moray offshore renewables ltd

Developing Wind Energy In The Outer Moray Firth

Environmental Statement

Telford, Stevenson, MacColl Wind Farms
and Associated Transmission Infrastructure

Volume 1

Non Technical Summary

edp renewables

REPSOL

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Introduction from Dan Finch, Project Director

In June 2010, we published our initial proposals to develop wind energy in the Outer Moray Firth. Since then, we have undertaken a considerable amount of work: surveys, studies, site investigations and the development of engineering concepts. We have consulted widely with a broad range of individuals and organisations with an interest in our proposals and the Moray Firth, and we are grateful for their continuing input.

As a result of that work, we now are able to publish the Environmental Statement for the Telford, Stevenson and McColl offshore wind farm sites, which lie within the Moray Offshore Renewables site in the Outer Moray Firth, and their associated transmission infrastructure. The Environmental Statement supports our applications for the consents needed to construct the wind farms and the offshore transmission infrastructure. Its publication represents a major milestone in the development of a project which could ultimately produce sufficient low-carbon generation to meet the electricity demands of nearly 850,000 Scottish households, representing a considerable contribution to greenhouse gas reduction.

The Environmental Statement is a detailed and extensive piece of work, covering a wide range of physical, biological and human environmental disciplines. This Non Technical Summary is intended to provide a summary of that work, accessibly written, and intended for a broad audience.

I take this opportunity to thank all those individuals and organisations who have engaged with us over the past two years and allowed us to reach this milestone. We look forward to continuing that engagement with stakeholders now that the Environmental Statement is in the public domain.

The Developers, Moray Offshore Renewables Limited

Moray Offshore Renewables Limited (MORL) is a joint venture between two leading European Energy Companies: EDP Renewables (EDPR UK) and Repsol Nuevas Energias UK.

EDP Renováveis

EDPR UK is a wholly owned subsidiary of EDP Renawables which is a world leader in the renewable energy sector. It is the world's third largest wind energy company with 7,163 MW of wind power in 11 countries across three broad geographic areas: Europe, North America and South America. It currently owns and operates more than 180 wind farms in Spain, Portugal, France, Belgium, Poland, Romania, the United States and Brazil. It also has various wind projects in different stages of construction and development in Italy and Canada and is actively engaged in expanding its activities into other countries.

This unparalleled achievement has resulted in the company gaining extensive experience in the design, development, operation and maintenance of wind farms. Such experience is coupled with the skill and knowledge of its parent company EDP Group which has an extensive and diversified generation, distribution, supply and retail portfolio. EDP Group owns and operates more than 18GW of power generation and supplies 70TWh of electricity to nearly 10 million customers in Spain, Portugal and Brazil as well as 25GWh of gas to 800,000 customers in Spain and Portugal.

REPSOL

Repsol Nuevas Energias UK is a wholly owned subsidiary of Repsol Nuevas Energias is a major integrated energy company headquartered in Spain. It is a Fortune 500 company with a turnover in the region of 60 billion Euros. The company's history is in hydrocarbons, both upstream - in development and production – and downstream, in refining, marketing, trading and transportation. In 2010 Repsol recognised the importance of renewable energies and Repsol Nuevas Energias was formed. In June 2011, Repsol Nuevas Energias UK was established following Repsol's purchase of 100% of SeaEnergy Renewables Limited. Repsol Nuevas Energias new UK headquarters in Edinburgh is responsible for all UK offshore wind activities and will become its centre of expertise for offshore renewables.

Introduction

This document is the Non Technical Summary (NTS) of the Environmental Statement (ES) which accompanies applications to Marine Scotland for consent under Section 36 of the Electricity Act 1989 and associated Marine Licences for the construction and operation of the Telford, Stevenson and MacColl wind farms (referred to as 'the three proposed wind farms') and Transmission Infrastructure (TI) which are collectively referred to as 'the Project'.

Provided alongside the ES is a stand alone Environmental Statement Book Map and Guide which briefly sets out the content and structure of the ES.

Zone 1 - The Outer Moray Firth

In January 2010 MORL was awarded a Zone Development Agreement by The Crown Estate to develop the Moray Firth Zone. The Zone is located on the Smith Bank in the outer Moray Firth approximately 22 km (12 nm) from the Caithness coastline as shown in NTS Figure 1 (See pages 6 and 7) and covers 520 km^2 (281 nm^2).

Wind Farm Locations Within The Zone

Detailed analysis of the Zone identified two separate development areas, the Eastern Development Area (EDA) and the Western Development Area (WDA). It was decided to develop the EDA first because of then existing spatial constraints in the WDA.

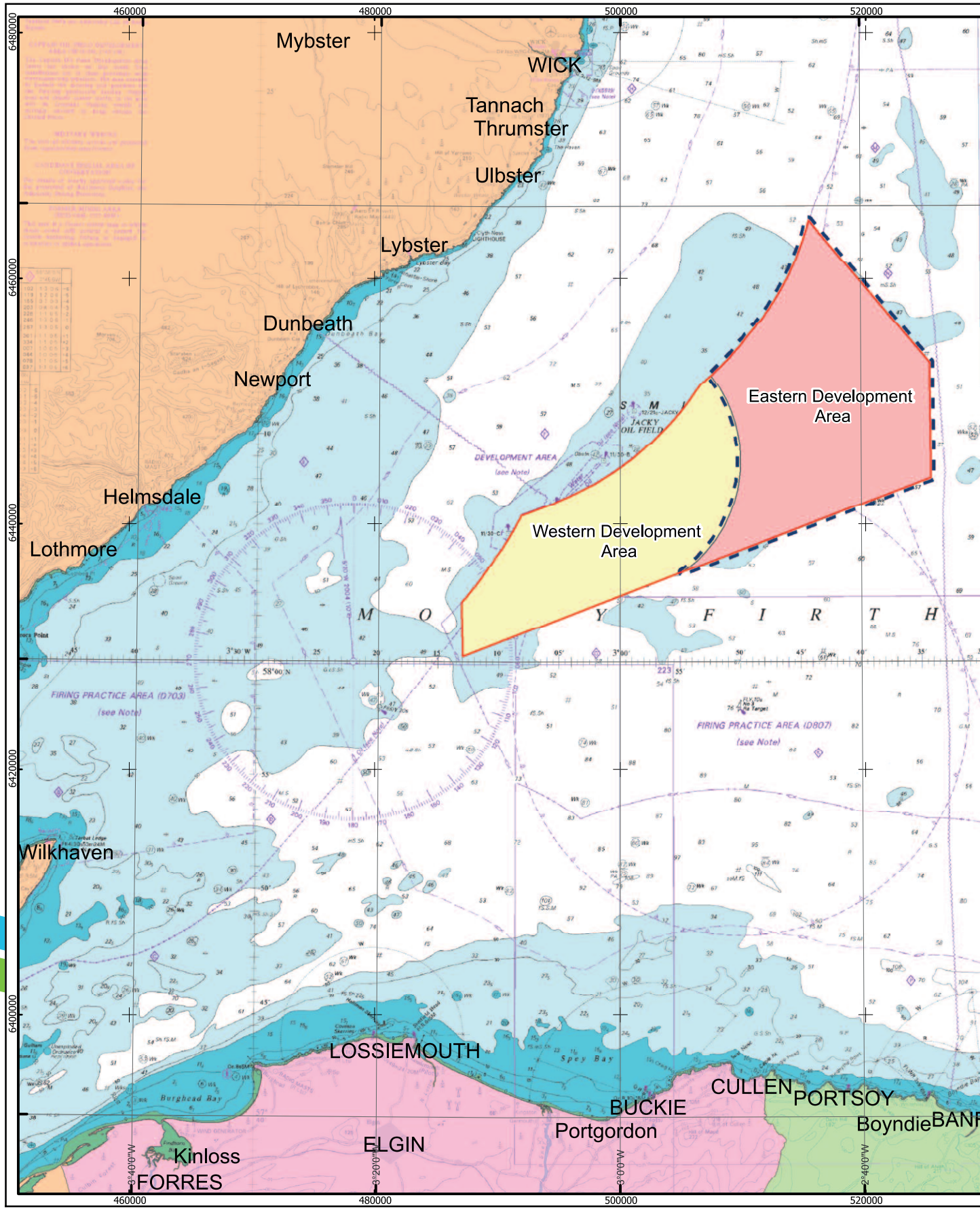
In the course of development of the Project, the EDA was split into three wind farm sites (as shown in NTS Figure 2 on pages 8 and 9). MORL has set up Special Purpose Vehicles to consent, construct, operate and maintain the offshore wind farm sites, as follows:

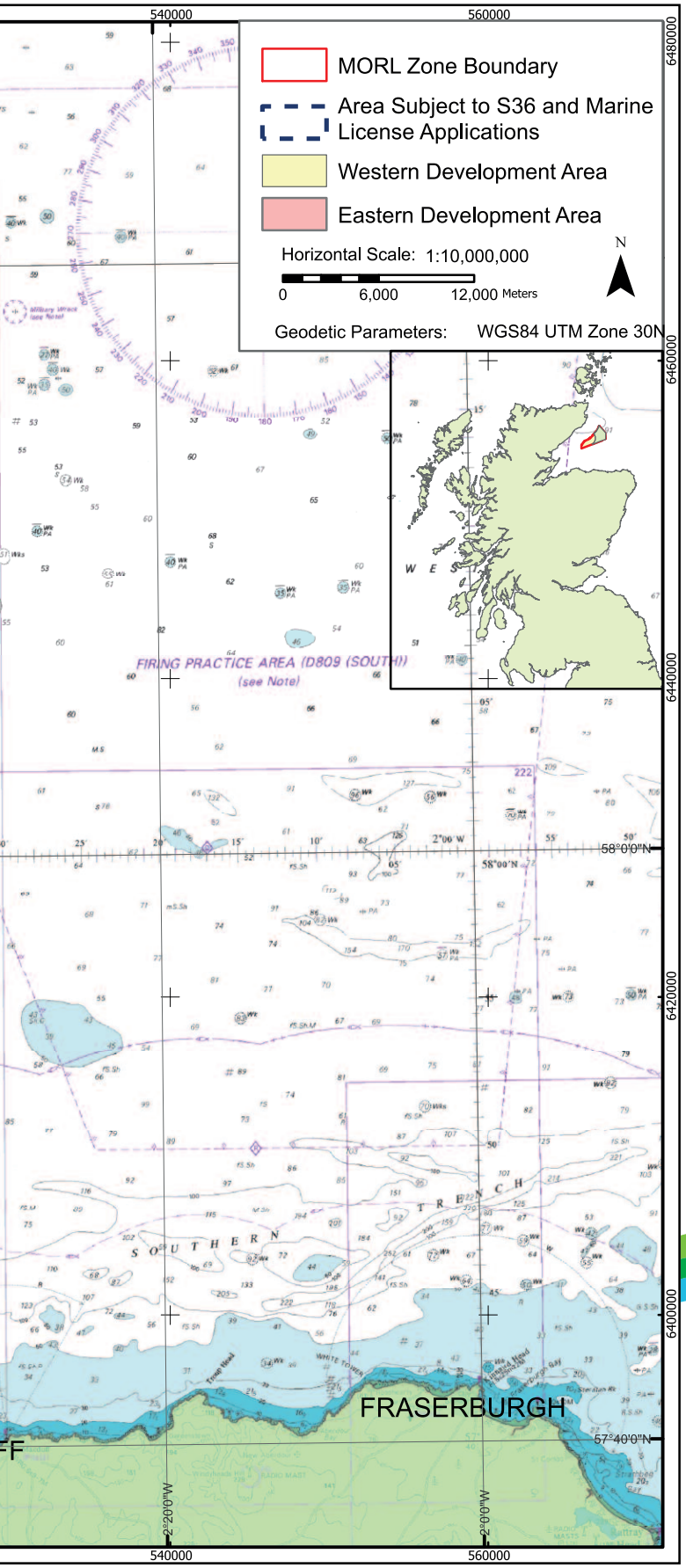
- Telford Offshore Wind Farm (Telford), for which consents for construction and operation are being applied for by Telford Offshore Windfarm Limited;
- Stevenson Offshore Wind Farm (Stevenson), for which consents for construction and operation are being applied for by Stevenson Offshore Windfarm Limited; and
- MacColl Offshore Wind Farm (MacColl), for which consents for construction and operation are being applied for by MacColl Offshore Windfarm Limited.

The maximum capacity for the MORL Zone is 1,500 MW (1.5 GW). Consent to construct up to a maximum total capacity of 1,500 MW across the three proposed wind farm sites is being sought. The maximum capacity for each of the three sites is set out below.

	Telford	Stevenson	MacColl	EDA
Area	93 km^2	77 km^2	125 km^2	295 km^2
Maximum capacity	500 MW	500 MW	500 MW	1,500 MW

NTS Figure 1 – MORL Development Areas





Zone 1 - The Outer Moray Firth

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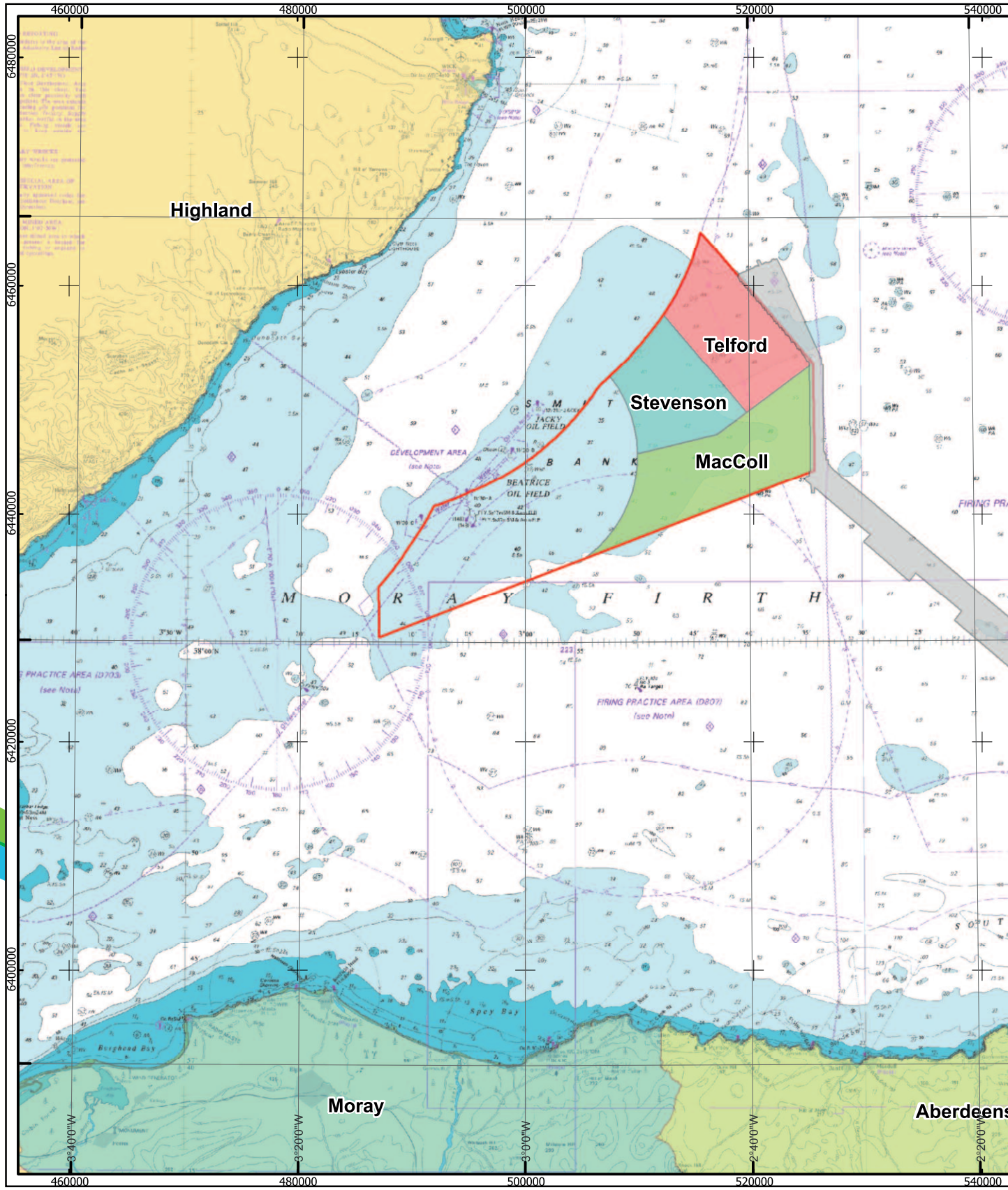
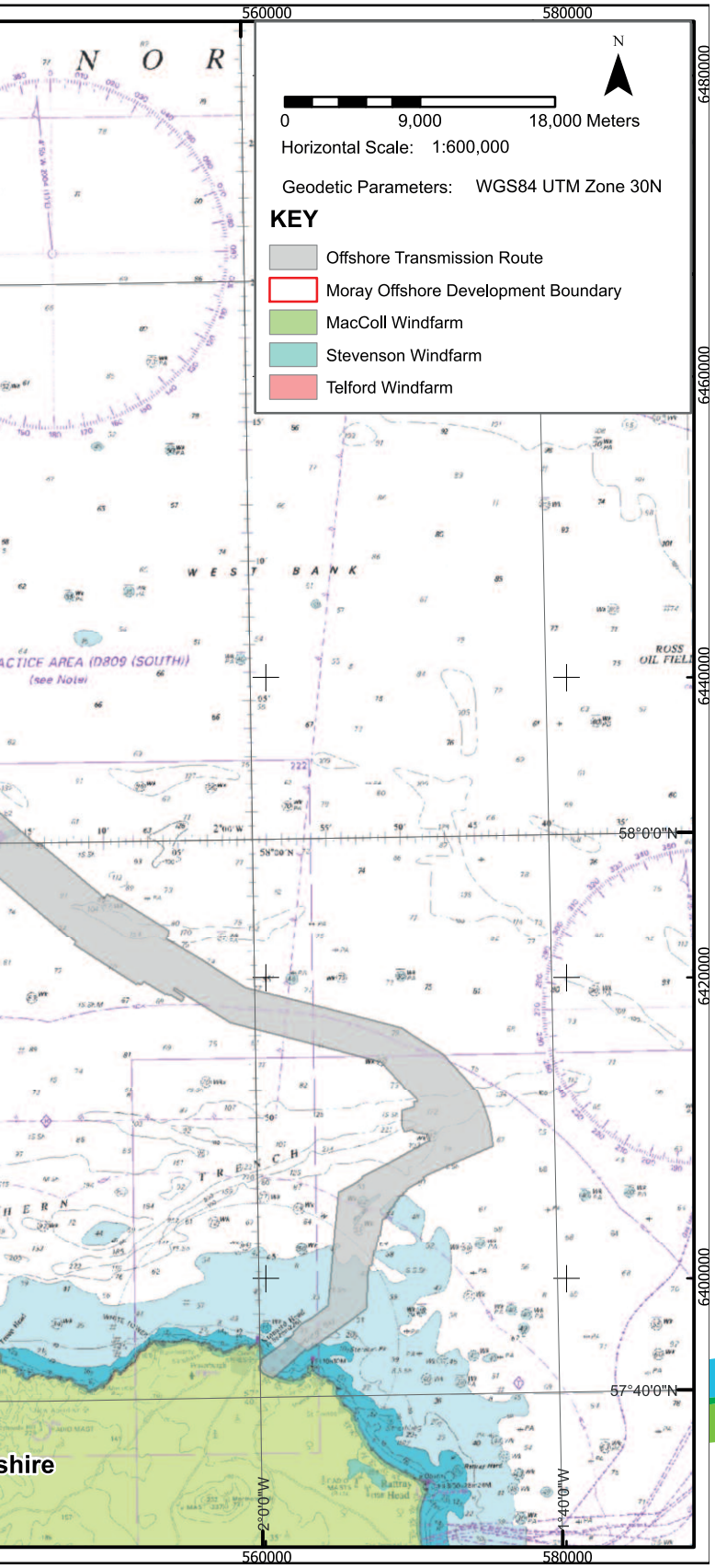
NTS Figure 2 – Wind Farm Site Boundaries





In the course of development of the Project, the EDA was split into three wind farm sites (as shown in NTS Figure 2)

Should MORL not construct the full 1,500 MW within the three proposed wind farm sites, then the development of the WDA may be pursued in order to achieve additional capacity.

The three proposed wind farms will comprise up to 339 three bladed horizontal axis wind turbines. The turbines will be secured to the seabed and a network of electricity cables (known as the inter-array cables), will connect each of the turbines to one of, up to eight, offshore substation platforms (OSPs). A marine licence has been granted within the EDA for a meteorological mast which MORL intends to install during 2012 to record meteorological data (e.g. wind speed, wind direction etc.) within the EDA. There are plans to install a second meteorological mast although the location of the installation within the EDA is currently unknown.

Transmission Infrastructure

The transmission infrastructure (TI) will connect the three proposed wind farms to the National Grid via an onshore connection to the Peterhead Power Station. The export cable route is approximately 135 km (105 km offshore and 30 km onshore) in length and has a landfall point at Fraserburgh Beach. Details of the onshore substations at Peterhead are currently being formalised in conversations with Scottish Hydro-Electric Transmission Limited.

The Non Technical Summary

This NTS provides an overview of the content of the ES. The ES sets out the details of the Project's parameters and the current environmental conditions of the development area. It also systematically provides the following information for the three proposed wind farms and the TI:

- The likely significant effects arising from development;
- The proposed mitigation – descriptions of proposed mitigation measures during construction, operation and decommissioning phases, based upon likely significant effects;
- The residual effects – the significance of effects after mitigation measures have been included in the assessment;
- The whole project assessment – the assessment of the combined effects of the three proposed wind farms and the TI as a whole;
- The cumulative impact assessment – the assessment of the likely significant effects that may arise as a result of interactions between the Project as a whole and other existing and reasonably foreseeable projects and activities; and
- Habitats Regulations Appraisal (HRA) – information provided by MORL on the assessment of likely significant effects on relevant sites of international nature conservation importance (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)). This information is summarised within each the relevant discipline (e.g. effects on SACs which have migrating fish as a qualifying species are considered in the Fish and Shellfish Ecology section, and effects on SPAs and their designated bird species are considered in the Ornithology and Terrestrial Ecology sections).

Policy and Legislative Framework

This section of the ES sets out the policy context for the Project as well as the legislative framework within which the ES has been prepared. The determination of both the Section 36 and marine licence applications required for the Project involves a wide range of material considerations including Climate Change and Energy Policy plus published and emerging Marine Policy.

The Planning Statement which accompanies the applications sets out in greater detail the relevant policy context for the deciding the applications for the three proposed wind farms and the offshore transmission infrastructure.

As the location of the three proposed wind farms are beyond 12 nm offshore and the location of much of the transmission infrastructure (TI) is less than 12 nm offshore, both UK and Scottish legislation and policy apply.

Climate Change

The Kyoto Protocol set targets at an international level to reduce emissions by developed countries of six principal man–made greenhouse gases overall to 5.2% below the 1990 levels over the period 2008–2012. Under the Protocol the UK's commitment is for a reduction in greenhouse gas emissions of 12.5% from 1990 levels by 2008–2012. In 2008 the European Commission published a series of climate and energy targets to be met by 2020, known as the "20–20–20" targets. These are:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels;
- 20% of EU energy consumption to come from renewable resources; and
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

The Renewable Energy Directive 2009 adopted these targets and requires the UK to generate 15% of its total energy requirements from renewable energy by 2020.

In the UK context, the UK Government has promoted renewable energy within its national policy framework and has put into place certain mechanisms to encourage the growth of electricity generation from renewable sources. This includes the Renewables Obligation which places an obligation on all UK electricity supply companies to source an increasing percentage of electricity from renewable sources each year. At the Scottish level, in 2011 the Scottish Government set the Renewable Obligation in Scotland to target the generation of the equivalent of 100% of Scotland's gross annual electricity demand by 2020 by renewable sources.

The Climate Change Act 2008 sets ambitious, legally binding targets for the UK to reduce greenhouse gas emissions which includes carbon dioxide emissions (CO_2) by at least 80% by 2050, relative to 1990 levels. The Act also requires a reduction in greenhouse gas emissions of at least 34% by 2020. The Climate Change (Scotland) Act 2009 created a statutory framework in Scotland to implement a reduction of CO_2 emissions of 42% from 1990 levels by 2020 and at least 80% from 1990 levels by 2050.

The Scottish Government's Routemap for Renewable Energy 2011 reflects the challenge of Scotland's new target to meet an equivalent of 100% demand for electricity from renewable energy by 2020 (and at least 30% overall energy demand from renewables by 2020). In addition, the Routemap demonstrates that with 25% of Europe's offshore wind potential, the manufacturing, supply chain, job creation and training opportunities present Scotland with scope for sustainable economic growth.

Taking an average capacity factor based on Department of Energy and Climate Change (DECC) published figures[1] of 30.79% (which is considerably lower than the current MORL calculations for the Zone) the Project will deliver:

- 101,145 Gwh over the 25 year life time of the wind farms;
- On an annual basis this equates the generation of electricity for 839,000 Scottish households (which is the equivalent 30.6% of households in Scotland); and
- Potential CO_2 emissions savings over 25 years of 91,940,950 tCO_2 and 40,458,000 tCO_2 over coal and gas fired electricity generation respectively[2].

[1] Digest of UK Energy Statistics 2011. Available online from: http://www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx

[2] The amount of CO_2 emissions produced during energy production varies with the type of fuel used; therefore the potential CO_2 savings from the three proposed wind farms depends on the type of fuel it replaces.

Marine Planning Policy

The UK Marine Policy Statement 2011 (MPS) was jointly published by the UK and Scottish Governments, the Welsh Assembly and the Northern Ireland Administration with a view to helping to achieve the vision for clean, healthy, safe, productive and biologically diverse oceans and seas.

The MPS recognises that a secure, sustainable and affordable supply of energy is of central importance to the economic and social well-being of the UK and that the marine environment will make an increasingly major contribution to the provision of the UK's energy supply and distribution. Offshore wind is expected to provide the largest single renewable electricity contribution as we move towards 2020.

In March 2011 the Scottish Government published its sectoral marine plan for offshore wind energy. The Plan contains proposals for offshore wind energy development in Scottish Territorial Waters at the regional level up to 2020 and beyond and recognises offshore wind as an integral element in Scotland's contribution towards action on climate change and Scotland's energy security. It notes that there is potential to generate 4.8 GW of electricity from the two Round 3 sites in Scottish Offshore Waters (within which the MORL Zone is located) before 2020.

Legislative Framework

The construction and operation of a 'generating station' such as the three proposed wind farms is subject to an application for consent to Marine Scotland (who manage the process on behalf of Scottish Ministers) under Section 36 of the Electricity Act 1989. The scope of these consents will include the wind turbines and inter–array cables.

In terms of the Marine and Coastal Access Act 2009 the Scottish Ministers have responsibility for licensing various licensable activities taking place in the Scottish offshore region (12–200 nm) which includes the area of the three proposed wind farm sites. In addition, they are also responsible under the Marine (Scotland) Act 2010 for licensing various licensable activities within Scottish inshore region of UK waters from 0–12 nm. Three separate Marine Licenses are sought for each of the wind farms and a further one for the offshore transmission infrastructure (OfTI).

Whilst applications for Section 36 Consent and Marine Licences for the three proposed wind farm sites and the OfTI will be submitted to Marine Scotland contemporaneously, the application for planning permission for the onshore transmission infrastructure (OnTI) will be submitted to Aberdeenshire Council once the precise route within the identified corridor for the onshore export cable and location and layout for the onshore substation(s) have been confirmed in discussion with Scottish Hydro-Electric Transmission Limited.

MORL has determined, through the requirements contained in the Marine Works (Environmental Impact Assessment) Regulations 2007, the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (as amended) and the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, that the Project requires an Environmental Impact Assessment.

Under the terms of the Conservation (Natural Habitats &c) Regulations 1994 and the Offshore Marine Conservation (Natural habitats &c) Regulations 2007 a Habitats Regulations Appraisal (HRAS) is required to be conducted by the 'competent authority' (in the case of the offshore consents this is Marine Scotland) before a project that is likely to have a significant effect on any designated or candidate Special Area of Conservation and Special Protection Area can be given consent. To assist in this appraisal the ES presents this information within each the relevant discipline and in standalone HRA summary chapter. The assessment of likely significant effects on designated sites is reported briefly in this NTS within the relevant disciplines.

Environmental Impact Assessment

The European EIA Directive (2011/92/EU) requires certain types of development, which are considered likely to cause significant environmental effects, to be subject to an environmental impact assessment (EIA).

EIA is a process that identifies the aspects of the environment likely to be significantly affected by the Project and which describes the likely significant environmental effects of the Project. This assessment has been informed by a number of detailed technical surveys and studies over the MORL Zone and the wider area. In order to ensure that the likely significant effects of the Project are identified then the assessments are carried out using the realistic worst case scenario (based on the range of parameters for the construction, operation and decommissioning of the Project) for each EIA discipline.

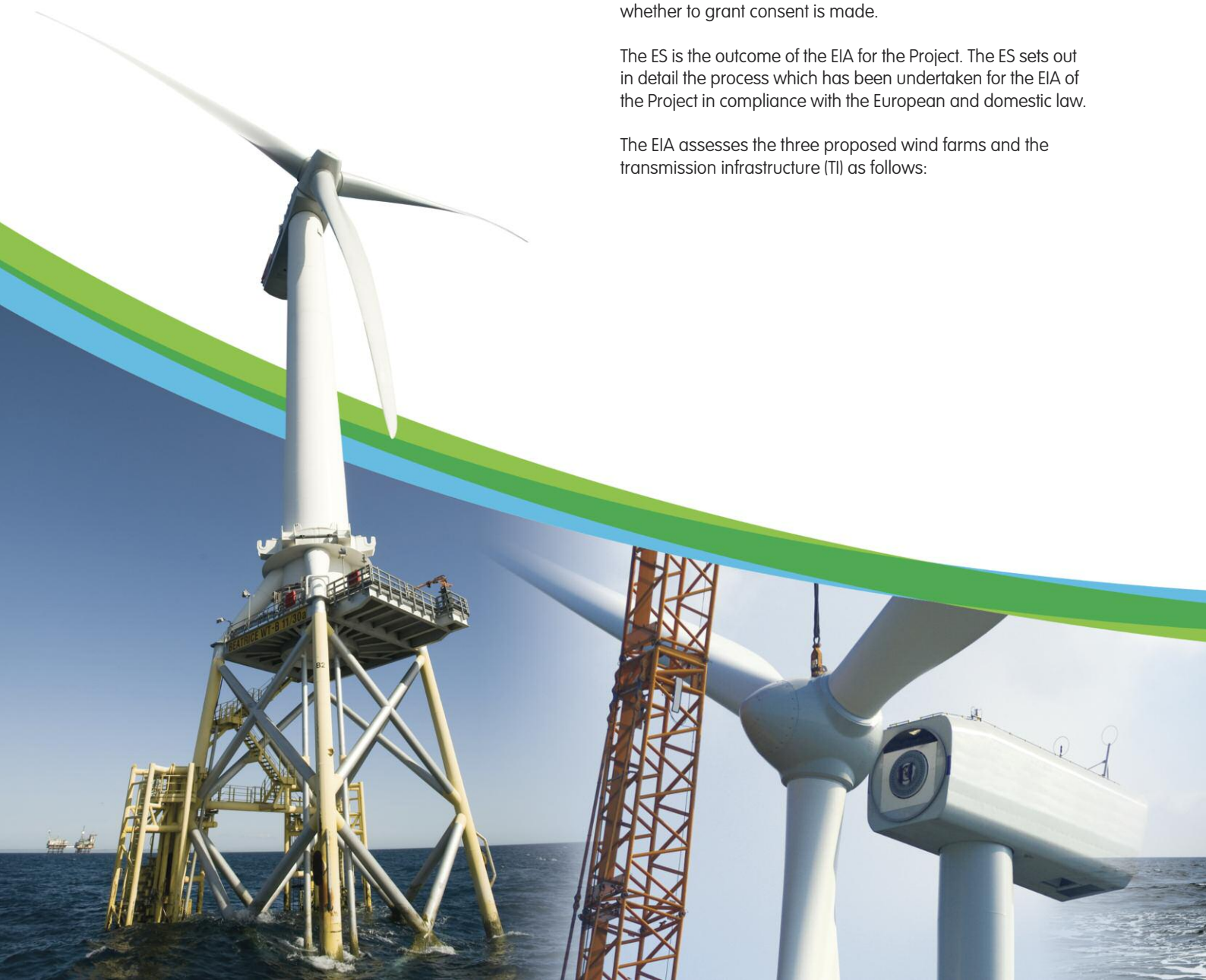
Within each impact assessment chapter of the ES the methodology for the assessment of the likely significant effects is set out for that particular discipline. These methodologies set out how the assessment has been carried out to determine the significance of the potential effect. Each section clearly sets out what level of significance constitutes a likely significant effect under the EIA legislation for the particular EIA discipline. In this NTS level of the significance of effect is reported and where any of these constitute a likely significant effect in terms of the EIA legislation then this is explicitly stated.

EIA also involves consideration and description of the mitigation measures envisaged to prevent, reduce and offset any significant adverse effects on the environment and it provides a summary of the residual effects of the development after mitigation. The assessment covers the full life cycle of the development, from planning to decommissioning.

The information resulting from the EIA process is presented in an Environmental Statement (ES) so that a decision maker has full information on the likely significant environmental effects of the proposed development at the time that the decision on whether to grant consent is made.

The ES is the outcome of the EIA for the Project. The ES sets out in detail the process which has been undertaken for the EIA of the Project in compliance with the European and domestic law.

The EIA assesses the three proposed wind farms and the transmission infrastructure (TI) as follows:



Wind Farm Site Impact Assessments

The primary assessment is of the three wind farm sites as one large project. The ES also contains assessments for each of the three sites individually, known as secondary assessments.

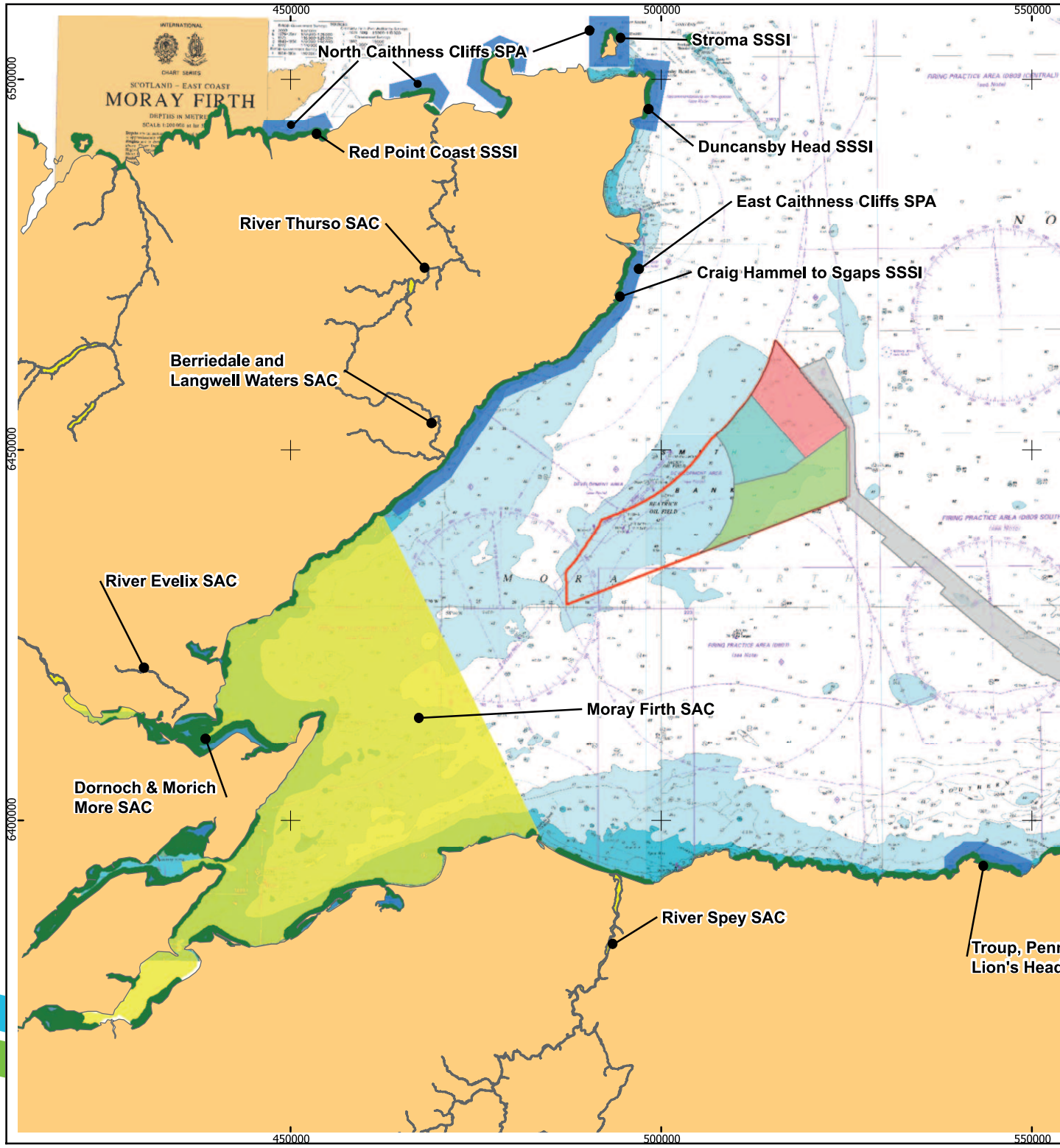
Sensitivity assessments have been carried out where effects are not equally spread across the three sites. In these assessments, the various combinations of the three sites are assessed. This is required because the combination of two of the three sites on the environment may be different from another combination. These are reported in the ES.

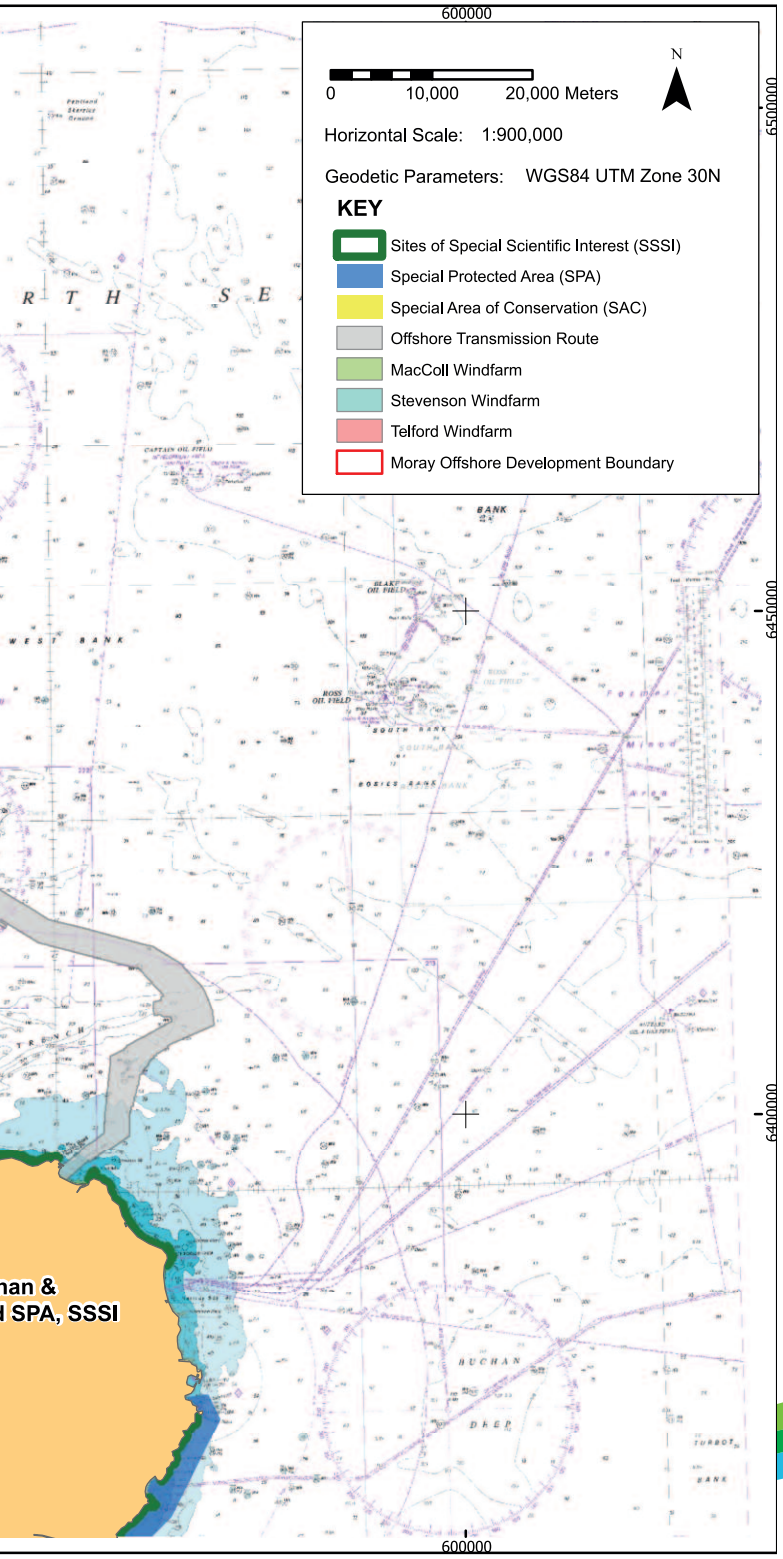
This NTS sets out the results of the primary assessments i.e. the three proposed wind farms as a whole.

Transmission Infrastructure Impact Assessments

The assessment of the TI (which includes offshore substation platforms (OSPs), offshore and onshore transmission cabling and an onshore substation(s)) has been carried out on the selected route (as shown in NTS Figures 4 and 5 on pages 16 to 18), representing the impact assessment for the TI both offshore and onshore. A precise route for the cable and an exact location for the onshore substation(s) at Peterhead is still to be determined. A cable route corridor has been identified together with the land area within which MORL proposes to locate the substation(s). Discussions are ongoing with landowners to determine the exact location and layout of the substation(s) on their land within the preferred onshore substation area. This will be finalised following production of a masterplan by the owners/operators of the Peterhead Power Station compound which forms part of the preferred area.

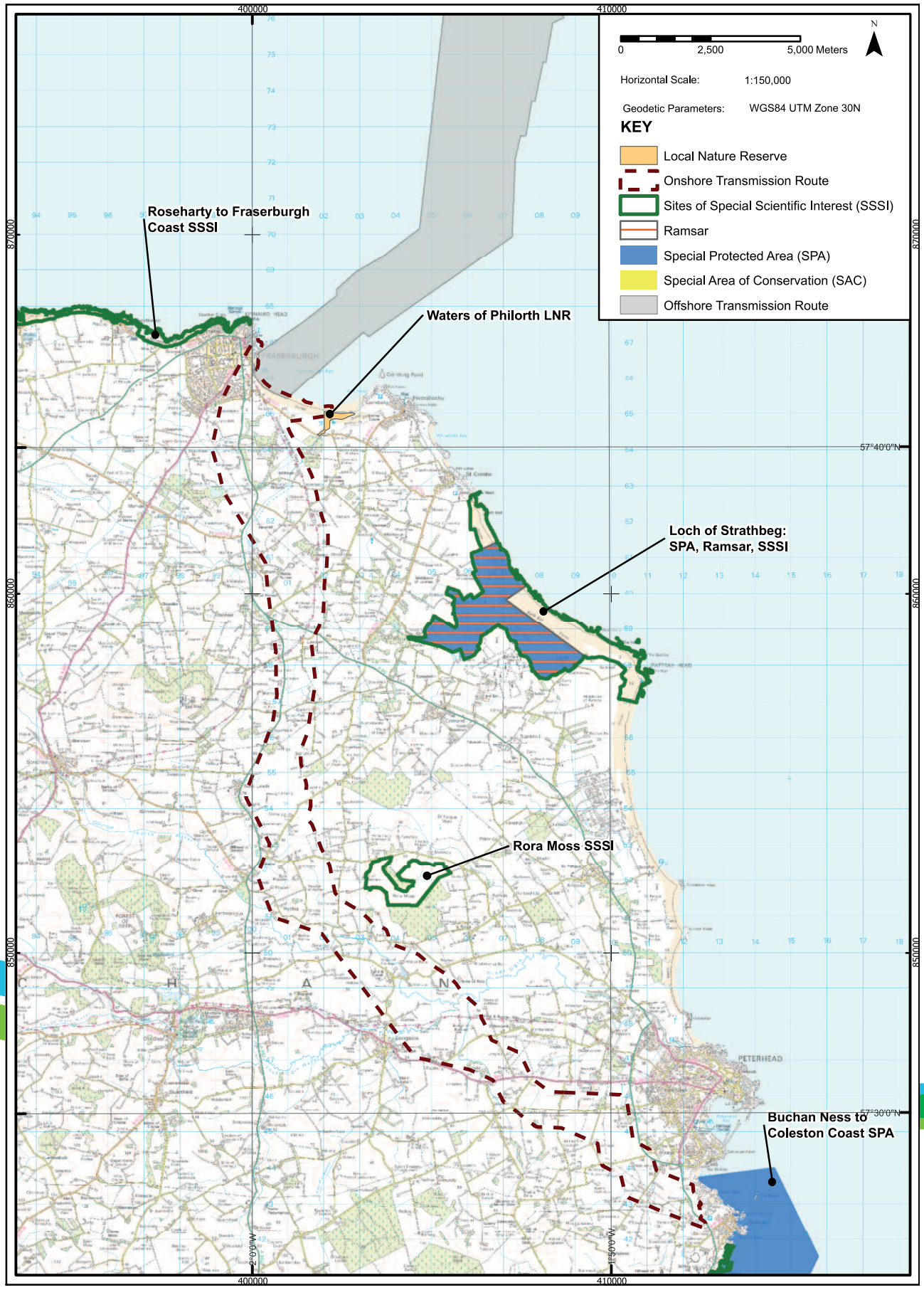
NTS Figure 4 - Offshore cable route and biological designated sites





The assessment of the TI (which includes offshore substation platforms (OSPs), offshore and onshore transmission cabling and an onshore substation(s)) has been carried out on the selected route (as shown in NTS Figures 4 and 5), representing the impact assessment for the TI both offshore and onshore.

NTS Figure 5 - Onshore cable route and biological designated sites



The Whole Project Assessment

In order to ensure that all effects are recognised MORL has also assessed 'the Project' as a whole. This assesses the likely significant effects from the three proposed wind farm sites and the TI together (based on the information available to MORL on the onshore transmission infrastructure at this time), and during differing phases of the development i.e. construction, operation and decommissioning.

Cumulative Impact Assessment

EIA also involves the assessment of the likely significant effects that may arise as a result of interactions between the Project as a whole and other existing and reasonably foreseeable projects and activities.

Within the ES the cumulative effects of the Project together with the development of the Western Development Area (WDA) are reported recognising that there is limited information relating to the development and the site's environmental sensitivities. In total the consented capacity of the Project and the WDA will not exceed 1.5 GW. Subject always to this overall maximum of 1.5 GW, the WDA may be developed for up to a maximum of 500 MW of capacity if less than 1.5 GW of capacity is delivered by the Project in the Eastern Development Area (EDA).

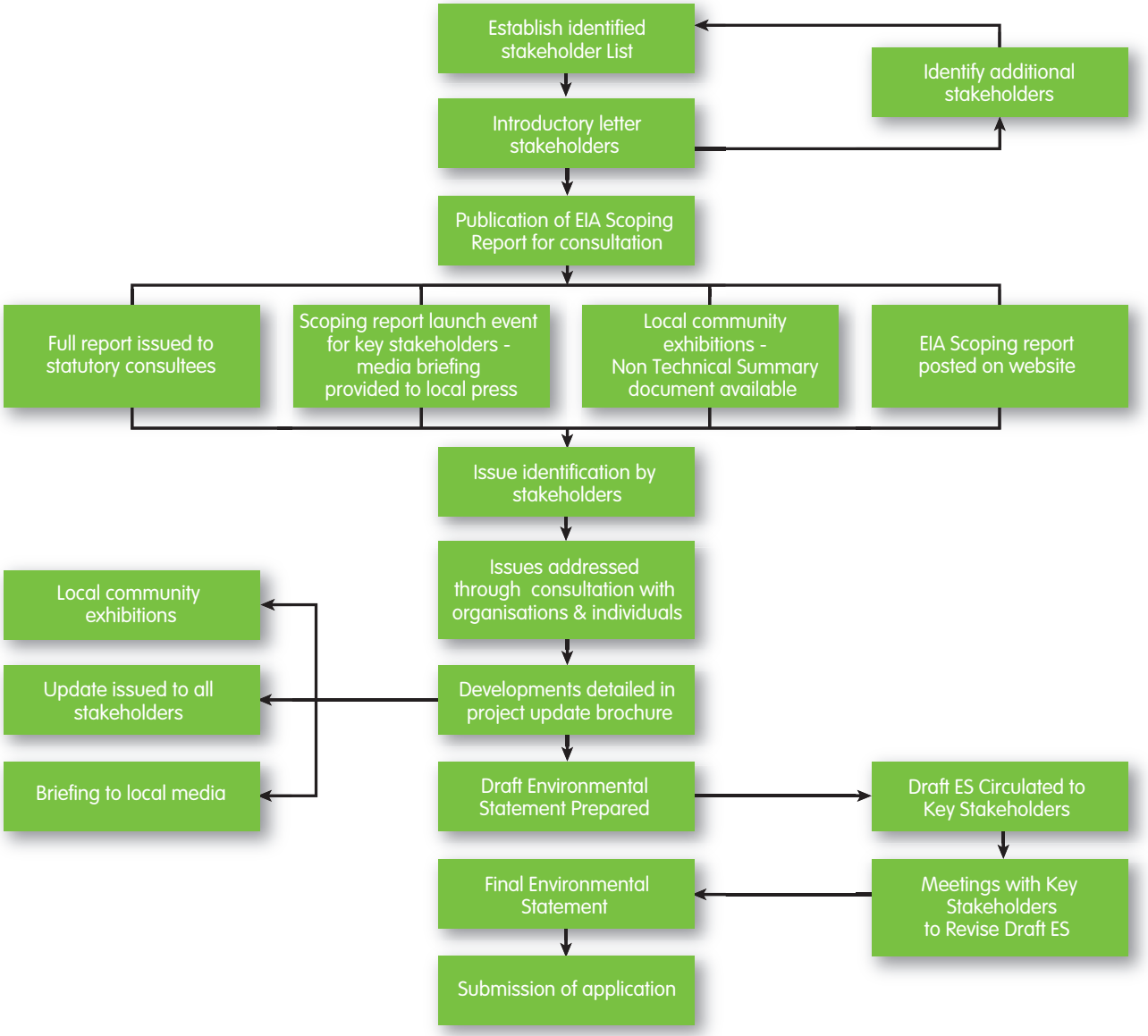
As the overall capacity of the MORL Zone is limited to 1.5 GW which is the same amount which has been assessed for the Project in the EDA on its own then not all effects are additive for all environmental receptors. This NTS reports where additive effects have been identified in relation to the Project in combination with the WDA.

Stakeholder Consultations

MORL is determined that the Project should progress through working with the organisations, individuals and communities who have an interest in the Project, whether as a result of their activities or their location. Chapter 1.4 of the ES sets out the extensive engagement programme undertaken by MORL which included:

- Development of an accessible non technical summaries of the wind farms and TI at an early stage providing details of the proposed project together with environmental information to allow stakeholders to comment on the scope of the EIA to be carried out;
- Distribution of public update brochures;
- Series of public exhibitions;
- Public opinion testing;
- Engagement with local media; and
- Engagement with environmental stakeholders and local and national politicians.

The engagement process undertaken by MORL is shown in the process chart opposite.


Establish identified stakeholder List
Identify additional stakeholders
Introductory letter stakeholders
Publication of EIA Scoping Report for consultation
Full report issued to statutory consultees
Scoping report launch event for key stakeholders - media briefing provided to local press
Local community exhibitions - Non Technical Summary document available
EIA Scoping report posted on website
Issue identification by stakeholders
Issues addressed through consultation with organisations & individuals
Local community exhibitions
Update issued to all stakeholders
Briefing to local media
Developments detailed in project update brochure
Draft Environmental Statement Prepared
Draft ES Circulated to Key Stakeholders
Final Environmental Statement
Meetings with Key Stakeholders to Revise Draft ES
Submission of application

Stakeholder Consultation Process

Public Consultation and Public Opinion

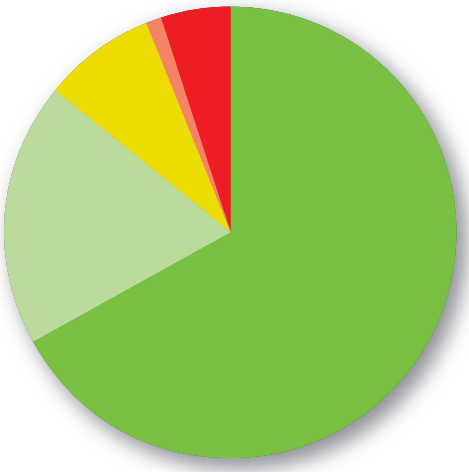
MORL carried out in excess of 20 public events and exhibitions which were held at various locations between Peterhead and Wick. The events were staffed by the project team, who spoke with more than 1000 members of the public.

The views of the public on the project were recorded by the distribution of 'Freepost' public opinion cards, of which 328 were returned to MORL.

From the survey:

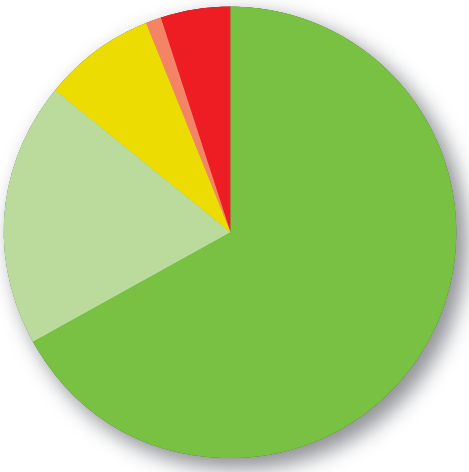
- 86 per cent of those surveyed support the development of wind energy in the outer Moray Firth. Only 6 per cent oppose development.
- 73 per cent of those surveyed believe the project will have a positive effect on the environment overall.
- 86 per cent of those surveyed expect the project to have a positive effect on the local economy.

Do you support the development of offshore wind energy in the outer Moray Firth ?



- Strongly agree 67%
- Agree 19%
- Neutral 8%
- Disagree 1%
- Strongly disagree 5%

Do you believe the development of offshore wind energy in the outer Moray Firth will have a positive or negative effect on the overall environment?



- Strongly positive 37%
- Positive 36%
- Neutral 22%
- Negative 2%
- Strongly negative 3%

Draft Environmental Statement

Prior to the current applications MORL produced a Draft Environmental Statement (ES). In doing so, MORL sought to ensure a high–quality ES, and to allow key stakeholders to examine, discuss and seek to resolve potential issues before the publication of the final ES. The Draft ES was provided to a limited list of key stakeholders including Marine Scotland, Statutory Nature Conservation Agencies, NGO's and industry representation groups and associations. A series of follow–up meetings was also organised with those stakeholders.

- 21 organisations received the Draft ES;
- 18 meetings were held with stakeholders; and
- 16 written responses were received by MORL.

The resources which stakeholders directed to the Draft ES have enabled the document to be refined and have allowed a number of issues and concerns to be addressed prior to consent application.

A programme of post–application engagement is planned in order to provide broad public awareness of the Project and its consent applications. MORL is committed to continue engagement with stakeholders and the decision makers throughout the consenting, construction, operational and decommissioning period of the Project.

Project Details – Assessment of Alternatives

This section provides an overview of the selection process used to identify the site for the Project including the consideration of alternatives for both the three proposed wind farms and the transmission infrastructure (TI).

Site Selection within the Zone

Following the award in 2010 of a Zone Development Agreement by The Crown Estate to MORL to develop the Moray Firth zone, MORL conducted a zonal constraints assessment. This included an assessment of the known existing spatial constraints to wind turbine development (see NTS Figure 3 on pages 26 and 27) as well as engineering factors.

This assessment identified two development areas within the Zone: the Eastern Development Area (EDA) and the Western Development Area (WDA). In comparison with the EDA, the WDA offered a more constrained development area at the time, hence it was decided that the EDA would be developed first.

The site selection process for each of the wind farms included the development of project description which was broadly defined, within a number of agreed parameters for the purpose of the consent applications. The range of parameters sets out the realistic maximum and minimum extents of the Project. This is commonly referred to as a Rochdale Envelope.

Extensive investigations have been undertaken in order to define the parameters of the Project. Each parameter was rated against the following key drivers:

- Health and Safely (above the "As Low As Reasonably Practical" standard);
- Consenting;
- Cost;
- Wind Farm Performance; and
- Technical risk.

Environmental input was a key factor into these discussions to ensure environmental risks were thoroughly considered.

In order to select the route for the TI MORL conducted environmental and engineering feasibility studies to identify potential routes to its grid connection point at Peterhead Power Station. This detailed technical appraisal took into account likely environmental issues, engineering, economic and health and safety constraints for route corridors for export cabling (onshore and offshore) and landfall points.

Project Description

There are two distinct parts of the Project: the generation of the energy and the transmission of the energy to the National Grid. Overall, consent to construct up to a maximum total capacity of 1,500 MW across the three sites is being sought; this is the equivalent to the output of a conventional thermal power station.

Offshore Generating Station

A summary of the infrastructure within each site is provided below:

- Wind turbines with rated capacity between 3.6 and 8 MW;
- Wind turbine substructures and foundations, of which there are two potential concepts
  - Jacket substructure with pin pile foundations;
  - Gravity Base Structure (GBS) with a gravel bed foundation;
- Alternating current (AC) inter-array cabling of a voltage between 33 or 66 kV; and
- Offshore meteorological mast.

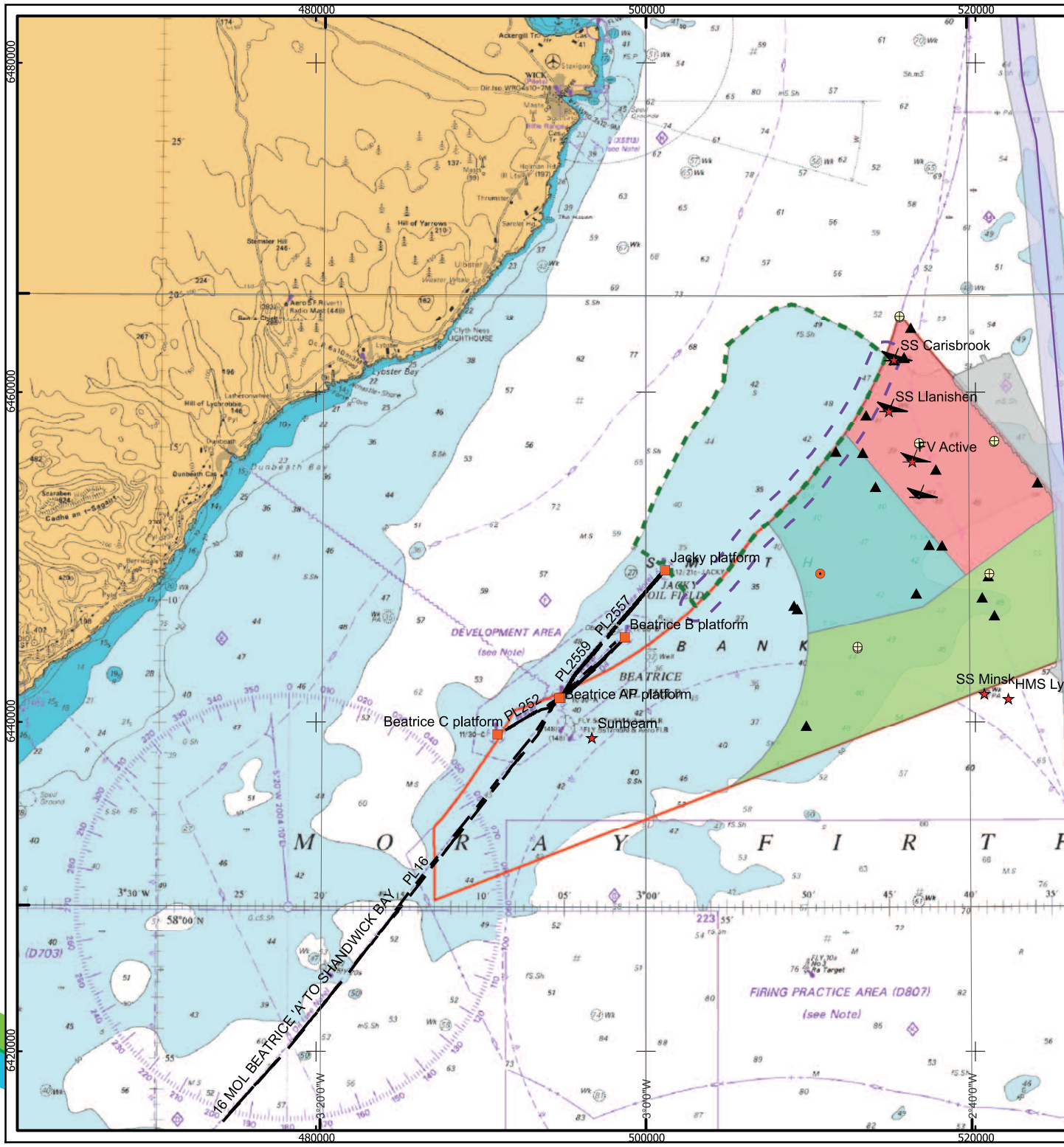
Wind turbines

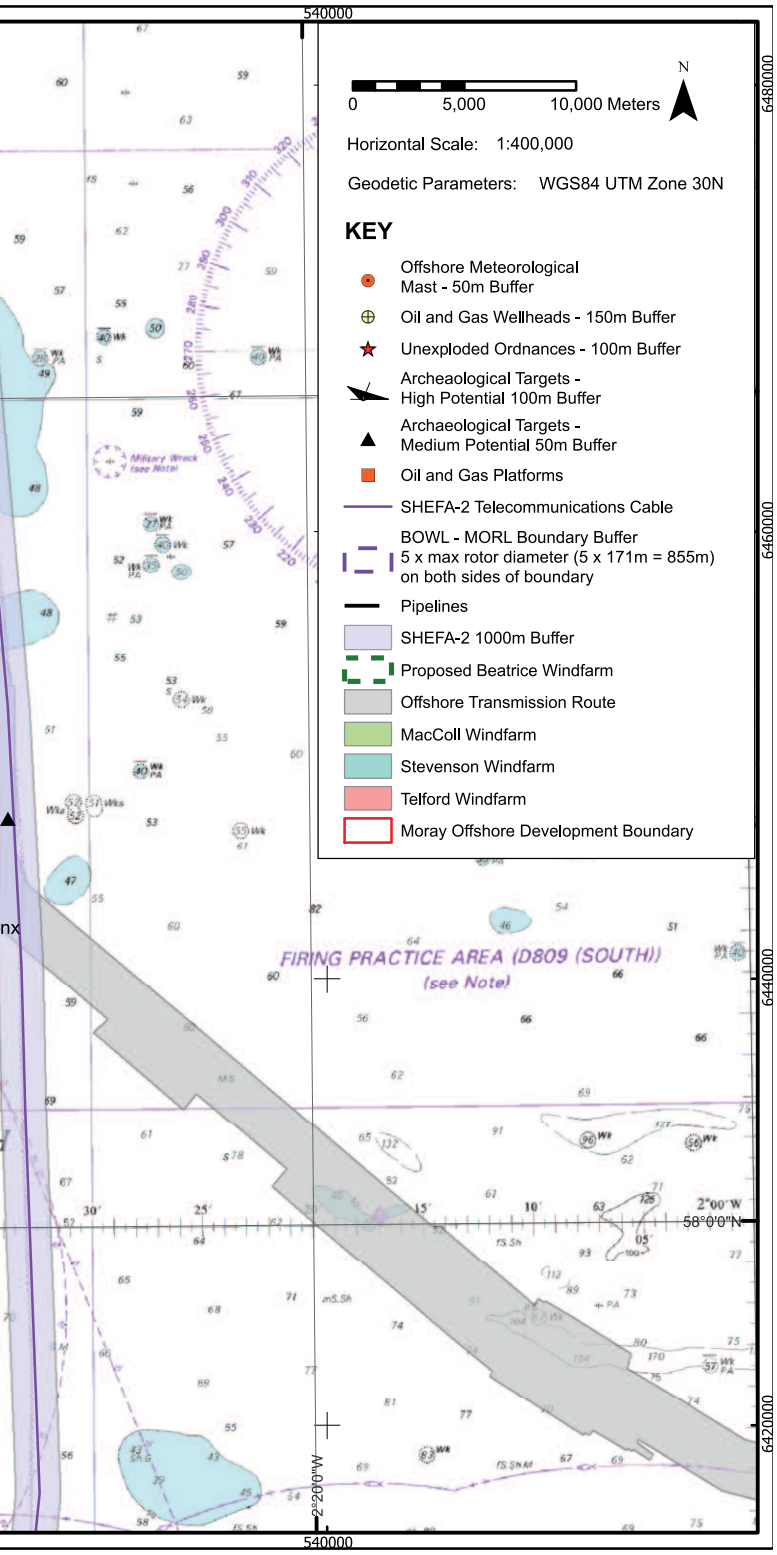
Offshore wind developments of this proposed scale require the applications for the necessary consents to be made several years in advance of commencing the construction process. At this stage extensive engineering design has been carried out, however, much of the infrastructure (for example, the larger 7 / 8 MW turbines) is still at the concept stage and will not be in production until closer to construction. Therefore at this stage it is not possible for MORL to define the specific size and number of turbines which will be installed on the three proposed wind farm sites.

Instead, a range of turbines has been identified and some of their key dimensions are shown below. The turbine type, numbers, locations and layout would be agreed with Marine Scotland following consent and prior to installation. The smallest turbine in the range is the 3.6 MW turbine with a maximum blade tip height of 162 m. The largest turbine is the 8 MW turbine which has a maximum height of 204 m. The maximum number of turbines which will be installed across the three proposed wind farm sites would be 339.

Rochdale Envelope Parameter	Dimension Range
Approximate hub height range	90 – 118 m
Rotor diameter range	120 – 172 m
Maximum blade width range	4.2 – 5.8 m
Maximum tip height	162 – 204 m

NTS Figure 3 – Project Spatial Constraints





Following the award in 2010 of a Zone Development Agreement by The Crown Estate to MORL to develop the Moray Firth zone, MORL conducted a zonal constraints assessment. This included an assessment of the known existing spatial constraints to wind turbine development (see NTS Figure 3 on pages 26 and 27) as well as engineering factors.

Only one type and size of turbine will be used within each site, but different types of turbines may be used in different sites. This will allow the Project to take advantage of advances in technology as the programme progresses. The table below represents the various build-out scenarios for the sequential development of sites, giving an indication of the lowest and highest number of turbines.

		Greatest No of Turbines			Least No of Turbines		
	Construction start	**Turbine rating**	**Turbines**	**Maximum capacity**	**Turbine rating**	**Turbines**	**Maximum capacity**
Site 1	2016	3.6 MW	139	500 MW	7 / 8 MW	72 / 63	500 MW
Site 2	2017/2018	5 MW	100	500 MW	7 / 8 MW	72 / 63	500 MW
Site 3	2019	5 MW	100	500 MW	7 / 8 MW	72 / 63	500 MW
EDA			339	1,500 MW		216 / 189	1,500 MW

The maximum level of installed capacity for which consent is sought within each site is 500 MW. Some of the combinations above appear to result in a higher capacity than this cap. This is due to rounding up some of the parameters which ensures that there is no under assessment of the environmental effects.

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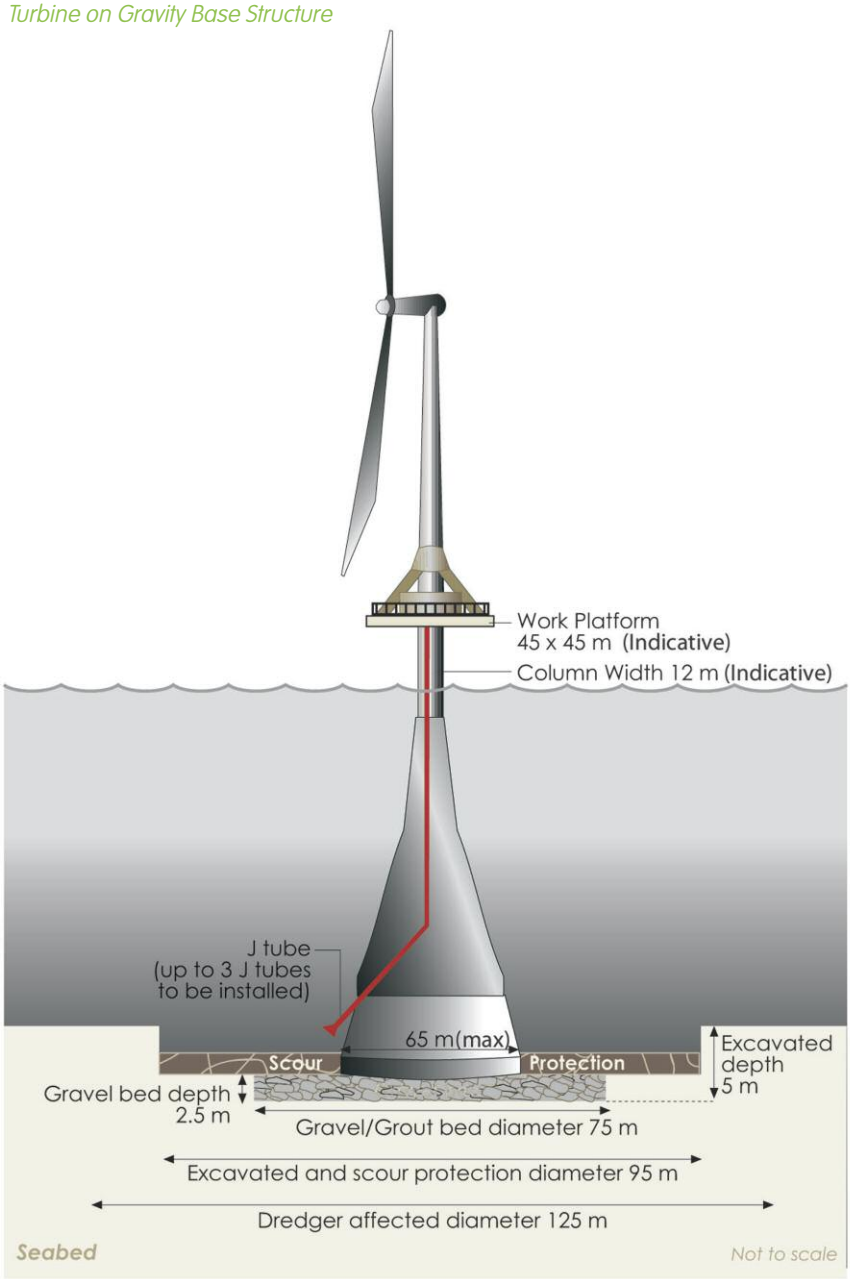
The turbines will be supported by substructures and foundations which hold them in place on the seabed. Two main foundation and substructure concepts, the Gravity Base Structure (GBS) on a gravel bed and the Jacket Structure with pin piles, are proposed within the three proposed wind farm sites.

The generic GBS is composed of a hollow concrete base and a steel monopole top–piece. Part of the GBS may penetrate the seabed. The concept requires the dredging of an area of seabed to allow the installation of a flat gravel bed to provide a stable foundation for the GBS. It is expected that the area of seabed which is excavated will be greater than the final area of the laid gravel bed. Scour protection (see below) is likely to be used around the concrete base. This GBS concept is illustrated below (the dimensions shown are indicative only).

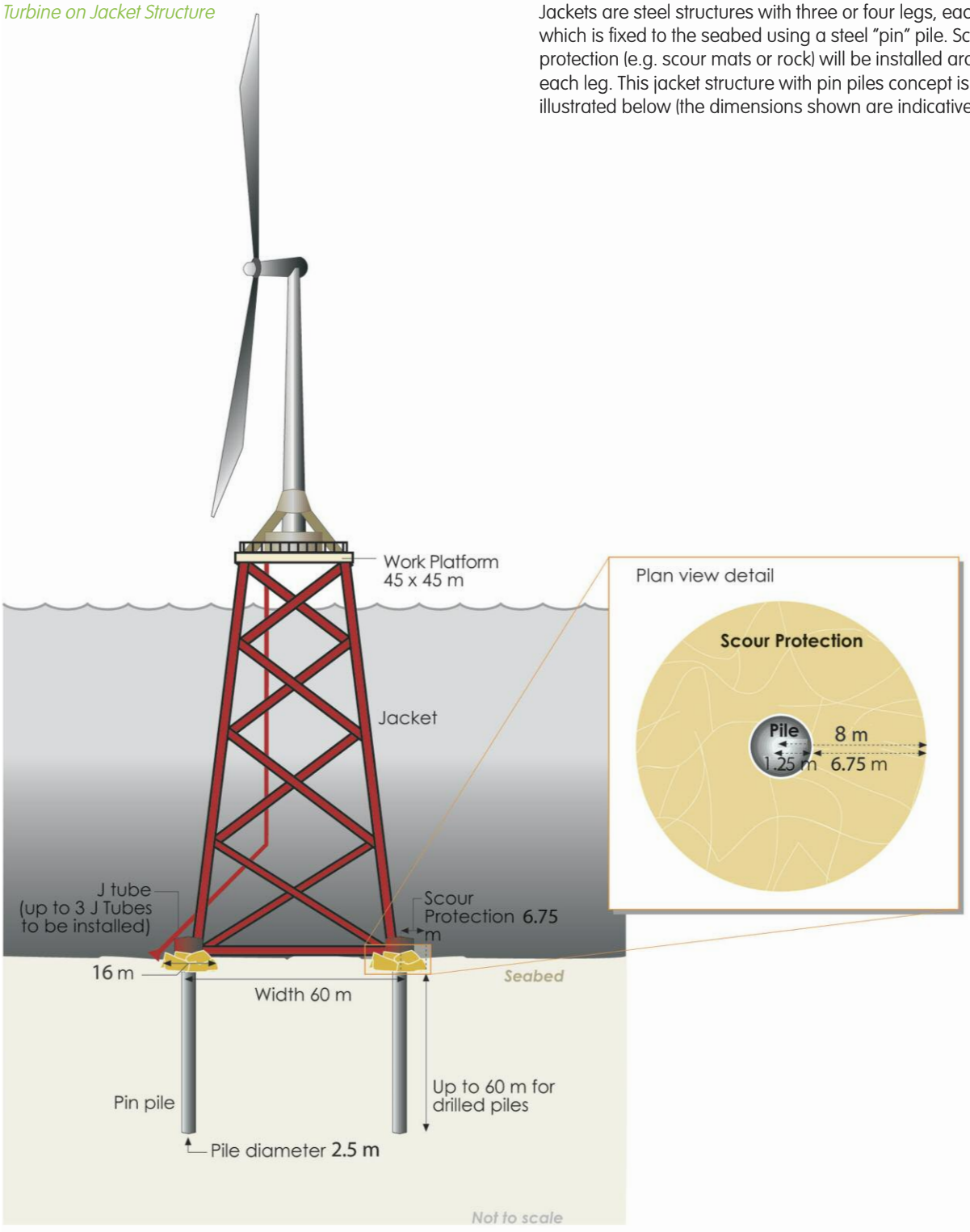
Scour is the process where the seabed is eroded by water movement and can be exacerbated where a new structure has been added to the seabed. Scour protection by the use of graded rock placement, concrete mattress or scour mats is used to reduce or eliminate scour.

Turbine on Gravity Base Structure



Turbine on Jacket Structure

Jackets are steel structures with three or four legs, each of which is fixed to the seabed using a steel "pin" pile. Scour protection (e.g. scour mats or rock) will be installed around each leg. This jacket structure with pin piles concept is illustrated below (the dimensions shown are indicative only).



Inter-array Cabling

Inter-array cables link the turbines to the offshore substation platforms (OSPs) (see further below). They will be installed in trenches for protection, but close to each turbine the cables will be laid on the seabed and the exposed cables will be protected. Protection of the exposed cables could include pre–formed concrete mattresses consisting of concrete block sections linked together by webbing so that they may drape flexibly over the cable and seabed. Alternatively, controlled rock placement may be used. It is also a possibility that concrete tunnels and grout bags, and propitiatory steel / plastic ducting or protecting sleeves could be utilised to protect the cable.

Offshore Meteorological Mast(s)

MORL has consent and intends to install a meteorological mast in 2012 within the EDA to monitor the weather conditions. It is proposed that up to one further meteorological mast may be installed within the three proposed wind farm sites. These meteorological masts are permanent structures, intended to remain on site for the life span of the wind farm.

Transmission Infrastructure

The three offshore wind farm sites will be connected to the National Grid using transmission infrastructure (TI). A grid connection agreement is in place with the National Grid at the existing Peterhead Power Station substation. The TI required to connect the wind farms to the Peterhead substation includes:

- Up to six AC offshore substation platforms (OSPs);
- Up to two AC to DC convertor OSPs;
- Cabling between the OSPs;
- Export cable from the convertor OSPs to the onshore substation;
- Onshore substation; and
- Cabling between onshore substation and onshore collector station.

OSPs

Between 5 to 8 OSPs will be required to collect and transmit the power generated by the three wind farms. Two of these OSPs may be AC (Alternating Current) / DC (Direct Current) converter stations to convert the AC electricity generated by the turbines to high voltage DC electricity.

The AC and AC / DC OSPs will be supported by substructures and foundations, for which there are five concepts identified as suitable for the three sites:

- GBS with a gravel bed foundation;
- Jacket with pin piles;
- Jacket with suction caissons;
- Jack–up with pin piles; and
- Jack–up with suction caissons.

The GBS concept has been described above for turbines, however, the GBS required to support the OSPs would be significantly larger than that of the GBS for a wind turbine.

The jacket substructure with pin pile foundations is similar to that of a wind turbine described above. However, the jacket structure required to support an AC OSP will have up to 6 legs and an AC / DC OSP will have up to 8 legs. The alternative suction caisson foundation would be an open–ended steel cylinder up to 20 m diameter attached to each leg. The principle is that water is sucked out of the cylinder which then embeds itself in a sandy seabed to depth of up to 20 m. This option cannot be used in many locations across the three sites because only 10% of the seabed in this area is suitable.

The jack–up concept will have either pin pile or suction caisson foundations. The jack–up substructure consists of a topside box with 4 support legs that can be raised or lowered using a powerful jacking system. This option may involve penetration of the seabed. The area around the legs will require scour protection.

Export Cable

HVDC export cables will be required to connect the AC/DC OSPs to the chosen grid connection point. Two 320 kV export cables per AC/DC OSP will be required resulting in a total of four export cables. For the majority of the route these cables will be bundled, i.e. two bundles of two cables. However, there may be short sections where cables are unbundled and laid as single cables. The length of the offshore export cable route is approximately 105 km.

For the subsea portion of the route, the DC cable bundles would be buried to a target depth of 1 m based on site–specific seabed conditions. Where adequate burial cannot be achieved alternative protection methods, such as mattresses or rock placement will be used. The onshore sections of the export cable route will also be buried to a target depth of 1 m. No overhead sections of the route are planned and the entire onshore cable length will be buried.

The width of the onshore export cable corridor ranges between 1.5 and 2 km, within which the onshore cables and lay–down areas will be located. The precise route is expected to be 20-30 m wide during construction to allow access to the trenches by excavators and cable–drum trucks etc. An optimised and precise cable route will be selected prior to the submission of the onshore planning application. The length of the onshore cable route is approximately 30 km.

Onshore Converter Substation(s)

Two direct current (DC) 750 MW + / – capacity onshore converter units will be required to convert the DC electricity transmitted by the AC / DC OSPs back to high voltage AC electricity in order for it to be connected to the onshore grid network at Peterhead Power Station. These two converter units will be co–located within a single compound onshore in close proximity to Peterhead Power Station and AC collector substation. The substations may be housed separately or within one building. The compound for this substation will cover a maximum area of approximately 200 x 170 m. It has an indicative height of 25 m and may require a 100 x 100 m laydown area.

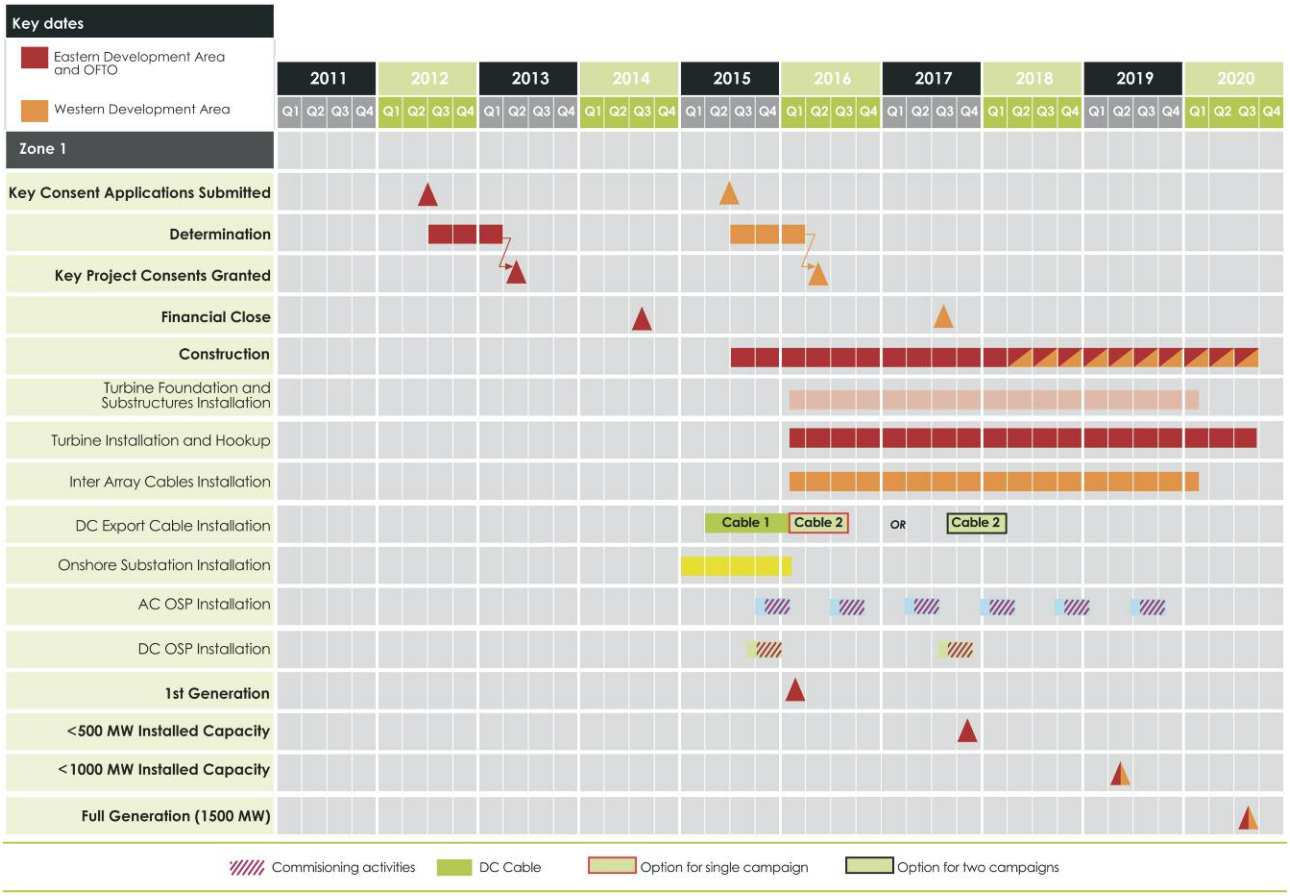
Construction

Construction will commence approximately two years after consent has been granted. An indicative construction schedule for the three offshore wind farms and the transmission infrastructure is shown below.

Operation and Decommissioning

The Project is expected to commence electricity generation as early as 2016, with full commissioning in 2020. A decision as to whether the sites will be repowered or decommissioned will be taken approximately 15–20 years after operation has commenced. This would most likely involve the replacement of turbines and, if necessary, associated cabling which by then will be near the end of their design lives. Depending on the scale and nature of the works, a new consent application with supporting Environmental Statement would need to be submitted. A preliminary decommissioning plan has been prepared to support these applications.

Indiciative Installation Programme



Biological Designated Sites

There are a number of international, national and local biological designated sites of nature conservation importance in the vicinity of the Project, though none overlap with the Project area. NTS Figures 4 (pages 16 and 17) and 5 (page 18) show the location of the biological designated sites in relation to offshore elements (i.e. the three proposed wind farms and offshore transmission infrastructure) and to the onshore transmission infrastructure respectively.

The sites considered to be of most relevance to the Project, which may be affected by its construction, operation and decommissioning include:

- East Caithness Cliffs Special Protection Area (SPA);
- North Caithness Cliffs SPA;
- and Troup, Pennan and Lion's Head SPA;
- Loch of Strathbeg SPA;
- Berriedale and Langwell Waters Special Area of Conservation (SAC);
- River Moriston SAC;
- River Oykel SAC;
- River Spey SAC;
- River Thurso SAC;
- River Evelix SAC;
- Moray Firth SAC; and
- Dornoch Firth and Morrich More SAC.

Likely significant effects on the designated features of these sites (i.e. bird, fish and shellfish and marine mammal species) are assessed in relevant chapters of ES.

Environmental Effects - The Physical Environment

Hydrodynamics (Waves and Tides)

Hydrodynamics of the site comprise the water levels, currents, tides and waves as physical processes in the marine environment. The likely significant effects on the hydrodynamics of the Smith Bank, sites designated for conservation purposes and on recreational surfing venues from the subsea components of the construction, operation and decommissioning phases of the proposals have been assessed.

Data on the characteristics of the waves and tides in and around the sites were gathered from various sources including desktop studies of existing data (existing tide gauges, tide tables and published information), field survey of wave and tidal regimes and numerical modelling tools.

The maximum water depth across the three proposed wind farm sites is 57 m, with waves forming and tides moving generally from northeast to southwest. The export cable route corridor passes through areas of deeper water (such as the Southern Trench) before reaching landfall at Fraserburgh beach.

Three Proposed Wind Farms

Activities that could affect hydrodynamics during construction and decommissioning of the wind farms, and which were assessed, are installation/removal of the turbine foundations and the inter-array cables. During operation, the presence of this infrastructure has been assessed.

No significant effects are predicted on the water levels, currents, tides or waves within or around the three proposed wind farm sites. The three proposed wind farms cause no measurable change to the tidal range or to the speed or directions of tidal currents. The development will not measurably affect wave period or direction.

Transmission Infrastructure

Tides and currents tend to increase towards the landfall point. Activities that could affect hydrodynamics during construction and decommissioning of the offshore transmission infrastructure (OfTI), and which were assessed, are the installation/removal of the offshore substation platforms (OSP) foundations and export cables. During operation, the presence of this infrastructure has been assessed.

No significant effects are predicted on the water levels, currents, tides or waves within or around the offshore export cable route corridor. The development causes no measurable change to the tidal range or to the speed or directions of tidal currents. The OSP foundations will not measurably affect wave period or direction.

Whole Project Assessment

No significant effects are predicted on the water levels, currents, tides or waves within or around the Project as a whole. The Project is not predicted to cause a measurable change to the tidal range or to the speed or directions of tidal currents. The development will not measurably affect wave period or direction.

Cumulative Impact Assessment

No significant effects are predicted on the water levels, currents, tides or waves in the area when considered cumulatively with Beatrice Offshore Wind Farm (BOWL). The developments cause no measurable change to the tidal range or to the speed or directions of tidal currents. Considered together, the developments will not measurably affect wave period or direction.

Sedimentary and Coastal Processes

The likely significant effects on sedimentary and coastal processes (the movement of seabed sediments around the proposed sites and coasts) on the Smith Bank, sites designated for conservation purposes and on recreational surfing venues from the subsea components of the construction, operation and decommissioning phases of the proposals have been assessed.

Data on the characteristics of the sedimentary and coastal processes in and around the sites were gathered from various sources including desktop studies of existing data (seabed sediment maps, previous surveys and publications), field survey of sediments and suspended sediments and data developed with regards to the hydrodynamic regime.

Three Proposed Wind Farms

Sediments within the three proposed wind farm sites generally comprise gravelly sand, becoming coarser in the deepest areas of the sites. The effects on sedimentary and coastal processes that were assessed for the three proposed wind farm sites include an increase in suspended sediment concentrations as a result of installation activities, accumulation of sediment and change of sediment type at the seabed as a result of installation activities, indentations left on the seabed by jack-up vessels and large anchors, changes to the sediment transport regime and geomorphology, due to the presence of the turbine foundations and exposure of inter-array cables and cable protection measures and scour effects (localised erosion) due to the presence of the turbine foundations.

No significant effects are predicted on sedimentary or coastal processes within or around the three proposed wind farm sites as a result of the development.

There will be minor increases in suspended sediment concentrations and sediment accumulation as a result of foundation installation activities during the construction and decommissioning periods, but these will be temporary and will not result in any significant effects.

There will be a small increase in scour effects around turbine foundations, but this will be within the range of natural variability and will not be significant.

Transmission Infrastructure

The effects on the physical sedimentary environment (patterns of sediment transport and geomorphological evolution) that were assessed are an increase in suspended sediment concentrations as a result of OSP installation activities and the presence of the OSP foundations, increase in suspended sediment concentrations as a result of export cable installation activities, disturbance of coastal morphology at the landfall site and scour effects due to the presence of the OSP foundations, export cables and cable protection measures.

No significant effects are predicted on sedimentary or coastal processes within or around the OfTI as a result of the development.

There will be minor increases in suspended sediment concentrations and sediment accumulation as a result of foundation and export cable installation activities during the construction and decommissioning periods, but these will be temporary and will not result in any significant effects.

There will be a small increase in scour effects around OSP foundations, but this will be within the range of natural variability and will not be significant.

Whole Project Assessment

No significant effects are predicted on the sedimentary or coastal processes within or around the Project. There will only be minor but temporary and insignificant increases in suspended sediment concentrations during the construction and decommissioning phases, and a small but insignificant increase in scour effects during operation.

Cumulative Impact Assessment

No significant effects are predicted on sedimentary or coastal processes in the area when considered cumulatively with BOWL.

Hydrology, Geology and Hydrogeology

Hydrology, Geology and Hydrogeology involves the assessment of the onshore water environment, onshore geological condition and assessment of contaminated land as a result on the MORL onshore transmission infrastructure (OnTI).

The study involved field surveys consisting of comprehensive site walkovers, detailed desk studies, consideration of key legislative and planning information, and consultations with relevant statutory and non-statutory bodies, including Aberdeenshire Council, Scottish Water, Scottish Environmental Protection Agency (SEPA) and RIGS Group (Regionally Important Geological Sites).

Transmission Infrastructure

The baseline conditions were characterised and assessed against the likely significant effects identified as a result of the OnTI. The likely significant effects considered for assessment on hydrology, geology and hydrogeology receptors range from effects relating to overland flooding due to changes to surface runoff and drainage disturbance to floodplains, pollution / contamination of water supplies through construction activities and physical soil compaction or damage to the physical environment and geological / geomorphological sites.

The likely significant residual effects for hydrology, geology and hydrogeology are assessed as either insignificant or minor significance.

The key mitigation activity will be detailed siting of the final onshore export cable route and substation location to avoid sensitive areas such as designated sites, peat bogs, private water supplies water abstraction locations, flood plains and contaminated land. MORL will finalise these details for submission of the onshore planning application to the local planning authority, Aberdeenshire Council.

Additional mitigation includes best practice construction site management that focuses on water pollution prevention, effective drainage and erosion prevention. Appropriate construction methods will be used for locations that cross watercourses.

A sustainable drainage system will be incorporated into the proposed substation compound to reduce effect on runoff, flooding and water quality.

Whole Project Assessment

The assessment of likely significant effects on hydrology, geology and hydrogeology have been undertaken in relation to the OnTI between the Fraserburgh Beach landfall and the onshore substation(s) location. Offshore wind farm installation, operation and decommissioning will have no effect on onshore hydrology, geology and hydrogeology.

This means there are no additive effects to the TI assessment and the likely significant residual effects for hydrology, geology and hydrogeology are assessed as either insignificant or minor significance.

Cumulative Impact Assessment

The likely significant cumulative residual effects for hydrology, geology and hydrogeology are assessed as either insignificant or minor significance.

A key effect considered as part of all cumulative sites is water pollution due to construction activities. Although this could lead to a cumulative effect, the spatial distribution and the timing of the works makes it highly unlikely that there will be a significant cumulative effect on any surface water or groundwater body.

Generally, all sites will be required to minimise the effect on the water environment through effective drainage solutions and pollution prevention measures to acceptable levels within the site boundary.

Onshore Noise

The potential onshore noise effects of the proposals have been considered. The study consisted of consultation with relevant statutory bodies, detailed desk study to establish the baseline conditions; and consideration of the relevant key legislation and guidance.

Three Proposed Wind Farms

Given the distance of the proposed sites from the coastline and noise receptors (in excess of 12 nautical miles), there will be no effects on noise onshore.

Transmission Infrastructure

It is likely that ambient noise levels throughout the majority of the onshore cable route area will be relatively low, especially during night time periods. Where dwellings are adjacent to the roads identified, road traffic noise is likely to be dominant at all times, although it is likely that road traffic flows will dip at night, reducing the contribution of road traffic noise. The acoustic environment at dwellings in the urban area identified in south east Fraserburgh is likely to be influenced by mixed urban sources resulting in perhaps higher ambient levels than those experienced at more rural locations.

It is also observed that there are a number of existing industrial installations at the Peterhead end of the route, which are likely to contribute noise from fixed plant to the surrounding environment; this may also influence ambient noise levels at the closest noise sensitive dwellings within the route.

The implementation of a Construction Management Plan (CMP) and associated mitigation measures (e.g. to restrict working hours) will ensure there are no significant noise effects from the construction, operation or decommissioning of the onshore transmission works.

Cumulative Impact Assessment

No significant cumulative effects are predicted from the OnTI during construction, operation or decommissioning.

The Biological Environment

Benthic Ecology

An assessment of the likely significant effects of the Project on benthic ecology (i.e. seabed habitats and associated fauna living on, over or within the seabed) has been undertaken.

The benthic ecology resource in and around the Project area has been characterised based upon desk-based review of existing data and the results of site-specific grab, drop video and stills photography, and trawl surveys.

Assessment draws upon established methods and guidance in addition to information and feedback gathered during consultation.

Three Proposed Wind Farms

The assessment has considered a range of direct (e.g. habitat disturbance, loss and change) and indirect (e.g. changes in sediment distribution and scour around structures) effects on benthic ecology resulting from wind farm construction, operation and decommissioning. No effect is considered to be of greater than minor adverse significance following the implementation of mitigation.

Mitigation measures include adherence to an Environmental Management Plan (EMP) that will limit the risk of accidental spillages or releases occurring.

Transmission Infrastructure

Localised features of nature conservation interest have been identified within the offshore export cable route. These include habitat that is known to be a component of the 'burrowed mud' Scottish draft Priority Marine Feature (PMF); encrustations of the reef building tube worm *Sabellaria spinulosa* growing erect from the seabed to match EC Habitats Directive Annex I *Sabellaria spinulosa* reef (this habitat is also a UK Biodiversity Action Plan (BAP) priority habitat); and, areas of cobbles and rock outcroppings identified during the site specific study matched EC Habitats Directive Annex I stony and bedrock reef.

Direct and indirect effects on benthic ecology resulting from TI construction, operation and decommissioning are considered to be of no greater than minor adverse significance.

Those mitigation measures relevant to the wind farms (outlined above) will also be applied to the TI. In addition, the offshore export cables will be micro-sited around sensitive *Sabellaria spinulosa* reef habitats.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the wind farms or transmission infrastructure above. Benthic ecology receptors will not be subject to effects of greater than minor significance as a result of the construction, operation or decommissioning of the Project.

Cumulative Impact Assessment

In conjunction with other projects and activities within the locale, the Project will only have minor cumulative effects on benthic habitat loss and introduction of new substrate. Cumulative effects of temporary seabed disturbances arising from the construction phase of the projects are considered to be not significant with regard to benthic ecology.

Effects on Fish and Shellfish

An assessment of the likely significant effects of the Project on Fish and Shellfish Ecology has been undertaken.

The Fish and Shellfish Ecology resource in and around the Project area has been characterised based upon desk-based review of existing literature and data. It is recognised that there is a knowledge gap with regards to accurate species population densities and distribution within the Moray Firth and a lack of understanding of exact migration routes of key species such as Atlantic salmon.

MORL has increased this knowledge base by undertaking an extensive offshore sandeel population survey within the MORL Zone. MORL is committed to further studies and monitoring to identify if any mitigation is required and, if so, to define feasible measures in order to reduce the significance of the likely effects.

Three wind farm sites

In relation to commercial fish species within the wind farm sites, haddock, herring, monkfish and whiting account for the majority of the fish landings whilst the principal shellfish species landed are king scallops, *Nephrops*, edible crab and squid.

Key prey species such as sandeels, herring and sprat play a key role in the North Sea food chain. Sandeels are a key component of the diet of many birds (i.e. kittiwakes, razorbills, puffins and common terns), fish such as herring, salmon, sea trout, cod and haddock and marine mammals. Given its importance as a prey species and the lack of site specific information on the distribution of sandeels in the area, a survey was commissioned by MORL to investigate the distribution of sandeels across the MORL Zone. Relatively low sandeel abundances were found in the survey (only 197 individuals in total) indicating that the sites do not support important sandeel populations.

A number of species of conservation importance have been identified as potentially present within the three proposed wind farm sites. Salmon, sea lamprey and freshwater pearl mussel are primary reasons and qualifying features for selection of a number of European designated Special Areas of Conservation (SAC) rivers in the Moray Firth.

Assessment has considered a range of effects on Fish and Shellfish Ecology resulting from wind farm construction, operation and decommissioning. These include temporary disturbance of the seabed and underwater noise during construction; and loss of habitat, introduction of new habitat, electromagnetic fields (EMFs) and changes to fishing activity during operation.

Taking into account the monitoring approach outlined above the likely significant residual effects for fish and shellfish ecology are assessed as being of minor significance.

No likely significant effects resulting have been predicted from the construction, operation and decommissioning of the three proposed wind farms on six key SACs which are designated for atlantic salmon (and in some cases fresh water pearl as well).

Transmission Infrastructure

The baseline of fish species identified for the wind farm sites is consistent with those species that are found in and around the OfTI.

Assessment for the OfTI considered a range of effects on Fish and Shellfish Ecology resulting from the OfTI construction, operation and decommissioning. These also include temporary disturbance of the seabed and underwater noise during construction; and EMFs and changes to fishing activity during operation.

The likely significant residual effects for fish and shellfish ecology are assessed as minor significance or insignificant.

No likely significant effects resulting have been predicted from the construction, operation and decommissioning of the TI on the key SACs.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the wind farms or OfTI above. Fish and Shellfish Ecology receptors will not be subject to effects of greater than minor significance as a result of the construction, operation or decommissioning of the Project as a whole.

Cumulative Impact Assessment

Fish and Shellfish likely significant cumulative effects involves the assessment of the effect of the three wind farm sites, the OfTI and all other relevant offshore projects / activities. The most sensitive cumulative effects predicted relate to construction noise, particularly arising from simultaneous piling events between MORL and BOWL. Taking into account the monitoring approach outlined above the likely significant residual cumulative effects for fish and shellfish ecology are assessed as minor significance.

No likely significant cumulative effects resulting have been predicted on the key SACs.

Marine Mammals

An assessment of significant effects of the Project on marine mammals has been undertaken.

The marine mammal resource has been characterised through a combination of desktop-based, boat-based and aerial surveys, passive acoustic monitoring (PAM) and telemetry studies. Historical data on the marine mammal distribution and densities were supplemented with site specific data for the three proposed wind farms.

The results were then used to predict the marine mammal distribution in the Moray Firth based on habitat preferences.

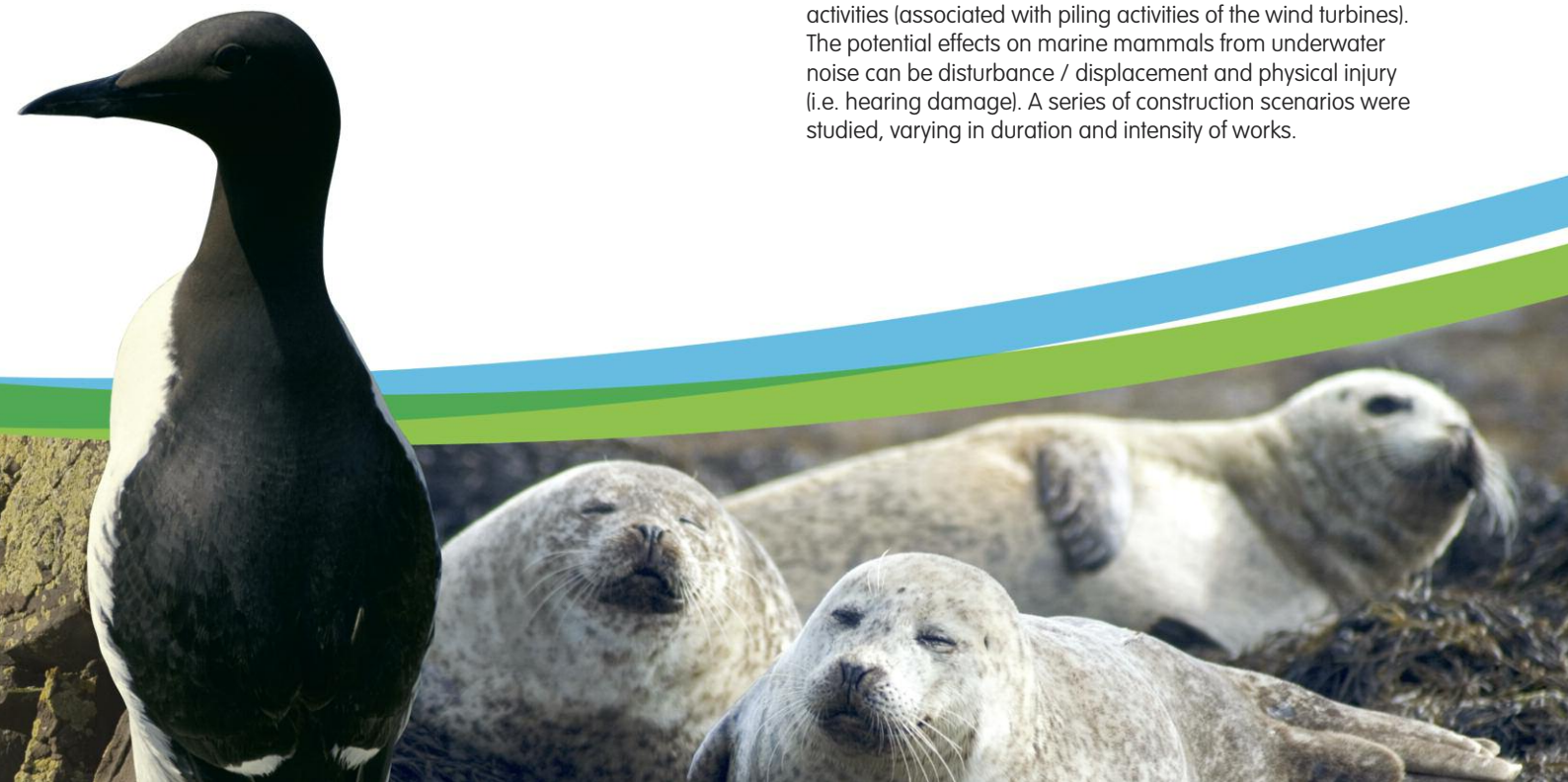
The key marine mammal species identified in this study were harbour seal, grey seal, harbour porpoise, bottlenose dolphin and minke whale. Two areas of conservation importance for marine mammals were also considered in detail in the assessment: the Moray Firth SAC which is designated for bottlenose dolphin and the Dornoch Firth and Morrich Moore SAC which is designated for harbour seal.

Harbour seal, grey seal and harbour porpoise were the most abundant species within the three proposed wind farms. Bottlenose dolphin is found mainly in coastal areas, particularly in the inner Moray Firth and therefore not frequent within the proposed wind farms area. Minke whale was found to be the least abundant of all five species studied within the Moray Firth.

Three Proposed Wind Farms

The potential effects on marine mammals from the construction, operation and decommissioning were identified for worst case scenario project parameters.

The greatest effect on marine mammals was considered to be from increased levels of underwater noise during construction activities (associated with piling activities of the wind turbines). The potential effects on marine mammals from underwater noise can be disturbance / displacement and physical injury (i.e. hearing damage). A series of construction scenarios were studied, varying in duration and intensity of works.



Significant short and medium term effects were identified during the construction activities for all species studied, apart from bottlenose dolphins for which no significant effects were predicted (short or long term). Nevertheless no significant long term effects were found as the populations would recover following cessation of piling. Soft start piling will be used to minimise the risk of injury to marine mammals during construction.

Other construction effects assessed include collision risk with vessels and effect upon foraging or social interactions from increased suspended sediment and reduction in prey sources. None of these effects were found to be significant.

Operational effects identified include collision risk with maintenance vessels, stranding due to electromagnetic fields, long term changes in prey availability due to habitat loss and toxic contamination. None of these effects were found to be significant for all marine mammal species assessed.

In addition to soft start piling during construction, designated vessel routes will also be used during construction / decommissioning and operation in order to reduce effects of collision risk and disturbance to marine mammals.

No likely significant effects have been predicted from the construction, operation and decommissioning of the three proposed wind farms on the Moray Firth SAC (designated for bottlenose dolphins) or on the Dornoch Firth and Morrich Moore SAC (designated for harbour seals).

Transmission Infrastructure

The potential effects from the construction, operation and decommissioning of the TI are similar to those assessed for the three proposed wind farms.

Increased levels of underwater noise from construction activities (associated with piling of the OSPs) are considered the key risk for marine mammals during the construction of the TI.

Significant short and medium term effects are considered for most species apart from bottlenose dolphin. However, no long term effects are assessed given the likely recover of population levels after cessation of piling activities.

No other significant effects were identified during the construction, operation and decommissioning of the OfTI.

No likely significant effects have been predicted from the construction, operation and decommissioning of the OfTI on the Moray Firth SAC or on the Dornoch Firth and Morrich Moore SAC.

Whole Project Assessment

The significant effects of the Project as a whole do not exceed those reported for the wind farms or OfTI above. No significant long term effects on marine mammals are predicted as a result of the construction, operation or decommissioning of the Project.

Cumulative Impact Assessment

A detailed cumulative assessment was undertaken with BOWL. Cumulative effects with other developments within and outwith the Moray Firth have also been considered. However, no detailed cumulative assessment was possible for most of the other developments due to insufficient information being available.

Temporary, significant effects on marine mammal receptors from piling noise are predicted during the construction phases of the Project and BOWL, but no cumulative long term population level effects are predicted. No other significant cumulative effects are predicted.

No likely significant cumulative effects (with BOWL) have been predicted on the Moray Firth SAC or on the Dornoch Firth and Morrich Moore SAC.

Ornithology

An assessment of significant effects of the Project on ornithology has been undertaken.

The ornithology resource was characterised through a combination of desk-studies and surveys, including boat based, aerial, migration and seabird tracking surveys.

The Moray Firth area holds internationally important numbers of breeding seabirds and over-wintering waterbirds. Within the vicinity of the Moray Firth there are several sites designated for ornithological receptors, including SPAs, Ramsar sites and SSSIs.

Three Proposed Wind Farms

The effects on birds which may result from the construction, operation and decommissioning of the three proposed wind farms are disturbance, displacement, collision risk and barrier to movement.

Ten key species were considered in the assessment: pink–footed goose, greylag goose, fulmar, gannet, kittiwake, herring gull, great black–backed gull, guillemot, razorbill, and puffin.

The main risk on birds is from disturbance/displacement and collision with turbines during the operation of the three proposed wind farms. The risks were assessed as minor for all the species apart from gannet and herring gull which had moderate collision risk. No significant effects are predicted for any of the species assessed.

Vessel traffic will be along set routes where possible; thus decreasing the risk of disturbance.

No likely significant effects resulting have been predicted from the construction, operation and decommissioning of the three proposed wind farms on key SPAs (20 SPAs assessed).

Transmission Infrastructure

The effects from the construction, operation and decommissioning of the OfTI were assessed for 14 key species: fulmar, gannet, eider, long tailed duck, common scoter, velvet scoter, red-throated diver, great northern diver, kittiwake, herring gull, great black-backed gull, guillemot, razorbill and puffin.

The only likely effects are disturbance during construction and displacement during operation. No significant effects are predicted for any of the bird species assessed.

No likely significant effects have been predicted from the construction, operation and decommissioning of the OfTI on key SPAs.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the wind farms or TI above. Ornithology receptors will not be subject to effects of greater than minor significance (apart from collision risk for gannet and herring gull being assessed as moderate) as a result of the construction, operation or decommissioning of the Project.

Cumulative Impact Assessment

A detailed cumulative assessment was undertaken considering BOWL and the European Offshore Wind Deployment Centre (EOWDC).

Significant cumulative effects from collision risk during the operation of the wind farms were identified for three species: gannet, great black-backed gull and herring gull. No other significant cumulative effects are predicted.

Likely significant cumulative effects have been predicted (with BOWL) on the East Caithness Cliffs SPA due to increased collision risk (moderate-major) on great black-backed gull and herring gull. No other significant effects on SPAs have been predicted.

Intertidal Ecology

An assessment of the likely significant effects of the TI on intertidal ecology (i.e. coastal habitats and communities of plants and animals between the high and low tide marks) has been undertaken.

Information on the intertidal ecology of the area where the transmission export cable will make landfall was acquired through survey of Fraserburgh Beach.

Effects on intertidal ecology are restricted to those resulting from the installation and operation of the export cable at its landfall location.

Transmission Infrastructure

The beach at Fraserburgh is approximately 120 m wide and has a relatively steep profile. It is dominated by mobile sand which is barren and supports few plants or animals. On the upper shore there are patches of exposed bedrock, boulders, cobbles and pebbles with barnacles and winkles. Above the beach is sea defence rock armour. The intertidal ecology of the landfall area is regarded as highly typical and representative of high energy intertidal environments in the UK.

The assessment considered the effects of temporary direct (i.e. resulting from the disturbance of beach sediments during cable installation) and indirect (i.e. resulting from the re-distribution of disturbed beach sediments) habitat disturbance, and of emissions of EMF and heat from the operational export cable. All effects were considered not significant.

There is no potential for whole project or cumulative effects on intertidal ecology.

Terrestrial Ecology

An assessment of significant effects of the Project on terrestrial ecology (i.e. terrestrial and freshwater habitats and associated fauna) has been undertaken.

The terrestrial ecology environment was characterised through a combination of desk studies and field surveys, including breeding bird surveys, habitat surveys, protected species surveys (otter, badger, water vole and red squirrel) and bat roost and habitat suitability surveys.

Key terrestrial ecology receptors include terrestrial breeding birds, coastal wintering birds, 16 habitats and three mammal species / group of species (otter, badger and bats). Sites of nature conservation importance, such as the Loch of Strathbeg SPA, SSSI and Ramsar site, Buchan Ness to Collieston SAC and SPA, Rora Moss SSSI and Waters of Philorth LNR have also been considered in the assessment.

Transmission Infrastructure

The main effects on terrestrial ecology during the installation, operation and decommissioning of the OnTI are associated with habitat loss and disturbance / displacement of key terrestrial and freshwater species. This includes effects on (1) qualifying species at Loch of Strathbeg SPA and SSSI (2) breeding and wintering coastal and terrestrial birds and (3) otter and badger from habitat loss and disturbance/ displacement; effects on breeding and wintering coastal and terrestrial birds from habitat loss and disturbance/ displacement. In addition, effects on habitats and conservation designated sites from pollution, damage and disturbance and the effects from damage to bat habitat were also assessed.

The effects identified are of negligible or minor significance following implementation of standard best practice measures during construction works.

No likely significant effects have been predicted from the construction, operation and decommissioning of the OnTI on the Loch of Strathbeg SPA.

Whole Project Assessment

The assessment of likely significant effects on terrestrial ecology has been undertaken in relation to the installation, operation and decommissioning of the OnTI between the Fraserburgh Beach landfall and the onshore substation(s) location. Offshore wind farm installation, operation and decommissioning will have no effect on terrestrial ecology.

Cumulative Impact Assessment

None of the individual effects on terrestrial ecology and on the Loch of Strahbeg SPA were considered to increase due to potential cumulative effects with other projects and activities within the locale. All of the cumulative effects will remain of minor or negligible significance.

The Human Environment

Commercial Fisheries

The likely significant effects of the proposals on commercial fisheries (that is, any legal fishing activity undertaken for declared taxable profit) have been assessed.

The three proposed wind farm sites are principally located on scallop grounds and, to a lesser extent, squid grounds. There is also a very low level of whitefish (including haddock, monkfish and cod) activity. The sites as a whole record a moderate level of fishing activity compared to grounds elsewhere in the Moray Firth, and relatively low levels of activity on a national scale.

In addition to those described above, commercial fishing activities along the offshore export cable route include *Nephrops*, mackerel (by handline) and static gear fishing (for crab and lobster).

As a result of salmon and sea trout fisheries being either in-river or, to a lesser extent, coastal, it is considered that there will be no direct effects arising from the construction / decommissioning and operation of the three proposed wind farm sites or OfTI. However, changes to the ecology of the species in the offshore marine environment (described under Fish and Shellfish Ecology) could affect coastal and in-river salmon and sea trout fisheries.

Three Proposed Wind Farms

Commercial fisheries

The construction of the three proposed wind farms will result in increasingly restricted access to fishing grounds within the site as the construction phase progresses. It is likely that all installed infrastructure, including turbines and met masts, will have temporary safety zones (up to 500 m) applied around them during construction. It is not considered, however, that inter-array cables will have the same safety zones and the risks associated with fishing in the immediate vicinity of this infrastructure during the construction phase are considered to be outside of acceptable limits. This would result in vessels being excluded from these areas during construction. The residual effect upon commercial fishing activities would be a moderate loss of fishing grounds during the construction phase.

For the purposes of the assessment, it is considered likely that 50 m safety zones will apply to all operating turbines and met masts. Outside of these zones it is considered that vessels will regain access to fishing grounds in the operational wind farms once the appropriate post-construction surveys, and if necessary seabed rectification measures, have been undertaken and the safety risk is subsequently considered acceptable. The degree to which access is regained is, however, dependent upon the final design of the three proposed wind farms and the resulting changes to normal fishing practices. There is therefore an effect of moderate significance arising from complete loss or restricted access to fishing grounds in the operational phase.

MORL will continue to facilitate ongoing dialogue throughout the pre-construction, construction and operational phases of the development, which will continue to address the mitigation options under investigation, as well as to define the protocol for engagement during the construction and operation phases.

Transmission Infrastructure

Commercial fisheries

Consultation with stakeholders with commercial fishing interests assisted in defining the offshore export cable route, with the aim of limiting the effects upon the principal fisheries in the area, and as such many effects have been minimised or avoided through project design.

The assessment of effects has identified significant effects during the construction phase, principally arising from the temporary loss of or restricted access to scallop, squid, *Nephrops*, crab and lobster fishing grounds, and the associated displacement of vessels during this time. A construction management programme will be implemented and will reduce the potential for conflict between static gear fishing vessels and construction vessels, and the effect during the construction phase as a result would be minor.

The effect of the loss or restricted access to fishing grounds in the operational phase will be minor, as a result of the post construction and installation surveys and, if necessary, seabed rectification measures to ensure that fishing activities can safely resume.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the wind farms or OfTI above.

Cumulative Impact Assessment

In conjunction with other projects and activities within the locale, the effects of the Project are assessed to be as described above, with no additional cumulative effects.

Shipping and Navigation

The likely significant effects of the proposals on commercial shipping, recreational and fishing vessels has been assessed. Potential impacts upon Search and Rescue (SAR) issues were also assessed.

Information was gathered through desktop studies, consultation with relevant stakeholders, Hazard Identification workshops and the monitoring of vessels in the area through the use of Automatic Identification Systems (AIS) and radar.

The proposed sites are located in an area of relatively low commercial shipping densities, with the main shipping route (the Pentland Firth route) passing approximately 4 nautical miles north east of the MORL Zone boundary. Fishing vessels were recorded within the proposed sites' boundaries but there was limited recreational vessel activity.

Three Proposed Wind Farms

The three proposed wind farm sites would have minor, insignificant effects on shipping and navigation receptors – commercial ship routing and collision risk during the construction, operation and decommissioning phases, fishing vessel routing and collision risk during the construction, operation and decommissioning phases, recreational vessel routing and collision risk during the construction, operation and decommissioning phases, Search and Rescue and helicopter operations/access during the operational phase of the three wind farms sites and vessels' marine based radar equipment during the operational phase of the three wind farms sites.

Vessels passing through the proposed sites should be able to pre-plan any revised passages in advance of encountering the wind farms and there is available sea room to re-route around turbines.

In terms of Search and Rescue issues, given the relatively low level of incidents in the vicinity of the proposed sites it is considered unlikely that the proposed wind farms will exacerbate maritime safety risks. Giving account to commitments to meet the Maritime Coastguard Agency / Marine Guidance Note 371 and the development of an Emergency Response Cooperation Plan, it is considered that Search and Rescue issues can be well managed, resulting in a minor effect that is unlikely to occur.

Radar interference on marine equipment could be experienced by a small number of commercial vessels (including those routing to Wick) and offshore vessels (associated with the Beatrice and Jacky platforms). However, based on the revised routing, interference is predicted to be low.

During the construction, operation and decommissioning phases of the developments, a number of industry standard mitigation measures will be implemented. These will include marking of wind farm structures, Marine Aids to Navigation and promulgation of information.

Transmission Infrastructure

The OSPs and offshore export cable route will have the following minor, insignificant effects on shipping and navigation receptors - commercial, fishing and recreational ship routing and collision risk during the construction and installation phase, Vessel to Structure (OSP) collision risk during operations for commercial, fishing and recreational routing, commercial and small vessel anchoring and snagging risk during the operational phase and the risk of fishing vessel gear interaction and snagging during the operational phase.

There is a relatively low level of commercial shipping activity along the export cable route and in the vicinity of the OSPs, with a denser volume of traffic transiting to the east of the development. However, given the available sea room, vessels should be able to increase passing distance from installation vessels and associated works.

The Moray Firth provides vessels with anchorages that are sheltered from adverse sea/weather conditions. Anchoring within 10 nm of the export cable route was recorded in Aberdour Bay (mostly smaller offshore/cargo vessels) and north of the Southern Trench (crude oil and shuttle tankers).

The coastal area of Fraserburgh beach is considered to be a higher risk to anchoring vessels, as there is a charted anchorage within Fraserburgh Beach. Provided industry standard mitigation (cable burial/protection) and surveys to monitor burial depth are carried out, the effect on commercial ship anchoring is considered to be minor.

Demersal trawling and scallop dredging was recorded in the area. With the appropriate mitigation in place (cable protection/burial and liaison with the fishing industry) there is not considered to be a significant risk of fishing vessels snagging cables.

Whole Project Assessment

Beyond those described above, there are no additional significant effects predicted on shipping and navigation receptors from the development of the Project as a whole.

Cumulative Impact Assessment

In terms of the Project and BOWL, cumulatively there will be an increased effect on shipping and navigation routing (commercial and non-commercial vessels including fishing and recreational craft). Vessels will be required to deviate around the developments. In addition, there will be a potential increase in the collision risk, where vessels pass around the wind farm sites into busier shipping channels, (i.e. the Pentland Firth route). This increased effect is not, however, assessed to be significant.

With development of the WDA, effects would be anticipated to be the same, due to the size of the development, to those considered within the Whole Project and Navigational Risk Assessments undertaken for the three proposed wind farm sites, with the exception of potential for additional collision risk and encounters associated with vessels transiting to the Beatrice Oil field, leading to an effect of moderate significance.

Military and Civil Aviation

Receptors have been identified and potential effects assessed through desktop studies, consultation with stakeholders and radar propagation modelling.

There are two dominant scenarios that can cause wind turbines to affect aviation interests, either physical obstruction (turbines can present a physical obstruction at or close to an aerodrome or other landing/take-off point) or on radar/air traffic services (turbine clutter appearing on radar display can affect the safe provision of air traffic services as moving turbines can mask unidentified aircraft from the air traffic controller and/or prevent him from accurately identifying aircraft under his control. In some cases, radar reflections from the turbines can affect the performance of the radar system itself).

Various military and civil aviation receptors have been identified, National Air Travel Services En Route Ltd (NERL) - Allanshill Primary Surveillance Radar (PSR) (supporting Civil Air Traffic Control (ATC) and En-route operations), MoD Air Surveillance and Control Systems (ASACS) Buchan Air Defence Radar (ADR) (supporting UK Air Defence operations and training), MoD ATC (Lossiemouth PSR used to provide navigational services to aircraft inbound to and outbound from the airfield, to military aircraft operating over the Moray Firth), Highland and Islands Airports Ltd (HIAL) Wick Airport (regarding potential effects on aircraft flight patterns and procedures), Helicopter Main Routes (HMR X-Ray, used by helicopters transiting between Aberdeen, via Wick to the Atlantic Rim offshore installations west of the Shetland Islands), Helicopter Approach Procedures to offshore platforms and Minimum Safe Altitude, which is the lowest altitude set in areas to ensure separation between aircraft and known obstacles.

Three Proposed Wind Farms

Potentially significant effects have been identified from the operational wind farms on NERL Allandshill and RAF Lossiemouth PSRs, ASACS Buchan ADR, offshore installation helicopter routes and Minimum Safe Altitude.

Various mitigation options are being investigated, in consultation with the relevant stakeholders including National Air Traffic Services (NATS) and the Ministry of Defence, to remove turbine radar returns (e.g. modifications or upgrade to existing radars). Integration of technical solutions will be agreed and implemented prior to construction, ensuring no significant residual effects from the development.

Transmission Infrastructure

At a maximum height of 70 m (230 ft) above Lowest Astronomical Tide (LAT), the OSPs will be lower in height than the projected turbines for the three proposed wind farms. Additionally, subsea and underground cabling and the onshore substation will not affect aviation operations. It is concluded that the proposed infrastructure will not pose a physical obstruction to routine aviation operations in the area and consequently the TI will not pose any negative obstruction effect on aviation activities.

During the commissioning and decommissioning phases of the development, the developer will notify the location and movement and maximum height of significant physical obstructions to NATS Aeronautical Information Service.

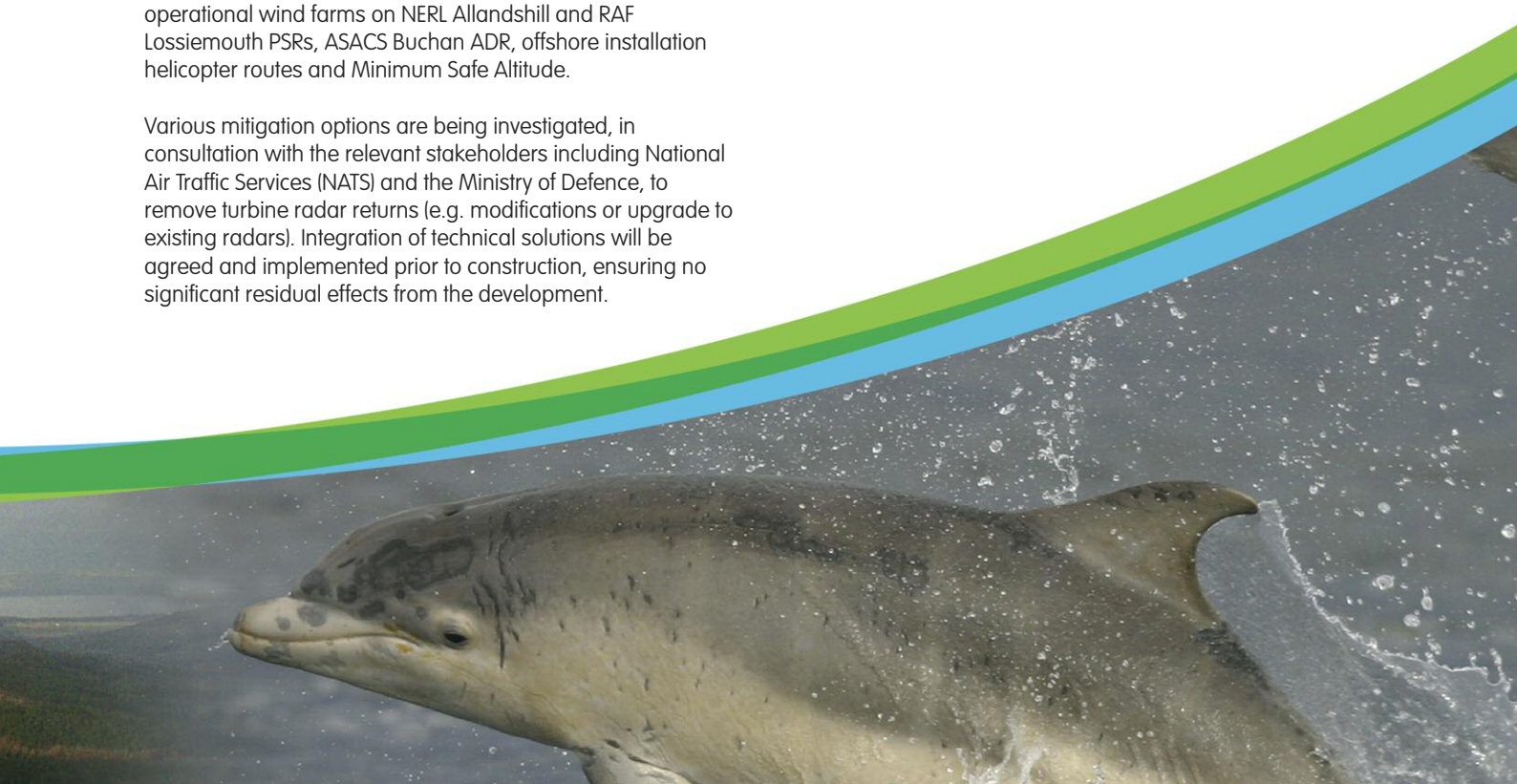
In addition, the static nature of the TI will have no effect on the identified PSR systems. PSR systems can distinguish between moving and static targets: the echoes received from a moving target change in electrical phase between pulses; the Doppler shift. Signal processing techniques within such systems will differentiate between moving and static targets, with the static targets not shown on Air Navigation Service Provider displays.

Whole Project Assessment

In addition to the effects described above, no further or cumulative effects from the Whole Project are predicted.

Cumulative Impact Assessment

In the absence of mitigation, the WDA and BOWL sites will have similar effects upon aviation receptors to those described above. With the implementation of mitigation, as described above, there will be no residual significant effects.



Seascape, Landscape and Visual Receptors

The term Seascape, Landscape and Visual Receptors refers to the landscape and seascape character of the Moray Firth, and the communities of people who experience this environment, the relationships that they have with each other and the physical environment. These receptors have been identified and the potential effects of the development on them have been assessed.

The study included consultation with relevant statutory and non–statutory bodies, detailed desk studies and assessments to establish the baseline conditions within the study area and field studies to inform the baseline.

Three Proposed Wind Farms

The effect of the three proposed wind farm sites is assessed as not significant on landscape/seascape character. Two national seascape units are located within the study area, covering the North Aberdeenshire / Moray Coast and the East Caithness and Sutherland coast. The seascape/landscape assessment has identified that the effect of the proposed development will not be significant on Coastal Character Areas (CCAs) within 50 km of the sites (the study area). The landscape elements of these CCAs will not be physically altered; changes arise principally through visibility, which may indirectly change the way in which the pattern of elements is perceived. The proposed development will introduce distant offshore wind farm development as a characteristic element on the open sea skyline of these CCAs, but the existing key characteristics of these CCAs will continue to provide their defining characteristics.

The effects of the three proposed wind farm sites is assessed as not significant on the landscape designations within the study area, including Gardens and Designed Landscapes (GDLs) and proposed Special Landscape Areas (pSLAs) all of which are located over 34 km from the three proposed wind farm sites.

The assessment of key viewpoints within 50 km of the sites has identified significant effects on some viewpoints located in the closest section of Caithness between Wick and Dunbeath. These viewpoints are located at distances of 22 – 34 km from the three proposed wind farm sites. In good visibility conditions, the threshold at which significant effects diminish is assessed in the region of 30 – 35 km, depending on the specific characteristics of the view. Significant visual effects arise from the closest locations of the Caithness coast as a result of the three proposed wind farm sites appearing to occupy a significant portion of the sea skyline, where it forms a wide horizontal feature in relation to the seascape in the view, in combination with the vertical effect of the turbines being notable due to the absence of any intervening features or landform between the viewpoints on the coastal edge and the development located in open sea. The assessment assumes clear weather and optimum viewing conditions. This means that effects that are assessed to be significant may be not significant under different, less clear conditions. An example montage of the appearance of the wind farms from Lybster, the closest point on the coast to the sites, is provided in NTS Figure 6. It should be noted that when printed in this NTS it does not meet the standard viewing guidance. Images that do meet this standard are contained in the ES, Volume 7.

The viewpoint assessment has identified that the effect of the three proposed wind farm sites will be not significant on more distant viewpoints in Caithness. In these views, the three proposed wind farm sites will be more distant from the coast and located on the skyline within a part of the broad, open sea views. Generally set apart from the visible landform of the coast, the three proposed wind farm sites will form a single, distinct feature in their own right on the skyline, surrounded by open sea.

Transmission Infrastructure

The effect on the Seascape, Landscape and Visual receptors from the OfTI has been assessed as being not significant. During construction and decommissioning the effects will be temporary and will arise from the cable laying vessels and construction equipment.

The majority of the study area for the OnTI will be affected only temporarily by the changes arising during construction of the onshore export cable, however, there may also be limited long term effects that arise as a result of the operation the substation(s)and where losses of vegetation such as trees and hedgerows cannot be mitigated.

Whole Project Assessment

There will be no additional effects of the Whole Project together, other than those described above. During operation, the effects of the OfTI will be from the offshore substation platforms, viewed at long distances offshore in the context of the proposed three offshore wind farm sites. Once operational, the only visible OnTI will be in the vicinity of Peterhead Power Station and as such will not be visible concurrently with the proposed wind farm sites.

Cumulative Impact Assessment

The cumulative assessment of seascape, landscape and visual receptors assesses the additional effect of the three proposed wind farm sites and OSPs in relation to the other wind farms assumed to be part of the landscape in three scenarios: operation, consented and application stage.

In general, the potential for cumulative effects is limited by the location of the three proposed wind farm sites and OSPs, which are visually separate from onshore wind farms, such that onshore and offshore wind farms are rarely seen in combination in the same portion of view.

The three proposed wind farm sites and OSPs are located largely behind BOWL, which limits the cumulative influence and prominence of the three proposed wind farm sites and OSPs. Although the three proposed wind farms sites increase the density of turbines visible in the array in combination with BOWL, the cumulative effect of BOWL with the three proposed wind farm sites and OSPs is similar to BOWL alone, with the exception of a limited area of Caithness around Dunbeath and Berriedale, where the three proposed wind farm sites increase the extent of the developed skyline in relation to BOWL and are considered significant.

The cumulative effect of the Project in addition to the WDA is generally to increase the horizontal extent of turbines on the developed horizon, either forming a connecting extension to the EDA or a separate wind farm feature on the skyline, viewed at the southern end of the wind farm from Caithness, and the western side of the wind farm from Moray and Aberdeenshire. The cumulative effect of the Project in addition to the WDA is assessed as significant from receptors over a limited part of the southern Caithness coastline in the study area, but of an equal or lower magnitude/significance from the northern parts of Caithness (north of Wick), and from Moray and Aberdeenshire.

NTS Figure 6 - Photomontage (Viewpoint 7, Lybster)

Photomontage view showing the proposed development Distance to nearest turbine: 26.88 km (Stevenson) Camera: Canon EOS 5D Mark II

Important

This photomontage has been reproduced in the NTS at a different scale to the original. To match to the standard viewing guidance, please refer to the ES, Volume 7 where it is reproduced to scale.

Focal Length: 50mm | Horizontal Field of View: 72 degrees | Camera Height: 1.5m | Date: 08/09/11 | Time: 16:56

Archaeology and Visual Receptors

An assessment of the likely significant effects of the Project on archaeological sites and features has been undertaken.

The archaeological resource in and around the Project area has been characterised based upon desk-based review of existing data, archaeological assessment of offshore seabed survey data, and a walkover survey of the OnTI survey area.

The assessment draws upon established methods and guidance in addition to information and feedback gathered during consultation.

Three Proposed Wind Farms

On the seabed within the wind farm sites are several wrecks in addition to a number of seabed features of archaeological potential that have been identified following analysis of seabed survey data. There is further potential for the discovery of previously unrecorded archaeological sites and features within the wind farm sites.

The assessment has considered a range of direct (e.g. damage to archaeological sites and features) and indirect (e.g. burial of sites and features as a result of the re-distribution of disturbed seabed sediments) effects on archaeology resulting from wind farm construction, operation and decommissioning. Known and potential sites and features of archaeological importance/potential within the wind farm sites will be avoided during wind farm construction and furnished with individual exclusion zones. In order to mitigate against effects upon previously unrecorded archaeological sites and features, a protocol to manage unexpected archaeological discoveries will be put in place by MORL. All post-mitigation effects will be of negligible significance.

The likely significant effects of the wind farms on the 'setting' of onshore archaeological sites and features have also been assessed. The visibility of the wind turbines is predicted to result in a negligible effect on the cultural significance of sites and features.

Transmission Infrastructure

On the seabed within the OfTI study area several wrecks and a number of seabed features of archaeological potential have been identified following analysis of seabed survey data. There is further potential for the discovery of previously unrecorded archaeological sites and features within the areas of seabed taken up by the OfTI. All post-mitigation effects on offshore archaeological sites and features will be of negligible significance.

A desk-based assessment and walkover survey of the onshore cable route from Fraserburgh to Boddam and the potential site(s) of the substation have identified three scheduled monuments and a number of listed buildings. There is further potential for the discovery of previously unrecorded archaeological sites and features. Onshore development will avoid all recorded cultural heritage sites and features where possible. Where effects upon sites and features cannot be avoided, a programme of work has been developed by MORL to allow the preservation by record of assets. All post-mitigation effects will be either not significant or of negligible significance.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the three proposed wind farms or TI above. Archaeology receptors will not be subject to effects of greater than negligible significance as a result of the construction, operation or decommissioning of the Project.

Cumulative Impact Assessment

In conjunction with other projects and activities within the locale, the Project will only have negligible cumulative effects on archaeological sites and features.

Socio-Economic, Recreation and Tourism

An assessment of likely significant effects of the Project on socio-economics, recreation and tourism has been undertaken.

The study area, defined as covering the Moray, Highlands, Aberdeenshire and Aberdeen City local authority areas, was characterised through a desk-study using economic (including employment and gross value added (GVA)[2]); social indicators (such as population, house prices, education and deprivation); and tourism indicators including levels of activity and profile of visitors.

Three Proposed Wind Farms

The socio-economic effects that were assessed for the three proposed wind farms are the amount of employment and GVA that would be supported as a result of expenditure on the construction, operation and decommissioning of the three proposed wind farms and the effect on the levels of leisure and business tourism and other recreational activities (surfing, sea-kayaking and walking) in the study area.

Given that many important design and procurement decisions have not been made to date there is a wide range of potential effects that depend upon who the successful contractors might be or where they might be based. The assessment is based on MORL's estimates of how much expenditure would be made and where, under Base and High scenarios. The Base case considers the total value of contracts that have been delivered, or are expected to be delivered, from within each geography, assuming the current supply chain. The High case estimates the total value of contracts that could be secured by firms based in Scotland (and the Study Area) with a stronger supply chain. This assumes that some Scottish-based firms that are not currently in a position to tender for work (but there is good reason to expect them to be in the future) could secure contracts.

In Scotland, the analysis suggests that the three proposed wind farms would support between 978 and 2,641 jobs in the peak year during construction and during the operations phase this would be between 245 and 400 jobs, including indirect employment (see Table below). The operations phase jobs mentioned below include wind farm and TI as it is difficult to separate the jobs associated with maintaining the three proposed wind farms and the TI.

Construction and operational employment effects summary

		Direct	Indirect + induced	Total
Construction phase (peak employment)				
Study area	Base Case	155	99	254
	High Case	1,024	577	1,601
Scotland (including study area)	Base Case	530	448	978
	High Case	1,569	1,072	2,641
Operations phase (peak employment)				
Study area	Base Case	92	74	166
	High Case	148	119	267
Scotland (including study area)	Base Case	136	109	245
	High Case	231	169	400

[2] Gross Value Added is defined by the Office for National Statistics as "the difference between output and intermediate consumption for any given sector/industry. That is the difference between the value of goods and services produced and the cost of raw materials and other inputs which are used up in production."

The tourism assessment is based on literature, the visual assessment and estimates of the number of visitors to the area. The literature concludes that while a significant minority of tourists prefer landscapes without wind farms, only a very small group changed their intentions about revisiting an area or Scotland. Coupled with the relatively small number of tourists that would be staying within sight of the three proposed wind farms, the effects on tourism are considered to be minor. A second source of effect is the sensitivity of visitors attracted to watch the marine wildlife and specifically dolphins. The Marine Mammals Assessment indicates that although there may be some short term displacement during construction, this is not significant in the longer term and would not noticeably reduce opportunities for marine wildlife watching.

No mitigation measures are proposed as no significant negative effects are predicted. In order to assist in maximising the potential local content through the development of the local supply chain MORL is already working with the Scottish Government Energy Division, Highlands and Islands Enterprise (HIE) and Scottish Enterprise (SE) to develop a 'pilot' scheme to enable HIE and SE to access appropriate parts of the Project's procurement process.

The pilot will take the form of frequent and regular engagement between MORL and HIE/SE. Although in its early stages, the intention is to allow partnership working between the public and private sector to facilitate the optimisation of support to the supply chain. The information provided by MORL is intended to allow the agencies which translate new markets into growth and prosperity to optimise their efficiency, effectiveness and success, with due respect to commercial confidentiality and commercial sensitivity.

Transmission Infrastructure

The socio-economic effect of the TI is limited to the employment and GVA associated with the expenditure on the supply and installation of the OSPs, export cables, and of the onshore substation(s). Because there is considered to be no significant visual effect of the TI in addition to that from the three proposed wind farm sites, any effect on tourism or recreation would come from the closure or diversion of access to tourism assets during construction.

For the study area, defined as the Highland, Moray, Aberdeenshire and Aberdeen City Local Authority areas, the total number of jobs supported at its peak is anticipated to be 300 and in Scotland between 495 and 590 during construction. This employment is relatively short term lasting over three years. Operational employment effects have been assessed within the three proposed wind farms assessment.

Construction employment summary for the TI

		Direct	Indirect + induced	Total
Construction phase (peak employment in 2015)				
Study area	Base Case	196	107	303
	High Case	207	113	320
Scotland (including study area)	Base Case	300	195	495
	High Case	352	237	590

Construction employment effects summary for the TI

During construction the employment and GVA effects are considered to be major positive, while there is a minor, negative effect on recreation, through temporary disruption close to the shore at Fraserburgh and during the installation of the export cables. During operation and decommissioning the effects are considered to be negligible.

Whole Project Assessment

Despite additive effects on job numbers and GVA being predicted for the wind farms and TI, the overall likely significant effects of the Project as a whole do not exceed those reported for the wind farms or TI above.

Cumulative Impact Assessment

In relation to the employment and GVA cumulative effects, timing and the supply chain are important, given not just considering cumulative effects with BOWL but also North Sea oil and gas activities, and other major proposed renewable energy projects. The cumulative effects of the expenditure (with BOWL) is assessed as having a major positive effect on social and economic conditions within the Study Area (defined as Highlands, Moray, Aberdeenshire and Aberdeen City Local Authority areas) and creating opportunities for employment across Scotland.

For tourism, while the cumulative effect of the Project and BOWL will be greater than the Project would be on its own, there is likely to be a diminishing marginal loss of value. The negative effect "per turbine" is lower for the combined wind farms (with BOWL) than for the three proposed wind farms (without BOWL). So arguably the attribution of any negative effects to these wind farms would be reduced. In practice, the cumulative effect has a greater visual impact, and this could be reflected in a minor reduction in tourism activity. The cumulative effect would be of minor significance.

Other Human Activities

An assessment of the likely significant effects of the Project on other human activities (with marine components) has been undertaken.

The assessment draws upon information and feedback gathered during consultation with other operators in the Moray Firth, and a desk-based assessment of the potential for unexploded ordnance (i.e. munitions and explosives) to occur within the three proposed wind farm sites.

Three Proposed Wind Farms

A number of operators have existing and potential interests and/or infrastructure that overlap with or are in close proximity to the wind farm sites. These include existing and proposed offshore wind farm projects, abandoned oil exploration wells, oil and gas exploration licences, and military practice and exercise areas. In addition, there is potential for unexploded ordnance to be present on and in the seabed within the wind farm sites.

The assessment has confirmed that wind farm construction, operation and decommissioning will have no significant effect on the majority of other human activities.

An exception to this is the potential for wind farm construction works and operational structures to exclude future oil exploration activities (e.g. seismic survey) within licensed blocks that overlap with the wind farm sites. MORL has initiated communication with the oil operators that may be affected, but their exploration plans remain unknown. Taking a precautionary approach and assuming that licence holders will wish to explore the licensed areas that overlap with the wind farm sites, effects of up to moderate adverse significance are reported. MORL is committed to ongoing consultation with oil and gas licence holders, aiming for co-existence where achievable.

MORL is also committed to a suite of standard industry measures to minimise risk from unexploded ordnance, including a pre-construction ordnance seabed survey. The risk associated with unexploded ordnance is therefore not significant.

Transmission Infrastructure

The assessment has confirmed that wind farm construction, operation and decommissioning will have no significant effect on the majority of other human activities.

There is potential for OfTI construction works and operational structures to exclude future oil exploration activities from limited areas within the licensed blocks that overlap with the OSPs and export cable. Effects of up to minor adverse significance are reported.

The transmission export cable will need to cross an existing subsea cable en route from the wind farms to the landfall at Fraserburgh Beach. Therefore, in addition to the mitigation measures described for the wind farms, MORL will establish and adhere to cable crossing and proximity agreements with the cable operator.

Whole Project Assessment

The likely significant effects of the Project as a whole do not exceed those reported for the wind farms or OfTI above. Other human activities will not be subject to effects of greater than moderate significance as a result of the construction, operation or decommissioning of the Project.

Cumulative Impact Assessment

In conjunction with other projects and activities within the locale, the Project will have up to moderate adverse cumulative effects in relation to the potential for exclusion of oil and gas exploration activities in licensed areas. Cumulative effects on all other human activities are considered not to be significant.

Traffic and Transport

Potential effects on traffic and transport from the construction and operation of the onshore aspects of the TI have been assessed, and comprised consultation with relevant statutory bodies, detailed desk study and accompanying field survey to establish baseline conditions and consideration of the relevant key legislative and planning information.

The assessment considered the following major and minor roads (A90 trunk, A950 non-trunk, A952 non-trunk and several B and C roads).

Three Proposed Wind Farms

The traffic and transportation associated with the construction of the offshore wind farms and OfTI has not been considered within this assessment due to the uncertainty of which port will be utilised during construction and the method of transportation for the offshore elements. It is likely that this will be assessed once a port(s) is selected.

Transmission Infrastructure

The effects on traffic and transport that were assessed for the OnTI included increase in the movements of Heavy Goods Vehicles; road safety effects; vehicle delays due to increase in traffic; effects on pedestrians and degradation of the highway structure.

With standard mitigation in place, no significant effects on traffic and transport are predicted. Mitigation includes the traffic utilising approved access routes, a traffic management plan and a condition survey of the access. In addition, suitable diversions will be implemented around works where necessary and works will be timed to avoid peak traffic periods.

Continuous monitoring during construction is not necessary, however, the Traffic Management Plan will ensure that frequent inspections are carried out to confirm that agreed mitigation measures as stated above are being implemented.

Cumulative Impact Assessment

No significant cumulative effects are predicted from the traffic and transport associated with the construction, operation or decommissioning of the OnTI.

Further Information

The ES will be available to view at the following locations:

- The Highland Council,
  Planning Office, Glenurquart Road, Inverness, IV3 5NX
- Caithness Planning Office,
  Market Square, Wick, KW1 4AB
- Moray Council, Planning Office,
  High Street, Elgin, IV30 1BX
- Peterhead Planning Office,
  Aberdeenshire Council, Arbuthnot House,
  Peterhead, AB42 1DA
- Helmsdale Library and Service Point,
  Dunrobin Street, Helmsdale, KW8 6JX
- Buckie Library,
  Cluny place, Buckie, AB56 1HB
- Golspie Service Point,
  Olsen House, Main Street, Golspie, KW10 6RA
- Brora Library,
  Gower Street, Brora, Highland, KW9 6PD

The Environmental Statement can also be viewed at the Scottish Government Library at Victoria Quay, Edinburgh, EH6 6QQ.

Copies of the Environmental Statement may be obtained from MORL (Tel: 0131 556 7602, Email: info@morayoffshorerenewables.co.uk) at a charge of £350 or on CD for £10 (including p&p). Further copies of this Non-Technical Summary may be obtained free of charge from MORL.

The ES is also available to download online at **www.morayoffshorerenewables.com**

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