completed by a conclusions chapter that will summarise the key outputs of the EIA process. Additional specialist reports and consultations will be included within separate appendices (such as navigation risk assessment, bird and sea mammal surveys).

13. Next Steps

The distribution of this scoping document represents the beginning of the formal S.36 consent scoping consultation process for the site. Through this scoping process, the project developers are seeking opinion on the issues to be addressed and the type of information that should be included in the Environmental Statement that will accompany the planning application for the offshore wind farm. Formal scoping responses to this document will be received by Marine Scotland and will then constitute part of the eventual formal scoping response that is provided to KOWL.

The formal scoping opinion will form the basis of the methodologies adopted for the desk based assessment to establish baseline use of the site by human and ecological receptors

The project developers intend to continue to consult with statutory consultees and relevant stakeholders throughout the period of data collection and potential impact assessment. In addition to continued direct contact to follow up any issues highlighted in the responses to the scoping document and throughout the EIA phase, a dedicated website will be maintained to inform interested parties as the project progress.

The project developers recognise that the survey work establishing the use of the site and surrounding area by ornithological and marine mammal species is a critical path element in the progression of the site EIA process. The project developers therefore initiated surveys to establish the use of the site by both groups in April 2013 and intend to continue these surveys before, during and after deployment of the project.

The project developers intend to conduct the required assessments during 2013 to 2014, and submit a planning application for the site in 2014.

We value and welcome your views and opinions on the proposed Kincardine Offshore Windfarm. Your opinions on the Scoping Report may also be sought by the Scottish Government.

All enquiries, queries, views and responses should be addressed to:

Pilot Offshore Renewables Ltd.

C/O MacAskill Associates Ltd.

95 Hamilton Place,

Aberdeen

AB15 5 BD

For further information prior to formally responding to this Scoping Report, please contact Pilot Offshore Renewables Ltd. via enquiries@pilot-renewables.com or alternatively write to the above address.

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Appendix A. List of COWRIE commissioned reports and other guidance documents

- Revised best practice guidance for the use of remote techniques for ornithological monitoring offshore wind farms (June 2009)
- High definition imagery for surveying seabirds and marine mammals – a review of recent trials and development of protocols (November 2009)
- Quantifying the relative use of coastal waters by breeding terns – towards effective tools for planning and assessing the ornithological impact of offshore wind farms (June 2010)
- Towards standardised seabirds at sea census techniques in connection with environmental impact assessments for offshore wind farms in the UK (April 2004)
- Best practice guidance for remote techniques for observing bird behaviour in relation to offshore wind farms (May 2004)
- Comparison of design and model-based estimates of seabird abundance derived from visual, digital still transects and digital video aerial surveys in Carmarthen Bay (October 2006)
- Use of aerial surveys to detect bird displacement by offshore wind farms (October 2006)
- COWRIE workshop on the cumulative impact of offshore wind farms on birds (May 2007)
- Potential use of population viability analysis to assess the impact of offshore wind farms on bird populations (September 2007)
- Trial high definition video survey of seabirds (September 2007)
- Further use of aerial surveys to detect bird displacement by offshore wind farms (October 2007)
- Full scale trial of high definition video survey for offshore wind farm sites (June 2008)
- A review of assessment methodologies for offshore wind farms (May 2009)
- Aerial surveys of round 3, zone 5 for waterbirds – final report (May 2009)
- High resolution video survey of seabirds and mammals in the Rhyl Flats area (July 2009)
- Comparison of visual and digital aerial survey results of avian abundance for Round 3, Norfolk Region (November 2009)
- Predicting the displacement of common scoter *Melanitta nigra* from benthic feeding areas due to offshore wind farms (March 2002)
- Coastal process modelling for offshore wind farm EIA – best practice guide (September 2009)
- A further review of sediment monitoring data (March 2010)
- COWRIE 2.0 Electromagnetic Fields (EMF) phase 2 (March 2009)
- Options and opportunities for marine fisheries mitigation associated with wind farms (2010)
- Benefits and disadvantages of co-locating wind farms and marine conservation zones, with a focus on commercial fishing (March 2003)
- A baseline assessment of electromagnetic fields generated by offshore wind farm cables (July 2003)
- Cowrie 1.5 electromagnetic fields review (July 2005)
- Historic environment guidance for the offshore renewable energy sector (January 2007)
- Offshore geotechnical investigations and historic environment analysis – guidance for the renewable energy sector (January 2011)
- Establishing best practice for the documentation and dissemination of marine biological data (September 2008)
- Development of spatial information layers for commercial fishing and shellfishing in UK waters to support strategic siting of offshore wind farms (May 2009)
- Methodologies for measuring and assessing potential changes in marine mammal behaviour, abundance or distribution arising from the development of offshore wind farms (July 2008)
- High resolution video survey of seabirds and mammals in the Rhyl Flats area (July 2009)
- Acoustic mitigation devices (AMDS) to deter marine mammals from pile driving areas at sea – audibility and behavioural response of a harbour porpoise and harbour seals (July 2010)
- Effects of pile driving noise on fish (March 2010)
- Measurement of underwater noise generated by acoustic mitigation devices (December 2010)
- Assessment of sub-sea noise and vibration from wind turbines and its impact on marine wildlife (May 2003)

- A review of offshore wind farm related underwater noise sources (October 2004)
- Effects of offshore wind farm noise on marine mammals and fish (June 2006)
- Assessment of the potential for acoustic deterrents to mitigate the impact on marine mammals of underwater noise arising from the construction of offshore wind farms (July 2007)
- Assessment and costs of potential engineering solutions for the mitigation of the impacts of underwater noise arising from the construction of offshore wind farms (September 2007)
- Measurement and interpretation of underwater noise (December 2007)
- Measurement and assessment of background underwater noise (September 2008)

BWEA best practice guidance on:

- BWEA Best Practice Guidelines for Wind Energy Development (Nov 1994)
- BWEA Health and Safety Guidelines
- Wind Farm Development and Nature Conservation (Mar 2001)
- Best Practice Guidelines - Consultation for Offshore Wind Energy Developments
- Fisheries Liaison (Aug 2004)

Additional Guidance documents for landscape, seascape and visual assessment:

- Department of Trade and Industry, Guidance on the Assessment of Impact of Offshore Wind Farms: Seascape and Visual Impact Report (November 2005);
- Horner and MacLennan and Envision, Visual Representation of Wind Farms: Good Practice Guidance (2006), for Scottish Natural Heritage, The Scottish Renewables Forum and the Scottish Society of Directors of Planning; and,
- Landscape Institute and Institute of Environmental Management and Assessment Guidelines for Landscape and Visual Impact Assessment': Second Edition (2002).
- Scottish Natural Heritage, Cumulative Effects of Wind Farms: Version 2 (2005).

Appendix B. Data Sources

Table 14-1 Summary of Data Sources

Database/Source	Consultees/Source	Status
Physical Environment		
Bathymetry	United Kingdom Hydrographic Office (UKHO) Admiralty Chart data (Easychart) & UKHO INSPIRE bathymetric data Seazone – HydroSpatial One data	Obtained Obtained Obtained
Geology and offshore sediments	British Geological Survey Marine Scotland Marine Scotland (onsite survey-drop down video and camera)	Obtained Obtained Obtained
Metocean data	UKHO Tidal stream data (Total Tide) Marine Scotland Aberdeen Offshore Wind Farm ADCP data ECMWF ERA Model output BSH (Budesamt für Seeschifffahrt und Hydrographie (Federal Maritime and Hydrographic Agency)	Listed below Listed below Used in separate Metocean model Used in separate Metocean model Used in separate Metocean model
Quantitative metocean data	MEDIN data base British Oceanographic Data Centre (BODC) Meteorological Office (wave and wind data for European and UK models) Wavenet directional waverider data collection	To be used as part of the Metocean model for validation of the marine wind and wave model.
Geology and geomorphology	BGS – maps and online borehole logs BGS – Offshore bore hole logs Marine Scotland PILOT site walk over	Downloaded and being used for initial cable route assessment Onsite review of possible cable route options.
Water and Sediment Quality		
Existing sediment quality e.g. disposal sites	Marine Scotland UKHO Bathymetric charts	Obtained
Bathing waters and Scottish Water discharge locations	SEPA	Obtained
Marine Ecology		
Review of literature and analysis of Marine Scotland benthic survey data and additional fish catch data.	Marine Scotland; CEFAS, literature; SFF, local fishing federations	Obtained and undergoing review
Ornithology		
WWT Aerial Survey Data	WWT	Obtained

Database/Source	Consultees/Source	Status
European Seabirds at sea (ESAS) database	JNCC http://jncc.defra.gov.uk/page-4469	Obtained
National Seabird Census (Seabird 2000)	JNCC website http://jncc.defra.gov.uk/page-1548	Obtained
Seabird Monitoring Programme	JNCC website http://jncc.defra.gov.uk/page-1550	Obtained
RSPB species-specific surveys	RSPB	Obtained
BTO Data records	BTO	Obtained
Regional database (North-east, Angus & Dundee, Fife Bird, Isle of May, Lothian, Borders and Northumberland &Tyneside)	Various sources	Obtained
Marine Mammals		
Marine mammal abundance data	Marine Scotland Small Cetacean Abundances in the North Sea (SCANS) Survey in July 1994 65, 66 and December 2006 (Scans II) North Atlantic Sightings Surveys (NASS) in 1989; Norwegian Independent Line Transect Surveys (NILS) in 1995 and 1998 SMRU & SMRU Ltd (The University of St Andrews) The University of Aberdeen JNCC & SNH The Seawatch Foundation UK Cetacean Stranding Investigation Programme NORCET cetacean survey data Moray Firth cetacean study 2009-2011	Obtained
Landscape, Seascape and Visuals		
Digital elevation model	Ordnance Survey	Obtained
Key receptors	SNH, Marine Scotland	Obtained
On site photos	KOWL	Obtained – to be used in stakeholder engagement
Tourism and Recreation		

Database/Source	Consultees/Source	Status
Recreational data	Marine Scotland	Obtained
Visitor numbers	SNH	To be obtained as part of the consultation process
Site photos for visualisation	KOWL	Obtained
Navigation and Maritime Traffic		
Shipping movements	Marine Scotland, MCA, IMO	Data obtained from Marine Scotland
Fishing vessel sighting	Marine Scotland and SFF	Data obtained
Recreational vessel activity	RYA and Marine Scotland	Data obtained
Commercial Fisheries		
Fishing Intensity	Marine Scotland	Obtained –see below
Fishing vessel sightings	Marine Scotland	Obtained
Consultation	The Crown Estate, Marine Scotland, Scottish Fishing Federation, Fish Producers; Salmon boards and trusts etc	On-going – to be collected and assessed as part of EIA.
Archaeology		
Marine archaeology and cultural heritage	Historic Scotland – Scheduled Ancient Monuments (12NM limit) via CANMORE or Pastmap databases Statutory lists, registers and designated areas, including designated wrecks and HMPAs UKHO charts The Receiver of wreck, MOD and UKHO MCA	Initial review and overview data obtained and detailed information collected as part of EIA. Figure 11-10and Figure 11-11 show current known wrecks in area and site (+cable route). Additional data sources may be identified as part of this review process.
Terrestrial cultural heritage	SNH	To be obtained
Potential Socio-economics		
Importance of area for recreation and tourism	Tourism data for key locations and regional context e.g Visit Scotland or Historic Scotland	To be completed as part of the EIA process
Local supply chain and Scottish business infrastructure	KOWL economic assessment	To be completed as part of the EIA process
Local employment rates	Census data	To be completed as part of the EIA process
Key recreational activities (onshore and offshore)	Tourism data for key locations and regional context e.g Visit Scotland or Historic Scotland and consultation groups for local sporting groups.	To be completed as part of the EIA process
Other Sea Users		
Review of subsea O&G installations	UKHO, UKDeal	Obtained
Review of O&G installation flight paths	Marine Scotland, NATS	Obtained
Aggregate Extraction	Marine Scotland	Obtained
Civil and Military Aviation		

Database/Source	Consultees/Source	Status
Aviation and Radar	Marine Scotland	Obtained
Military sites and activities	Marine Scotland	Obtained
Potential for unexploded ordnance	UKHO Web based archives	To be undertaken as part of the EIA process and cable route survey.

Appendix C. Summary of Marine Mammal Protection Legislation

The most important wildlife legislation affecting Regulators of offshore wind and the marine renewable energy industry is the European Habitats Directive. All cetacean species are European Protected Species (EPS) listed in Annex IV of the Directive and, Under Article 12, member states are required to take the requisite measures to establish a system of strict protection for species in their natural range prohibiting (a) all forms of deliberate capture or killing of specimens of these species in the wild, (b) deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration and (c) deterioration or destruction of breeding sites or resting places.

For Annex II species, which include the harbour porpoise (Phocoena phocoena), bottlenose dolphin (Tursiops truncatus), grey seal (Halichoerus grypus) and harbour seal (Phoca vitulina), Member States are required to designate Special Areas of Conservation (SACs) in order for their habitats to be maintained or, where appropriate, restored at a favourable conservation status in their natural range. To date, both species of seal are qualifying features at several designated SACs; twelve for grey seals and eleven for harbour seals. The bottlenose dolphin is a qualifying feature of three sites; the Moray Firth, Cardigan Bay and the Llyn Peninsula. Data on harbour porpoise are under review and there are no sites currently designated in UK waters for this species. Consideration also needs to be given to instances where SACs span the jurisdictions of Member States, or where activities within one jurisdiction are likely to affect an SAC within the jurisdiction of another Member State.

EU Member States are also required to undertake surveillance of the conservation status of species referred to in the Annexes of the Habitats Directive, which includes all cetaceans and seals in UK waters.

The Habitats Directive has been transposed into the law of England, Wales and Scotland by the Conservation (Natural Habitats &c.) Regulations 2010 for inshore waters of England and Wales and in Northern Ireland by the Conservation (Natural Habitats &c.) Regulations 1995 (as amended); these are referred to as Habitat Regulations (HR). Additionally, the Habitats Directive has been transposed into UK law for all offshore activities in the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2010 for UK offshore waters (including off Scotland). The OMR cover marine areas within UK jurisdiction, beyond 12 nautical miles.

In the context of offshore wind and marine renewable energy in territorial waters of England and Wales and UK offshore waters, the potential for an offence arises under the HR and OMR which prohibit:

The deliberate capture, injury, killing or disturbance of any wild animal of a European protected species (EPS).

Whales and dolphins are classed as European protected species and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) in relation to whales, dolphins and porpoises in Scottish inshore waters (within 12 nautical miles of land).

It is an offence to intentionally or recklessly kill, injure or capture whales, dolphins or porpoises; disturb or harass them.

Under The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2007, there is a slightly different and expanded wording for Scottish territorial waters. Specifically, it becomes an offence to deliberately or recklessly disturb. In offshore waters (greater than 12 nautical miles from land) cetaceans are protected by the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007.

Additionally, on the 1st February 2011 it became an offence to kill, injure or take a seal at any time of year except to alleviate suffering or where a licence has been issued to do so by Marine Scotland under the Marine (Scotland) Act 2010

Appendix D. Fish Landing Values

Average (2000-08) Annual Landings Values by Species ICES Rectangle 42E8 (source: MMO, 2009)

Species	Rectangle 42E8	
	Average Landings Values (2000-2008)	% of Total Value from 42E8
Scallops	£738,305	76.8%
Haddock	£148,995	15.5%
Squid	£19,222	2.0%
Lemon Sole	£11,729	1.2%
Whiting	£8,177	0.9%
Plaice	£6,617	0.7%
Cod	£3,868	0.4%
Nephrops	£3,100	0.3%
Red Gurnards	£3,091	0.3%
Monks or Anglers	£3,086	0.3%
Other	£14,784	1.5%

Average (2000-08) Annual Landings Values by Species ICES Rectangle 42E7 (Source: MMO, 2009)

Species	Rectangle 42E7	
	Average Landings Values (2000-2008)	% of Total Value from 42E7
Scallops	£729,352	42.8%
Lobsters	£427,985	25.1%
Nephrops	£178,411	10.5%
Edible Crab	£169,224	9.9%
Velvet Crab	£115,882	6.8%
Squid	£54,739	3.2%
Haddock	£8,679	0.5%
Other Molluscs	£3,817	0.2%
Plaice	£3,664	0.2%
Cod	£2,433	0.1%
Other	£10,439	0.6%

Top 10 Ports by Landings Values from Rectangle 42E8 (Source: MMO, 2009)

Port	Rectangle 42E8			
	Annual landings Values from 42E8 (average 2000-08)	% of Total Value of rectangle 42E8	Total Annual Port Values (average 2000-08)	% of Total Annual Port Value that fishing rectangle 42E8 represents (average 2000-08)
Aberdeen	£534,350	55.6%	£13,397,222	4.0%
Arbroath	£113,854	11.8%	£819,632	13.9%
Peterhead	£112,403	11.7%	£82,280,944	0.1%
Eyemouth	£70,276	7.3%	£3,681,730	1.9%
Montrose	£43,635	4.5%	£238,503	18.3%
Buckie	£33,420	3.5%	£3,241,696	1.0%
Fraserburgh	£19,016	2.0%	£39,617,782	0.0%
Gourdon	£10,394	1.1%	£265,574	3.9%
Stonehaven	£7,323	0.8%	£89,417	8.2%
Macduff	£5,401	0.6%	£1,487,809	0.4%

Top 10 Ports by Landings Values from Rectangle 42E7 (Source: MMO, 2009)

Port	Rectangle 42E7			
	Annual Landings Values from 42E7 (average 2000-08)	% of Total Value of rectangle 42E7	Total Annual Port Values (average 2000-08)	% of Total Annual Port Value that fishing rectangle 42E7 represents (average 2000-08)
Arbroath	£556,263	32.6%	£819,632	67.9%
Aberdeen	£496,092	21.9%	£13,397,222	3.7%
Gourdon	£248,867	14.6%	£265,574	93.7%
Montrose	£133,695	7.8%	£238,503	56.1%
Stonehaven	£75,677	4.4%	£89,417	84.6%
Johnshaven	£68,144	4.0%	£68,727	99.2%
Peterhead	£52,722	3.1%	£82,280,944	0.1%
Fraserburgh	£20,811	1.2%	£39,617,782	0.1%
Buckie	£15,552	0.9%	£3,241,696	0.5%
Pittenweem	£5,401	0.6%	£1,487,809	0.4%

Appendix E. List of Scoping Report Consultees

Consultees	Key areas of EIA consultation
Scottish Government (Energy Division)	All elements of the EIA
The Crown Estate	All elements of the EIA
Marine Scotland	All elements of the EIA
Aberdeen City Council	All elements of the EIA
Aberdeenshire Council	All elements of the EIA
Angus Council	All elements of the EIA
Scottish Environment Protection Agency	All elements of the EIA
Aberdeen Renewable Energy Group	All elements of the EIA
Marine Safety Forum	All elements of the EIA
Scottish Natural Heritage	Ecology, landscape and seascape
Aberdeen Chamber of Commerce	Socio-economics
Planning (Scotland)	Socio-economics
Scottish Enterprise	Socio-economics
Transport Scotland	Socio-economics
Visit Scotland	Socio-economics
East Grampian Coastal Partnership	Cultural Heritage
Chamber of Shipping	Navigation and shipping
Aberdeen Harbour Board	Navigation and shipping
Marine and Coastguard Agency	Navigation and shipping
Northern Lighthouse Board	Navigation and shipping
Royal National Lifeboat Institution	Navigation and shipping
Ports and Harbours	Navigation and shipping
Civil Aviation Authority	Aviation, electromagnetics
Aberdeen International Airport	Aviation, electromagnetics
National Air Traffic Services	Aviation, electromagnetics
Defence Infrastructure Organisation	Military radar, naval and aviation
British Telecom (Radio Network Protection Team)	Electromagnetics
Joint Radio Company	Electromagnetics
OFCOM	Electromagnetics
Scottish Hydro Electric Transmission Ltd (SHETL)	Design and technology
Department of Energy and Climate Change (Aberdeen)	Design and technology
National Grid	Design, technology, cables, grid
Scottish and Southern Energy	Cables, grid
Network Rail	Onshore cable routes
Scottish Water	Onshore cable routes
Oil and Pipelines Agency	Cable routes
Receiver of Wreck	Cable routes, archaeology
Historic Scotland	Cultural heritage, archaeology
National Trust for Scotland	Cultural heritage, archaeology
Dunecht Estates	Ecology, landscape and seascape
Local golf clubs (Stonehaven; Portlethen; ; Murcar Links; Trump International; Newburgh; Kings Links (all),	Landscape and seascape

Royal Aberdeen; Nigg Bay (Balnagask))	
Joint Nature Conservation Committee	Ecology and nature conservation
Scottish Wildlife Trust	Ecology and nature conservation
Scottish Environment LINK	Ecology and nature conservation
RSPB Scotland	Ecology and nature conservation
Whale and Dolphin Conservation Society Scotland	Marine mammals
University of Aberdeen – Lighthouse Field Station	Marine mammals
University of St Andrews - Sea Mammal Research Unit	Marine mammals
Association of District Salmon Fisheries Board	Fisheries and aquaculture
Atlantic Salmon Trust	Fisheries and aquaculture
Scottish Fisherman's Federation	Fisheries and aquaculture
Scottish Fisherman's Organisation	Fisheries and aquaculture
Local fisherman's organisations	Fisheries and aquaculture
Scottish Federation of Sea Anglers	Fisheries and aquaculture
Inshore Fishery Groups	Fisheries and aquaculture
Royal Yachting Association (Scotland)	Recreational maritime use
Local sailing clubs	Recreational maritime use
Scottish Canoe Association	Recreational maritime use
Scottish Sub-aqua Club	Recreational maritime use
Scottish Surfing Federation	Recreational maritime use
Sport Scotland	Recreational maritime use
Surfers Against Sewage	Recreational maritime use

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