



FORTHWIND OFFSHORE WIND DEMONSTRATION PROJECT

Environmental Scoping Request

Prepared by Cierco Ltd

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EXECUTIVE SUMMARY

In December 2016 Forthwind Ltd secured a Marine Licence and Section 36 (S36) from Scottish Ministers for the installation and operation of two demonstration offshore wind turbines sited approximately 1.5km from the coast of Methil.

Forthwind Ltd are seeking a new consent to reflect recent changes in both the offshore wind industry and wind turbine technology. The purpose of the original Forthwind Offshore Wind Demonstration Project will remain the same, i.e., to provide a facility *“to demonstrate a new model of offshore wind turbine, which will be used to generate clean electricity from a renewable source of energy, the wind”*.

Forthwind have secured the necessary seabed lease rights from the Crown Estate Scotland. The project will enable the new turbine technology to validate the following:

- Turbine performance.
- Turbine load simulation models.
- Turbine assembly processes.
- Offshore installation processes.
- Validation of the tooling and equipment specifically designed for the turbine.
- Development of the turbine supply chain (local and international); and
- Maintenance and servicing arrangements.

The Development proposed by Forthwind within this scoping document is broadly similar in terms of location and most aspects of the design envelope previously presented in the original application for the 2016 consented project. However, the turbine is different to the 2B Energy design provisioned in the original consent. The new technology is visually similar to a ‘conventional’ offshore wind turbine, although it is technically different (it is larger, has a higher generation capacity and has a different internal technical design).

The turbine design consists of a three bladed upwind horizontal axis wind turbine with a rotor diameter of up to 255 meters. The turbine rotor and nacelle are mounted on top of a tubular steel tower with a hub height of 156 m above Highest Astronomical Tide (HAT).

This scoping report contains details of the proposed project envelope along with site characterisation information currently available. This scoping report was originally submitted in 2019 with the resultant Marine Scotland scoping opinion being published in November 2019. As the scoping opinion was ‘valid’ for a period of 12 months. In December 2020 Forthwind sought clarification from Marine Scotland whether the scoping opinion required updating as a consent application had not been submitted by then. Marine Scotland confirmed in February 2021 that it required Forthwind to re-submit the scoping request to update the scoping opinion.

This updated scoping report identifies potential impacts that will be studied in the Environmental Impact Assessment (EIA) Report, provides further information/clarifications previously requested by stakeholders on the previous scoping report and identifies those impacts that can be scoped out and why. It proposes the studies to inform the EIA process and outlines a proposed stakeholder engagement strategy.

1. INTRODUCTION

1.1. Background

This scoping report has been prepared by Cierco Ltd on behalf of Forthwind Ltd in respect to a proposal to develop an offshore wind demonstration project on the northern shore of the Firth of Forth at Methil, Scotland. The project, known as the Forthwind Offshore Wind Demonstration Project (hereafter referred to as ‘the Development’), will consist of the installation and operation of a single demonstration turbine (i.e., new prototype or ‘pre-commercial series 0’ turbines not currently offered in the marketplace) connected back to shore to a substation located at the Fife Energy Park. The turbine is approximately 1.5km seaward of the mean high-water springs (MHWS) and the entire development will be capable of producing up to 20 megawatts (MW) of renewable electricity. Forthwind has secured a test and demonstration seabed lease agreement with the Crown Estate Scotland for the development.

It is intended that this Scoping Report will be followed by a new application for consent for the Development. As the Development generating capacity is in excess of 1MW, it requires Scottish Ministers’ consent under Section 36 of the Electricity Act 1989 (S36 Consent) to allow its construction and operation. Under the Marine (Scotland) Act 2010, the Development will also require Marine Licence(s) granted by the Scottish Ministers to allow for the construction and deposit of substances and structures in the sea and on the seabed.

The S36 and Marine Licence applications will be accompanied by an Environmental Impact Assessment Report (‘EIA Report’), as required by the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). The EIA Report will detail the outcomes of the Environmental Impact Assessment (EIA) for the project.

The application and EIA report will provide due consideration to the UK Marine Policy Statement, Scotland’s National Marine Plan (“NMP”), Scottish Planning Policy other relevant Policy and National Policy Planning Guidance, Planning Advice Notes, Fife Councils Development Plans and any relevant supplementary guidance.

This document is the Development EIA Scoping Report (‘the Scoping Report’) prepared in compliance with the 2017 regulations stated above to support a request to the Scottish Ministers to provide an opinion as to the scope of the information to be provided within the Development EIA (‘the Scoping Opinion’) to accompany the S36 and Marine Licence applications.

The scope of the EIA Report will be informed by the responses from the statutory and non-statutory consultees to this scoping report, set out in the Scoping Opinion provided by the Scottish Ministers. Forthwind intend to submit the EIA Report in support of the S36 and Marine Licence application in October 2021.

1.2. The Developer

Forthwind Ltd is the developer of the Forthwind Offshore Wind Demonstration Project. Forthwind Ltd is a fully owned subsidiary of Cierco Ltd, specifically established to develop the Development. Cierco Ltd is a Scottish renewable energy development company based in Aberdour established with the aim to facilitate the commercialisation of new marine renewable energy technologies into the marketplace.

Forthwind Ltd currently holds a S36 consent and a Marine Licence at the same location, granted in December 2016, for the development of a two-turbine array with a total capacity of 30MW (updated in June 2019). Since the consent award, several factors have emerged to make Forthwind re-evaluate the consented project envelope and identify the need to submit a new application for a revised project.

1.3. The Existing Forthwind Consent

In July 2015 Forthwind Ltd sought a Marine Licence and Section 36 (S36) from Scottish Ministers for the installation and operation of two demonstration offshore wind turbines, nominally rated at 9MW each and sited approximately 1.5km from the coast of Methil. The turbines intended to be deployed were of the 2B Energy design; a 2 bladed wind turbine based on a lattice tower that extended down to the seabed. The Marine Licence and Section 36 applications were approved by the Scottish government in December 2016.

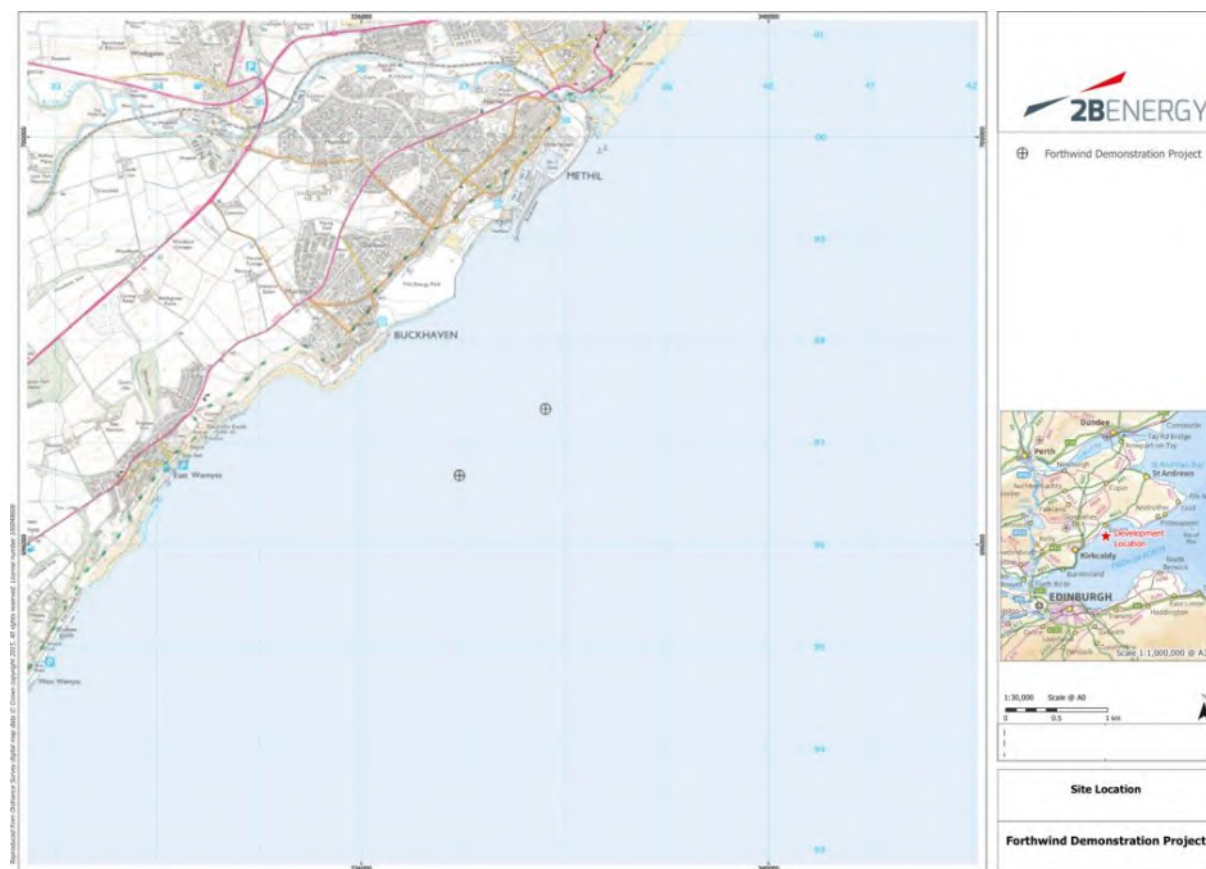


Figure 1 - Original Consented Forthwind Offshore Wind Demonstration Project Layout

Following consent Forthwind entered due diligence negotiations with project investors to secure project finance. The financial case was based on securing the offshore demonstration Renewable Obligation Certificates (ROC's) which required installation and export of electricity by 30 September 2018. Ultimately, due to time constraints, the project was unable to secure the required investment to develop the project before the ROC qualification period ended.

Forthwind Ltd are now seeking a new consent to replace the existing consent, in the same location, to reflect recent changes in both the offshore wind industry and wind turbine technology. The purpose of the original Forthwind Offshore Wind Demonstration Project will remain the same, i.e., to provide a facility "to demonstrate a new model of offshore wind turbine, which will be used to generate clean electricity from a renewable source of energy, the wind".

The Development proposed by Forthwind is broadly similar in most aspects of the previously consented design envelope. However, the turbine is different to the 2B Energy design provisioned in the original consent. The new technology is visually similar to a ‘conventional’ offshore wind turbine, although it is technically different (it is larger, has a higher generation capacity and has a different internal technical design).

1.4. The Need and Purpose of the Proposed Development

1.4.1. Need for Turbine Demonstration

Offshore wind technology has witnessed significant advances over the last 6 years since the original Forthwind application in July 2015; when it was considered that a wind turbine capacity between 6 to 9 MW was at the cutting edge of technology demonstration. However, by 2017, through incremental efficiencies in technology design, the average capacity of new offshore wind turbines installed was 5.9MW (a 23% increase on 2016) and now turbine technologies providing 15 MW will soon be commercially available on the market.

The increase of turbine size has been enabled through small changes to the industry standard 5-6 MW turbine platform introduced in 2005. The small steps in evolution have been based upon years of industry learning and experience in rotor control, load reductions and the emergence of a mature supply chain. This experience has allowed the industry to ‘stretch’ the turbine platform in both generator capacity and rotor diameters to enable 6MW turbines to become 8+MW and 7MW to become 10MW through gradual processes.

1.4.2. New turbine class – going forward.

The recent introduction of the very first 12 MW turbine now forms the start of a new “stretch” process for a new class of wind turbine platform. The new class of turbine has a substantially larger rotor surface from the current MHI V164 10MW of 21,113 sqm to the GE Haliade X turbine in Rotterdam at 37,994 sqm - an increase of 80%. This rotor size increase is a significant, unprecedented leap from an engineering standpoint. In the same fashion as the earlier “stretching processes”, a new period of optimisation to reach the ideal cost of energy of this brand-new turbine platform. The process requires following an established certification assessment process and validation, consisting of checks and confirmations through multiple steps in the design, manufacture, installation, and operations process to confirm technology optimum performance. This process is exemplified by the MHI V164 turbine evolution, starting at 7MW, but after validation and assessments, the platform went from 7MW to 8.3MW, thereafter to 9MW, followed by 9.5MW and today the 10MW capacity. The achievement would not have been possible without the necessary demonstration deployments, measurements, and validation.

The industry is now at a point in technology development, given the new turbine size, where the stakes are substantially higher and the need for this same process is key to optimize the respective platforms and lower the cost of energy. As a result, the significance of wind turbine demonstration is greater than it has ever been before, given the considerations below:

- The first 12MW prototype wind turbine was deployed in Rotterdam and has undergone its first stage validation, establishing the understanding of the fundamental benchmark of the design optimization for the next generation of larger capacity turbines.

- The new turbine class has component weights and dimensions that have gone beyond the capacities of onshore testing facilities, leaving offshore demonstration as the only remaining option.
- The proposed turbine for the Forthwind project represents an even greater upgrade, with a 26% increase in rotor length than the 220m GE Haliade X turbine in Rotterdam.
- The proposed technology represents a “stretching” of the rated capacity from the current established 12MW turbines, navigating within a specific but optimized design envelope. This is made possible by understanding the controller functions and responses through real operation and validation, which is necessary to explore the full use of the design.
- A key element for wind turbine rotor development is the establishment of new and ground-breaking blade fabrication process where carbon content can be introduced without the traditional area of stress concentrations. This opens up the design for lighter, stronger and larger blades and the first iteration of this process will be demonstrated in the Forthwind project.

1.4.3. *Current Turbine Demonstration Requirements*

The next generation turbine platform design can be described as more of a technology leap rather than an incremental design step. Going from 164m - 175m rotors to 255m, is significant and dramatic. This fundamental re-design raises new challenges in offshore installation, internal turbine engineering and nacelle layout, performance, wear and tear, maintenance and operation and turbine behaviour. The design requires the technology provider to address issues that have been far outside the established offshore wind industry “know how” on many aspects of design, now advancing with solutions for bolt connections, blade manufacturing techniques etc. In this regard, a key area is blade fabrication and use of various glass materials like polyester, e-glass or epoxy-based designs, now integrating the stronger carbon in new ways.

As a result, this next generation turbine platform, requires the demonstration of the technology in an environment where it is expected to be installed and operated commercially. The Forthwind project accordingly becomes the very cutting-edge project of significance, where the absolute latest technologies and solutions will be tested in a unique environment with accessibility and ideal conditions to mitigate various risks.

1.4.4. *Purpose of the Development*

The purpose of the original Forthwind Offshore Wind Demonstration Project consented in December 2016, as described in its consent application and Environment Statement, was to provide a facility “to demonstrate a new model of offshore wind turbine, which will be used to generate clean electricity from a renewable source of energy, the wind”.

The development reasoning remains the same, in that the project will demonstrate a new model offshore wind turbine technology, not currently available for commercial sale, just offshore Methil to validate the technical and operational abilities of the technology. The commitment to demonstrating new technology in the project, as opposed to commercially deployed technology, is reinforced by the restrictions within the Forthwind seabed Agreement for Lease granted by the Crown Estate Scotland specifically for Technology Demonstration. The lease restricts Forthwind to only deploying offshore wind technology for demonstration purposes which is defined within the lease as:

“Demonstration Purposes means demonstrating prototype or series 0 wind turbines and/or novel foundation types and/or the demonstration of technologies and techniques (which have achieved a

technology readiness level of between 5 and 9 at the time of intended demonstration as such technology readiness levels are defined in the UK Environmental Transformation Fund Strategy published by the Department for Environment, Food and Rural Affairs, and the Department for Business, Enterprise and Regulatory Reform and a copy of which technology readiness levels are included in Schedule Part 10 (Technology Readiness Levels) that have not previously been deployed commercially and that are intended to reduce the levelized cost of energy of offshore wind generation.”

The Crown Estate Scotland recently evaluated the appropriateness of the proposal as a Test and Demonstration project as part of their decision to extend the Forthwind lease. The review resulted in Forthwind securing the required lease extension from the Crown Estate Scotland. In addition, any change to the nature of the technology intended to be deployed on the site cannot happen without prior approval from the Crown Estate Scotland under the terms of the lease.

Specifically, this project will enable the turbine technology to validate the following:

- Turbine and rotor performance.
- Turbine and rotor load simulation models.
- Rotor manufacturing process.
- Turbine assembly processes.
- Offshore installation processes.
- Validation of the tooling and equipment specifically designed for the turbine.
- Development of the turbine supply chain (local and international).
- Maintenance and servicing arrangements.

1.5. Proposed Changes to the Design Envelope

The main physical differences between the current Forthwind consented project and this revised proposal are as follows:

Table 1 - Design Envelope - Consented compared to New Proposed Parameters

Design Element	Parameter	2016 Consented Parameters	New 2021 Proposed Parameter
Turbine	Project Rated Capacity	Up to 18MW	Up to 20 MW
	No of turbines	2	1
	No of blades per turbine	2	3
	Max hub height (m above LAT)	121m	156m
	Max rotor tip height (m above LAT)	198.5m	280m
	Max rotor diameter	172m (155m*)	255m
	Min. blade clearance to HAT	25m**	25m
	Max blade swept area (per turbine)	18,869 m ² *	45,244 m ²
	Colour Scheme	Not defined	Not defined
	Location (British National Grid)	Turbine 1: 336964E; 696677N Turbine 2: 337812E; 697333N	Turbine 1: 337812E; 697333N

Design Element	Parameter	2016 Consented Parameters	New 2021 Proposed Parameter
Foundations	Foundation Type	3 pin piles or suction bucket	4 pin piles or monopile
Meteorological Mast	No. of Met Mast	-	1
	Height	-	160m
	Location (British National Grid)	-	337106E; 696948N
	Foundation	-	4 pin piles or gravity base
	Duration (from Commissioning)	-	5 years
Permanent Deposits	Steel/Iron (per turbine)	292 tonnes	292 tonnes
	Concrete (pile grout)	472 m ³	632 m ³
	Armour stone (450 mm size range)	2,317 m ³	3,088 m ³
	Concrete bags/Mattresses	16,480 m ³	As consented
	Export Cable	1,800 m (each)	One cable 1,800 m
Duration	From commissioning	20 years	25 years

**Defined in CRM of HRA Addendum **Defined in the ES*

These changes are discussed in more detail in Chapter 4 Project Description. All changes proposed have the potential to affect only the offshore aspects of the Forthwind consent and the new application is not expected to exceed any aspect identified in the onshore project envelope proposed previously in the original EIA and subsequently provided for within deemed planning consent. Therefore, it is proposed that all onshore aspects are scoped out of EIA report and that the existing deemed outline planning permission previously granted by the section 36 consent is carried forward into the new consent, should it be granted. This includes all compliance conditions associated with the installation of the onshore infrastructure.

1.6. Regulatory Framework

Forthwind Ltd have established through correspondence and discussion with Marine Scotland (clarification request to Marine Scotland, August 2018¹ and Variation screening request, October 2018²) that the proposed increase in turbine size is fundamentally different in terms of character and scale from that already consented and would constitute a change in the design envelope for the consented Forthwind project

As a consequence, to accommodate the revised project and turbine characteristics, Forthwind will submit a new Marine Licence application under the Marine (Scotland) Act 2010 and a new Section 36 consent application under the Electricity Act 1989 to replace the existing consent (as varied).

It has also been determined that an EIA is required under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000 (“the 2000 EIA Regulations”) and the Marine Works (Environmental Impact Assessment) Regulations 2017 to assess the impacts of the proposed design changes on the environment.

In addition to the relevant EIA legislation, the proposed wind farm consent application will also be required to comply with The Habitats Directive (Council Directive 92 / 43 / EEC) as transposed into UK law by the Conservation (Natural Habitats &c) Regulations 1994, as amended (Habitat Regulations)

¹ http://marine.gov.scot/sites/default/files/original_variation_-_scottish_ministers_decision_redacted.pdf

² http://marine.gov.scot/sites/default/files/forthwind_-_variation_-_amended_-_screening_opinion_redacted_0.pdf

and the Offshore Marine Conservation (Natural Habitats &c) Regulations 2007, as amended (Offshore Marine Regulations) with regard to carrying out a Habitat Regulations Appraisal (HRA) for the proposed wind farm consent application.

2. APPROACH TO SCOPING

2.1. Introduction

This chapter sets out the approach to scoping, in relation to the Project Environmental Impact Assessment, the cumulative impact assessment and the anticipated consultation process.

2.2. The Approach to Scoping of the Project

The project being put forward is broadly similar in relation to the location and most aspects of the design to the original project consented in December 2016. The Scoping Report uses environmental baseline information gathered as part of the original Environment Statement (submitted 06 July 2015) and HRA Addendum (April 2016) prepared for the original consented Forthwind Offshore Wind Demonstration project, and consists of:

- Volume 1: Environment Statement
- Volume 2: Figures and Visualisations; and
- Volume 3: Technical Appendices
- The Habitats Regulations Appraisal Addendum – Ornithology, submitted in March 2016

These documents can be accessed from the Scottish Government website at:

<http://www.gov.scot/Topics/marine/Licensing/marine/scoping/FW-Methil>

Since the original Environmental Statement significant additional existing data and knowledge on the environmental baseline characteristics of the development have been acquired through site specific surveys, technical studies and data gathering to supplement work performed for the original 2015 application, which are still relevant to inform the scoping of this revised project proposal.

In addition, some of the development design parameters between the consented Forthwind project and the revised proposed development are the same (for example the onshore infrastructure) and as a result have already been thoroughly assessed. Where these similar parameters exist, and the outcomes of assessment considered by the Scottish Ministers in the determination of the consented development, it will be suggested that they are scoped out of the EIA process. As such, it is Forthwind's intention to maximise, where appropriate, the use of existing data and the previous impact assessment in order to:

- (a) Characterise the baseline environment to inform the EIA, where data is sufficient, and it is appropriate to do so.
- (b) Scope out impact where there is clear justification for doing so; and
- (c) Where impacts are scoped in, to use the existing information, where appropriate, in preparing the development EIA.

The approach is intended to focus the Development EIA Report on those potential impacts that are likely to give rise to significant effects (or where significant uncertainty exists in relation to the validity of the previous assessments) and thereby avoid revisiting assessments where the conclusions reached previously in the Original ES and Addendum demonstrate that significant effects would not occur.

2.3. Scoping Report

This scoping report has been prepared as part of a formal request for an opinion on the scope of the Environmental Impact Assessment (EIA) required to support applications for a new Section 36 Consent and Marine Licence for the proposed Forthwind Offshore Wind Demonstration Turbine.

This scoping report represents a key early stage of the EIA process and is designed to provide a structure for consultation on the approach to the EIA and the content of the EIA Report. It provides details of the baseline environmental information, key issues anticipated and outlines methodologies (including the content and extent of consideration) for the various technical assessments.

2.4. Approach to Scoping of Cumulative Impacts

Assessment of cumulative effects forms part of the EIA process. This Scoping Report aims to confirm the scope of the Cumulative Impact Assessment (CIA) to be considered in the Development EIA Report.

Fundamental to scoping of the CIA is agreement of the list of plans, projects and activities to be considered alongside the Project. Appendix E of this document sets out the list of projects that have been considered during this scoping exercise. In advance of completing the CIA, this list may need to be updated and further agreed with the Scottish Ministers to ensure that the CIA takes account of all relevant existing and reasonably foreseeable plans, projects and activities.

2.5. Proposed Scoping Consultation

Although the Scoping Opinion will form an important step in developing the EIA of the Development, Forthwind also recognise that the final scope of the assessments will require further development and discussion with relevant statutory and non-statutory consultees. Forthwind expects to engage with consultees through the scoping process and throughout the pre-application period to ensure the EIA Report is completed appropriately and takes account of all relevant issues (see also Section 17 for further detail on proposed consultation).

3. CONSENTS AND EIA

The Forthwind site is located within Scottish waters and as such the Scottish Minister for Business, Innovation and Energy is the relevant decision maker in respect of the Section 36 consent and Marine Licence required for the construction and operation of an offshore wind farm.

Although the UK left the European Union in December 2020, the Scottish Parliament has passed legislation to ensure that Scotland's nature will remain protected to the same standard as before. In addition, in the future, the Scottish Government has committed to maintain or exceed EU environmental standards.

Previously designated Natura sites are now known as European sites and include internationally important or threatened habitats and species. European sites are made up of Special Protection Areas (SPAs) and Special Areas of Conservation (SACs). SPAs are classified under the Birds Directive to protect birds that are rare or vulnerable in Europe as well as all migratory birds that are regular visitors. SACs are designated under the Habitats Directive for habitats and non-bird species. The Habitats Regulations in Scotland set out how these European sites should be protected.

Certain species are given special protection in Scotland as European Protected Species and there will be no change to how these species are protected.

Forthwind will be required to obtain a number of consents from Marine Scotland before construction starts.

Table 2 - Required Project Consents

Application	Regulatory Authority	Notes
Marine Licence	Marine Scotland	<p>The Marine (Scotland) Act 2010 states that a marine Licence is required to construct, alter or improve any works, or deposit any object in or over the sea, or on or under the seabed, where these works are seaward of the MHWS.</p> <p>An Environment Statement is required to support the application and will be prepared in accordance with the Marine Works (Environmental Impact Assessment) Regulations 2017, as amended.</p>
Section 36	Marine Scotland	<p>To construct and operate an electricity generating station with a capacity greater than 1 MW in Scottish Territorial Waters, consent is required under Section 36 of the Electricity Act 1989 (as amended).</p> <p>As with the Marine Licence an Environment Statement is required to support the application and will be prepared in accordance with the Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017, as amended.</p>
Town and Country Planning	Marine Scotland	<p>The Growth and Infrastructure Act 2013 allows for Marine Scotland Licencing and Operations Team to 'deem' planning permission for onshore elements of offshore electricity generation schemes granted consent under Section 36 of the Electricity Act.</p> <p>It is anticipated that the Development will seek the existing 'deemed planning' consent within the S36 consent for the onshore infrastructure and sub-station is carried forward into the new S36 consent if granted.</p>

Application	Regulatory Authority	Notes
<p>Conservation of Habitats and Species Regulations 2010; and</p> <p>The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland)</p>	Marine Scotland	<p>A European Protected Species (EPS) licence will be considered and a decision on its necessity will be informed through consultation with SNH and Marine Scotland.</p> <p>It is anticipated that a Habitats Regulation Appraisal (HRA) will be required to consider the effect on the qualifying features of the following designated areas:</p> <p>Special Protection Areas (SPAs)</p> <ul style="list-style-type: none"> • Firth of Forth SSSI, SPA and Ramsar site • Forth Islands SSSI, SPA • Firth of Tay and Eden Estuary SSSI, SPA and Ramsar Site • Cameron Reservoir SSSI. SPA and Ramsar site • Isle of May SSSI • Loch Leven SSSI, SPA and Ramsar site • Imperial Dock Lock, Leith SPA • St Abb's to Fast Castle SSSI and SPA • Fowlsheugh SSSI and SPA • Farne Islands • Buchan Ness to Collieston Coast SSSI and SPA • Loch Leven SPA and Ramsar site • Cameron Reservoir SPA and Ramsar site • Outer Firth of Forth and St Andrew's Bay Complex SPA <p>Special Areas of Conservation (SACs)</p> <ul style="list-style-type: none"> • Firth of Tay and Eden Estuary SAC (Marine Mammals) • Isle of May SAC (Marine Mammals) • Berwickshire and North Northumberland Coast SAC (Marine Mammals) • River Teith SAC (Fish and Shellfish) • Moray Firth SAC (Marine Mammals)

3.1. The Environmental Impact Assessment (EIA)

The European Commission (EC) EIA Directive 2011/92/EU³ of 13 December 2011 as amended by Directive 2014/52/ EU⁴ requires that an EIA must be carried out in support of an application for development consent for certain types of major projects.

The EIA Directive lists a series of such projects in Annex I and Annex II which are likely to have the potential to give rise to significant environmental effects. Offshore wind farm developments, such as the proposed Development, are categorised as Annex II projects as "installations for the harnessing of wind power for energy production (wind farms)".

The EIA Directive has been transposed into Scottish law through a number of different regulations. In relation to the Project, the EIA Directive is applied through the following regulations:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017; and

³ European Parliament and the Council of the European Union (2011) DIRECTIVE 2011/92/EU: Available online at: http://ec.europa.eu/environment/eia/pdf/EIA_Directive_informal.pdf

⁴ Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment: Available online at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052>

- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

The proposed Development EIA will be carried out in accordance with both of the above regulations and supporting documentation and will also take into consideration the requirements of the Habitats Regulation (Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). The EIA process will be reported through an Environmental Impact Report (EIA Report), which will include a test of significance and, if necessary, an Appropriate Assessment will be provided. The EIA Report will accompany the formal applications for Marine Licence and Section 36 consent.

Under Article 3(1) the EIA report, under the EIA Regulations, is required to identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant impacts of a project on a number of key factors and interactions between the factors.

With respect to the EIA for the proposed development consent application, the factors or topics requiring assessment relate directly to the marine environment, users of the marine environment and/or topics with direct interactions with the marine environment. Links between the factors listed in the EIA Directive and those topics included in this scoping report are summarised in the table below:

With respect to the EIA for the proposed wind farm consent application, the factors or topics requiring assessment relate directly to the marine environment, users of the marine environment and/or topics with direct interactions with the marine environment. Links between the factors listed in the EIA Directive and those topics included in this scoping report are summarised in the table below.:

Table 3 - Relevant EIA Topics addressed within Scoping Report

EIA factors for Assessment	Relevant Marine and Marine related factors covered in this scoping report
Population and human health	Civil and Military aviation Socioeconomics Commercial Fisheries Airborne Noise Shadow Flicker Shipping and Navigation Other human activities (Marine Aggregate Extraction, Marine Waste Disposal, Oil and Gas infrastructure, Subsea Cables and Military Exercise areas)
Biodiversity with particular attention to species and habitats protected under Director 92/43/EEC and Directive 2009/147/EC	Benthic Ecology Fish and shellfish ecology Marine Mammals Ornithology
Land, soil, water and climate	Physical Processes and Water Quality Waste management
Material assets, cultural heritage and the landscape	Archaeology and Cultural Heritage Access and Transport Radio Links and Telecommunications Recreation and Tourism Cables and Pipelines

3.2. Structure of the Environment Statement

The ES will be prepared in discrete technical environmental assessment chapters in order to provide a complete picture for each individual subject area; with the preliminary chapters providing the

project (including the envelope), legislative and policy context for the Development. The technical environmental assessment subject areas will be determined as a result of the scoping responses and through ongoing consultation with the statutory and non-statutory consultees.

Each of the technical assessments will follow a systematic approach, with the principal steps as follows:

- Description of baseline conditions.
- Identification of receptor sensitivity.
- Prediction of potential effects including any cumulative effects.
- Assessment of potential effects.
- Identification of appropriate mitigation measures; and
- Assessment of residual environmental effects.

All elements of the Development and associated infrastructure during the construction, operation and decommissioning phases will be assessed within the ES. The nature of the potential effects will be described in each technical assessment chapter and include:

- Direct and indirect effects.
- Adverse and beneficial effects.
- Short, medium and long term effects.
- Permanent and temporary effects; and
- Cumulative effects.

3.3. Cumulative Effects Assessment

In accordance with the EIA Regulations, the ES will consider 'cumulative effects'. By definition these are effects that result from incremental changes caused by past, present or reasonably foreseeable actions together with the Development. Within the ES it is proposed that for cumulative assessment, two types of effect will be considered:

- The combined effect of individual effects, for example underwater noise, on a single receptor; and
- The combined effects of several developments that may on an individual basis be insignificant but, cumulatively, have a significant effect, such as operational noise of wind turbines.

The extent of any cumulative assessment will be defined in each technical assessment chapter. This is necessary as, for example, the potential landscape and visual effects that relate to the intervisibility of individual wind farm development schemes will be much more wide ranging than underwater noise effects which will be limited to receptors in the more immediate vicinity of the Development. An initial list of projects/operations for cumulative effect consideration will be given in each relevant section of this scoping report. Where no cumulative effects have been identified, this is stated.

3.4. Non-Technical Summary

A Non-Technical Summary (NTS) will be produced to form part of the ES. The NTS will provide detail on the key aspects and environmental effects of the Development in a non-technical language. The NTS will also be provided as a separate document, available both online and in paper format, for anyone with an interest in the Development. This will meet the requirements of the Aarhus Convention and the Environmental Impact Assessment (EIA) Directive (2014/52/EU) which requires EIA reports to be made more understandable for the public.

4. PROJECT DESCRIPTION

4.1. Introduction

This section of the scoping report presents an outline description of the revised project design and describes the activities associated with the construction, operation and maintenance (O&M), and decommissioning of the Forthwind Demonstration Site (hereafter referred to as “the Development”). This section is based on a preliminary design and is subject to change as the design development progresses.

Forthwind is proposing to install 1 offshore wind turbine with a nominal capacity of up to 20MW. Figure 2 shows the proposed locational arrangements, with a 100m micro siting allowance to take account of local and geotechnical conditions.

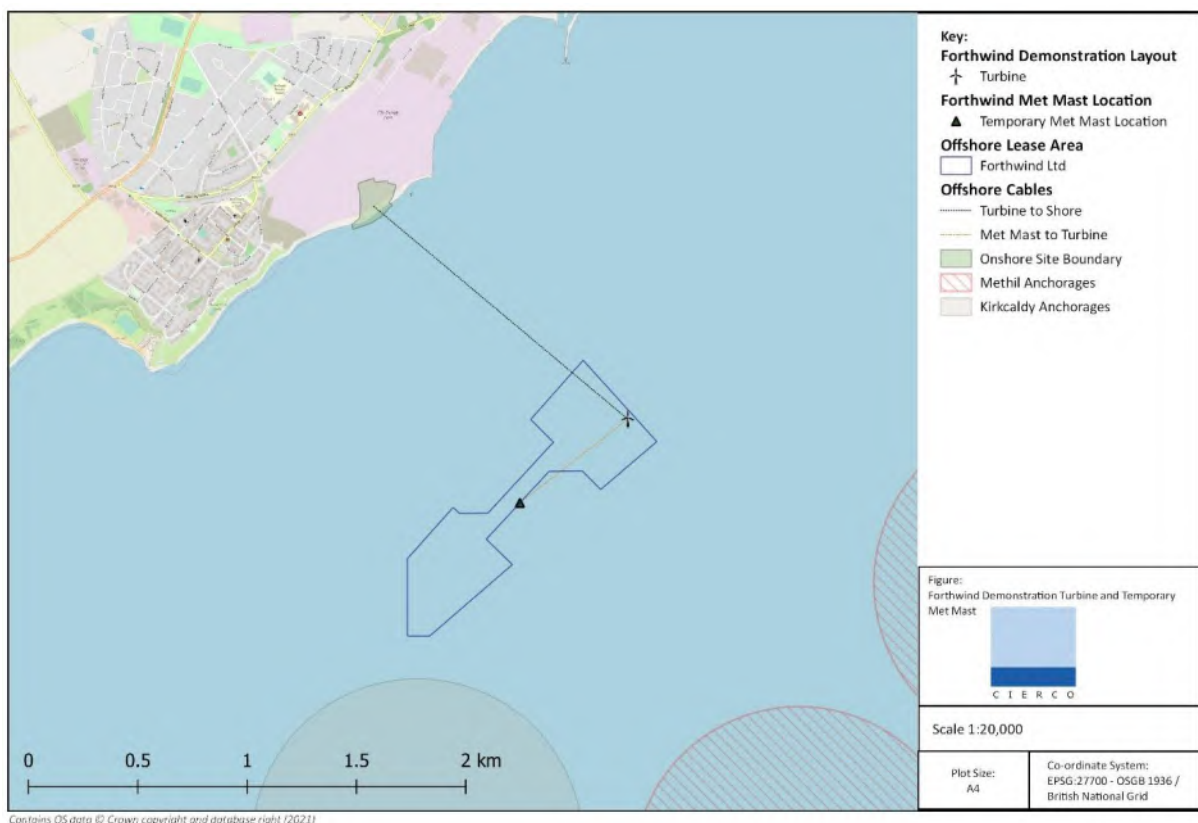


Figure 2 - The Forthwind Offshore Demonstration Project layout

The Development is based on a ‘design envelope’ which captures the full range of potential design options and is intended to provide enough flexibility to accommodate further expected refinement in design as the Development moves through the consenting process towards construction. This section sets out the design options and parameters, for which maximum values provide a ‘realistic worst-case scenario’.

The Development proposed by Forthwind is broadly similar in terms of location and most aspects of the design envelope previously presented in the original application for the 2016 consented project (the ‘original project’). The design envelope of the original project is presented in Chapter 3 of the Forthwind Offshore Wind Demonstration Project Environmental Statement, July 2015⁵ and the HRA Addendum of April 2016⁵. Where these similar parameters exist, and the outcomes

⁵ Available from: <https://www2.gov.scot/Topics/marine/Licensing/marine/scoping/FW-Methil>

of assessment considered by the Scottish Ministers in the determination of the consented development, the conclusions of that assessment are used to inform scoping.

The design envelope has been informed by a range of technical and environmental constraints including the proximity spacing requirement between the turbine and meteorological mast to other marine infrastructure, particularly Forth Port's operations in the area.

4.2. Site Location

4.2.1. Offshore

The proposed project is located on the northern shore of the Firth of Forth at Methil, Scotland, with the turbine located approximately 1.5 km from the mean high-water springs (MHWS) mark.

The Firth of Forth is formed by the estuary of the River Forth, extending approximately 96 km from the tidal water limit at Stirling to the Isle of May. The Development is adjacent to the coast of Methil and Buckhaven, on the northern shore of the Forth. The coastline in this section runs in a southwest to northeast direction and consists of a reclaimed area of land made of colliery waste. The residential areas of Methil and Buckhaven are located further back inland. Much of the coastline in this section of the Forth is characterised by intertidal rock platforms, covered by thin veneers of sand (Firth et al, 1997).

The stretch of coastline extending from Buckhaven to Methil is defended by a rock armour revetment, except for a sheet pile quay at the shorefront of the Fife Energy Park. Further west, between East Wemyss and Buckhaven, the coastline is formed by a soil and vegetation embankment. To the northeast there are the docks of Methil and a concrete seawall that extends up to Leven (Fife Council, 2011).

The mean tidal ranges in the Development area are 2.5 m for neap tides, and 5.0 m for spring tides (Admiralty Tide Tables, 2015).

4.2.2. Onshore

The onshore substation and control building will be located at the Fife Energy Park site.

Fife Energy Park, acquired by Scottish Enterprise in 2005 and being developed in partnership with Fife Council, was originally the site of the Wellesley Colliery which operated from 1890 until closure in 1964. The site was largely established by the deposition of colliery spoil, gradually reclaiming land from the sea. Following the closure of the mine, the site was further developed in the 1970s as a North Sea Oil Fabrication Facility by Redpath de Groot Caledonian (RGC). RGC subsequently sold their interest to Kvaerner Oil & Gas who operated the yard until 2001 when production ceased.

The primary activities performed at the site were the production of drilling rigs for the offshore oil and gas industry, at its peak over 2000 people were employed on the site.

The vision for the Fife Energy Park is to establish a state-of-the-art industrial facility for energy in Scotland, delivering excellence in engineering, fabrication and assembly. It will incorporate a vibrant local and national supply chain and host innovation in the supporting technologies, across the energy sector.

A comprehensive programme of earthworks and site levelling has been completed which has seen formation of engineered embankments between the Fife Energy Park and neighbouring residential properties along with formation of approximately 70 acres of new development land which is the focus for attracting new companies and investment onto the site. Current users of the site include:

- Offshore Renewable Energy (ORE) Catapult Levenmouth 6MW Test turbine and associated facilities.
- Harland & Wolff group (part of InfraStrata plc) – an oil and gas decommissioning and offshore wind and marine renewables fabricator (formerly known as Burntisland Fabrication Limited).
- Professional Testing Services Ltd - heavy engineering NDT.
- Glacier Energy – Professional Testing Services.
- Hydrosphere UK Ltd.
- Ferguson Transport and Shipping; and
- Duncan Engineering - contract engineering.

4.3. Wind Turbine

4.3.1. Turbine Location

The design envelope identifies the ambition to install one turbine and one temporary meteorological mast. The turbine is located approximately 1.5km offshore Methil (at the same location identified as turbine B in Annex 1, Figure 1 of the Forthwind S36 consent). The meteorological mast is located approximately 500 metres northeast from the previously consented second turbine location (identified as turbine A in Annex 1, Figure 1 of the Forthwind S36 consent).

Table 4 – Turbine and Meteorological Mast Location Coordinates – British National Grid

	Easting	Northing
Turbine	336964	696677
Meteorological Mast	337315	696956

4.3.2. Turbine Technology

The turbine design is visually similar to a ‘conventional’ offshore wind turbine, although it is technically different (it is larger, has a higher generation capacity and has a different internal technical design). As explained in section 1.4, the technology presents new challenges for offshore installation and operation that have not been demonstrated in the offshore environment before. The turbine design consists of a three bladed upwind horizontal axis wind turbine with a rotor diameter of up to 255 meters. The turbine rotor and nacelle are mounted on top of a tubular steel tower with a hub height of 156 m above Highest Astronomical Tide (HAT).

The wind turbine is anticipated to employ an active yaw control (designed to steer the wind turbine with respect to the wind direction), active blade pitch control (to regulate turbine rotor speed) and a variable speed generator with a power electronic converter system. The rotor blade airfoils are anticipated to transition along the blade span with the thicker airfoils being located inboard towards the blade root (hub) and gradually tapering to thinner cross sections out towards the blade tip.

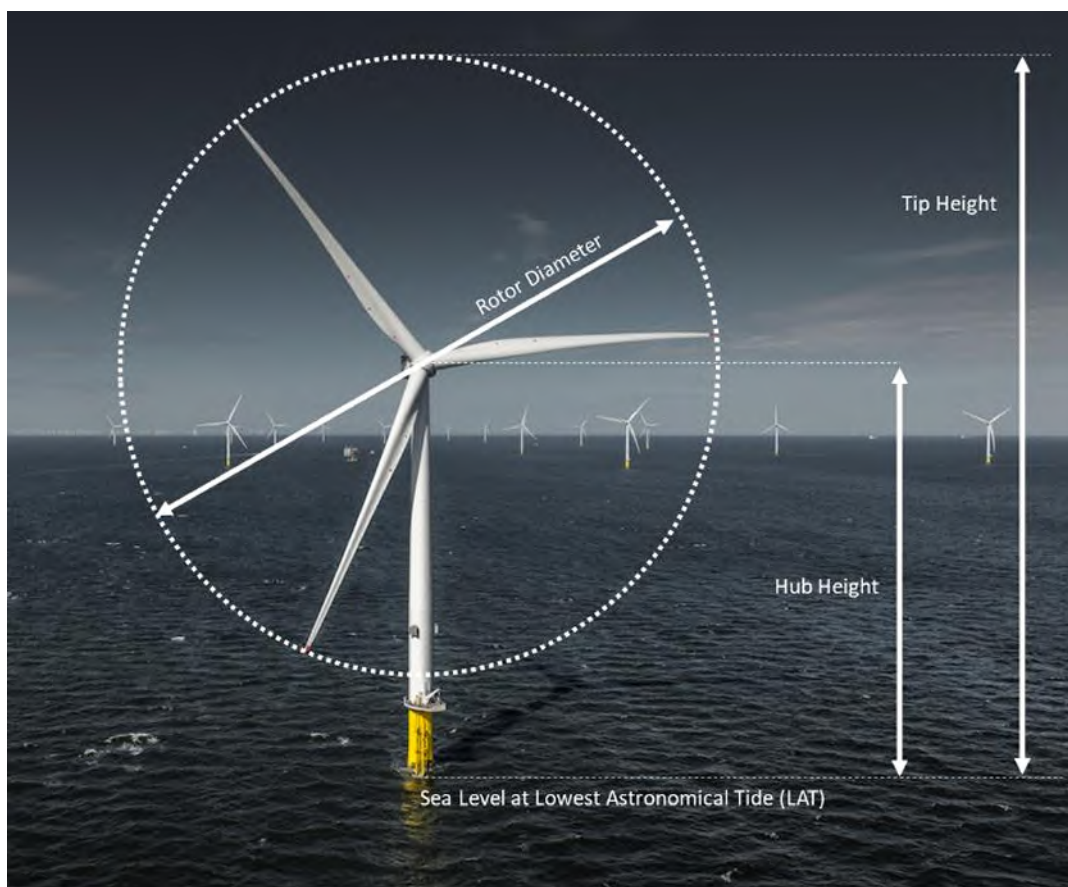


Figure 3 - Turbine Parameters

Table 5 - Key Technical Features of the Forthwind Turbine

Key Data and Dimensions of the Forthwind Turbine	
Number of blades	3
Orientation	Upwind
Direction of Rotation	Clockwise
Rotor Diameter	255 metres
Length of rotor	122.5 metres
Blade swept area	45,244 m ²
Hub height	156 m HAT
Tip height above HAT	280 m HAT
Blade Clearance to HAT	25 metres
Rated Capacity	up to 20 MW
Voltage	66kV
Converter	Full size
Structure	Tubular Steel Tower
Number of structure legs	4 legs on Steel Jacket / Transition Piece
Foundation	Pin piles (one per leg) or Monopile
Design Life	25 years
M&O Access	Boat

4.3.3. Meteorological Mast

The meteorological (or anemometry) mast will be installed 625 meters to the southwest of the turbine to measure the required wind speed and direction data to certify the turbine. The design and location of the mast is in line with the IEC standard, and it is intended that the meteorological mast will be dismantled and removed from site following 5 years of successful operations (the period required by the certification standard). Floating Light Detection and Ranging (LiDAR) technology was initially

considered as an option to gather the required data; however, the LiDAR concept has not been approved for use for the appropriate Type Certification testing standards. LiDAR units comprise of a floating buoy on which meteorological instruments are mounted to obtain wind speed and directional data. These instruments use infrared light beams to measure the wind speed and direction at a determined height using the Doppler shift in the reflected signal. The decision on whether LiDAR can be used will be reviewed should floating Lidar receive approval for turbine type certification, however we are intending to proceed with a meteorological mast as a conservative assumption.

The meteorological mast is estimated to be 160m high (with respect to HAT). There will be an anemometer to measure wind speed and direction mounted on the top of the mast. Additional instrumentation may include sensors to measure wave height and direction, sea temperature and salinity, and structural response data.

Key Data and Dimensions of the Forthwind Meteorological Mast	
Height	160 m HAT
Structure	Lattice Steel Tower
Number of structure legs	3 legs to transition piece
Foundation	Monopile or Gravity Base
Design Life	5 years
M&O Access	Boat

4.3.4. Turbine Appearance and Markings

During operation of the development, it is proposed that the wind turbine will be marked as outlined below. Please be advised that the final wind turbine markings will be agreed with the relevant authorities in the Lighting and Marking Plan (LMP):

- The bottom end of the structure will be painted yellow (RAL 1004 Golden Yellow) from the level of Highest Astronomical Tide (HAT) up to 15 metres.
- Above 15m the structure, turbine and blades will be painted grey (RAL 7035 Light Submarine Grey)
- Subject to agreement with the CAA, Forthwind propose that the turbine is fitted with a single 200 candela red aviation hazard light, with fixed illumination (i.e., not flashing) on the top of the nacelle. During routine operations (i.e., no search and rescue (SAR) operations in or around the wind array) this light shall be switched off.

Forthwind do not intend to install any other permanent structures apart from the proposed wind turbine and a temporary meteorological mast.

As noted above, the final LMP will be agreed with Forth Ports prior to construction. Forth Ports exercise jurisdiction over all the waters of the Firth of Forth (including the development site area) and are also the Local Lighthouse Authority. As part of the process, Forthwind will also consult on the details of the LMP with MS-LOT, the MCA, the NLB, the DIO and other stakeholders.

4.3.5. Structure and Foundations

An initial indication of the structure and foundation is as follows:

The turbine tower will extend from the turbine to a transition piece which will then connect to either a steel frame structure (Jacket) or tubular monopile. The transition piece will be secured to the foundations via bolts or grout. The transition piece will include a boat landing arrangement, ladders, a crane and other ancillary components as well as a flange for connection to the turbine tower.

The jacket foundation comprises of a lattice tubular steel members and welded joints, fixed to the seabed using a piled foundation. Corrosion protection will be required for all substructure elements and for areas of the structure within the splash zone, which is likely to be in the form of cathodic protection and protective coatings. Sacrificial anode cathodic protection and ICCP (Impressed Current Cathodic Protection) are the options being considered for cathodic protection. The alternate option, the monopile foundation, consists of a single steel tubular section made from several sections of rolled steel plate welded together. The selection of the eventual pile foundation type will be dependent on the ground conditions and the design considerations for the turbine.

The base case for the meteorological mast will have a monopile foundation, however the project envelope will include the option to employ a gravity base as an alternative foundation option.

Table 6 – Turbine and Met Mast Foundation Options

Parameter	
Foundations	
Turbine	<ul style="list-style-type: none"> - 4 Piles (one for each leg) or monopile - 2.5 – 3.5m diameter per pin pile or 10m monopile - Maximum depth of 50m per pile
Meteorological Mast	<ul style="list-style-type: none"> - 8m diameter monopile or gravity base

Piled Foundations

A pile is a steel peg that is inserted into the seabed to secure the turbine in place. For the jacket solution, each leg of the jacket foundation in contact with the seabed requires one pile. The size of the piles used will vary depending on a number of factors including ground conditions, structural loading and hydrological regime, although it is anticipated that it will not exceed 3.5m diameter and inserted to a depth of up to 50 m. The monopile foundation solution utilizes one larger pile of up to 10m in diameter.

The piles will be installed using a drill pile technique. Once installed, the piles will be secured by grouting, which involves the injection of cement into the small space between the pile and the pile sleeve.

4.3.6. Turbine Construction and Installation Methods

Installation of the turbine and meteorological mast is anticipated to take place over a 2 to 3 month period, after which the turbine and meteorological mast will undergo testing and commissioning. The turbine will be expected to be operational for a period of 25 years from final commissioning and the meteorological mast will be operational for a period of 5 years from final commissioning.

The main construction phases and likely sequence (with overlap between phases) are as follows:

- Site preparation for foundations; including levelling or pre-piling operations offshore and onshore/intertidal cable routes.
- Installation of the piled foundations.
- Concurrent offshore site preparation and installation of electricity inter array and export cables
- Installation of wind turbine and meteorological mast.
- Commissioning and energy export.

The final construction methods will be determined after detailed design is completed but will remain within the range of construction methods (and associated effects) presented in the Project Envelope.

Each technical assessment within the ES will consider the effects of construction in determining the worst-case impact assessment.

4.3.7. *Turbine Assembly and Preparation*

As the turbine to be deployed at Methil is a demonstration turbine, it will be of a bespoke design and manufacture. The completed turbine will be readied for assembly and then transported by road/rail/sea to a central assembly facility (most likely within Europe) that has direct access to waterways suitable for onward transportation to the installation site.

As far as is practicable the components of the turbine will be delivered to the assembly site as pre-tested modules. The assembly of the turbine will be carried out in a predetermined sequential manner by a suitably qualified and experienced (SQEP'ed) contractor. Prior to shipping, systems will be commissioned and tested as much as practical, to de-risk offshore activities and minimise commissioning time.

In a similar fashion it is anticipated that the fabrication and production of the foundation system will be contracted out to a specific fabrication contractor to an approved design specification. The contract is anticipated to include the fabrication, testing and inspection of the main structure, access systems (including the boat landing system), all secondary steel, cable channels and necessary ancillary items (such as the hoist mechanism, etc). Once fabricated and painted, the completed structure will be transported to the deployment location.

4.3.8. *Overview of the Offshore Installation Process*

The offshore installation process for the project is expected to be performed in two phases. The first phase involves the installation of the foundation; whilst the second stage is the installation of the structures, meteorological mast, turbine and export cables, which will take place over a 2 to 3 month period, after which the turbine and meteorological mast will undergo testing and commissioning before becoming operational. Based on the presumption of using a piled foundation, the offshore installation process to be followed can be summarised as:

- 1) Seabed preparation will be undertaken prior to piling operations commencing and will include clearance of debris or levelling of the piling area.
- 2) A pile socket will be drilled into the seabed from the jack up vessel) for each foundation piece (four in total for each structure), using a single drill bit.
- 3) A steel pile is lifted into place by the lifting vessel, inserted into the pile sleeve ready to receive the jacket structure.
- 4) The structure is then installed, with the Jacket section placed into the seabed piles. A cement grout, required for each pin pile following installation, will be injected from a jack up vessel through tubes in the legs of the tubular jacket substructure into the space between each pile pin and sleeve.
- 5) Once the grout has been set the installation of the turbine can now commence, starting with the installation of the tubular tower section. The turbine nacelle is then installed, followed closely by the installation of the turbine blades

4.3.9. *Pile Loadout and Site preparation*

In the Forthwind project the legs of the turbine are anticipated to attach directly to the seabed using either a pin pile or monopile foundation solution. The pile(s) will be made from steel and may be up

to 50m in length (while most of the pile will be in the seabed, there will be portion of the pile that will “stick up” from the seabed, potentially up to 4m).

The piles will be transported to site from their manufacturing location by vessel by a cargo or jack up vessel which will use a dynamic positioning system.

The installation of the piles will be undertaken by a jack up vessel. Once on site, the legs will be lowered and deployed. The legs of the jack-up vessel placed on the seabed and once it is established that the placement is suitable for weight bearing operations, the drilling of the piles will commence.

4.3.10. Pile Foundation Installation

Installing the foundations for both the turbine and meteorological mast is anticipated to take around 38 days. The drilling activity is temporary and is expected to be based on one jack up vessel being used for the pile installation period with minimal vessel movement, it is not anticipated to cause a major disturbance to birds, which is consistent with the conclusions of the 2015 Environment Statement, the ES Addendum and Appropriate Assessment. The installation sequence for the foundation piles at Methil is anticipated to be as follows:

Table 7 - Pile Installation Sequence

No	Activity	Likely Duration
-	Mobilise Jack Up Vessel to site	10 days
1	Position jack up vessel to achieve the desired positional tolerance. The jack up vessel will be jacked up and a pile “template” lowered onto the seabed.	1 day
2	The sacrificial casing and drilling conductor will be lowered through the piling gates and allowed to self-penetrate the overburden.	7 days
3	The above will then be “vibrated” through the overburden to achieve a seal at the toe of the sacrificial casing in the rock.	
4	The pile top drill rig will be lifted into position, connected to the pile via pneumatic bladders.	
5	Once the rig is on and secure, the down-hole drilling equipment will be lowered into place and run to mudline.	
6	On reaching mudline the driller will begin drilling. The drilling spoil will be deposited back into the water column. Drill fluids are used to lubricate the drill as it penetrates the seabed. The use of drill fluids will be managed, and the fluid will be biodegradable and non-toxic (likely to consist of water-based mud).	
7	The open socket will then be created beneath the toe of the sacrificial casing	
8	Upon completion of drilling, the drill bit will be lifted from the base of the rock socket.	
9	The drill rig will be removed from the drilling conductor and placed back on board the construction vessel. The drilling conductor will then be disconnected from the sacrificial casing.	

No	Activity	Likely Duration
10	Once the sacrificial casing is unobstructed, the permanent works pile will be lowered through the water column and into the open socket.	
11	Once positioned, the annulus between the pile and open socket will be grouted up to the toe of the sacrificial casing.	
12	Complete sequence 2 to 11 for second pile	7 days
13	Complete sequence 2 to 11 for third pile	7 days
14	Complete sequence 2 to 11 for fourth pile	7days
15	Mobilise to Met Mast location	0.5 day
16	Vessel jacked up and the pile “template” lowered onto the seabed.	1 day
17	Complete sequence 2 to 11 for the met mast pile	7 days
-	<i>Demobilise Jack Up Vessel back to base port</i>	<i>10 days</i>

4.3.1. Alternative Gravity Base Foundation Option for the Meteorological Mast

The gravity base requires to be laid on a flat and level seabed to ensure even distribution of weight and to ensure that the structure is vertical; therefore, multiple seabed operations may be required to achieve this prior to installation. The gravity base foundations are predicted to be up to 10 m in diameter.

An area of the seabed will be prepared/levelled prior to the installation of gravity-based foundations. The total volume of material to be removed for a level base will not exceed 15,000 m³. This material will be removed during the seabed preparation and disposed of at an existing off-site disposal facility under a Marine Licence or re-used as ballast material within the foundation (if suitable).

4.3.11. Offshore Cables

A 66 kV electricity export cable will transmit electricity from the turbine to shore (a distance of approximately 1.5 kilometres or 0.8 nautical mile). The cable will connect to an onshore sub-station at Fife Energy Park. A 20 mm² fibre optic communications cable will run alongside the power cable to link the cable to the SCADA system. Onshore, the cable and cable landfall point will be within the existing onshore consented area, with the exact location determined after ground investigations and agreement with Fife Council.

A communications and power cable approximately of 625 meters in length will connect the meteorological mast to the turbine. The power cable connection from the turbine to the met mast is to supply power for the instrumentation. There is an intent to include redundancy in case of power loss to the met mast, so the met mast platform will have some backup elements (solar panels/batteries/etc).

An initial overview of the installation of offshore electricity cables is as follows: depending on ground conditions, the preferred installation method for the 66kV electricity export cable and met mast cable

will be to bury (to a target depth of 1 to 1.5m). The cables may alternatively be laid on the seabed and protected by a suitable method (such as matting or rock placement on top of the cables) where burial is not possible/effective. The following sets out the installation options that may be employed in the burial of the export cable:

Ploughing - Ploughing involves the cutting of a trench in the seabed with the cable being laid behind. This can be undertaken by surface vessels, remote operated vehicles (ROVs) or a combination of the two.

Jetting - Jetting uses high pressure water to displace sediment and create a trench in the seabed into which the cable is laid. The jet is attached to an ROV which is either operated in the water column as a free-swimming vessel, or 'driven' along the seabed on caterpillar type tracks.

Trenching - Trenching involves the digging of a trench by a seabed vehicle, typically on caterpillar type tracks, into which the cable is laid. The material displaced from the digging of the trench is placed to the side of the trench.

The final detailed route of the export cable from the turbine will be based on the geophysical, geotechnical and benthic surveys. The cable route trenching, duct installation and cable installation activities are scheduled to be undertaken over a period of 7 days, avoiding the sensitive overwintering period between October and February for the relevant bird species within the intertidal zone.

An Unexploded Ordnance (UXO) survey along the route will be undertaken and the results supplied to Marine Scotland prior to the commencement of installation activities. These surveys will be used for removing potential obstructions from the route, such as boulders and fishing debris.

A cable burial risk assessment will be provided by the cable installation contractor and submitted to Marine Scotland and consultees as part of the Construction Plan, once available.

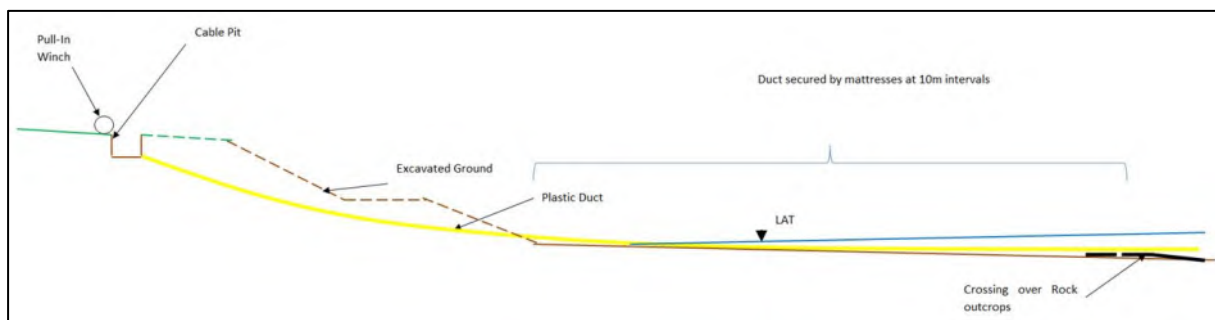


Figure 4 - Cable Landfall Cross Section

Cable Installation - Onshore Works

A pull through trench will be dug using excavators from the shallow tide limit through the beach area and the sea defence heap of rock and soils. The precise plan for this arrangement will be finalised on completion of the offshore cable route survey and location of the onshore jointing pit to ensure there is a straight run from onshore to offshore for a simple pull-in.

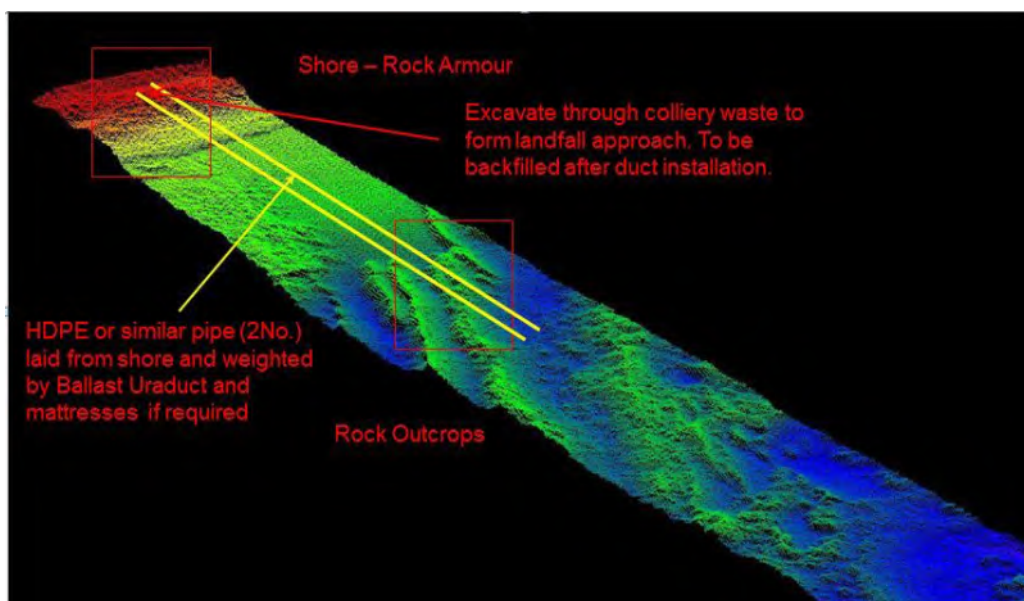


Figure 5 - Duct Solution at Cable Landfall area

Cable Ducting at Landfall

The shore approach section of the cable route will use a duct to protect the electricity export cables, circa 1200m in length. The duct will be buried wherever possible and externally protected with rock bags or concrete mattress. The duct will be made from High Density Polyethylene (HDPE) material with a design life of 50 years.

Use of concrete mattresses / rock bags

Where the cable cannot be buried due to rocky outcrops and where the cable exits the trench at the base of the turbine, it is intended to install external protection to pin and protect the cables. Profiling of these areas will be performed as required using loose rock / gravel to smooth the lay path and maintain the minimum bend radius of the cable. Protection will be applied in the form of 6m x 2m x 0.15m standard density concrete mattresses or alternatively via bulk rock bags. A final determination on cable burying requirements and need for concrete matressing and/or additional rock bag support/protection can only be made after the cable installation is completed.

To maintain existing and future safe navigation, in areas where external cable protection methods are used, the installation contractor will ensure that the depth in the affected area does not reduce the navigable depth by more than 5% of the surrounding depth as referenced by Chart Datum.

Additional Cable Protection

Where there is a requirement to surface lay the cables over rocky outcrops, additional protection will be added to the cables in the form of Uraduct. The Uraduct is fitted externally to the cable during lay and gives increase impact and abrasion protection. This system will also be installed at the exit of the J-Tube on the turbine structure to protect the cable.



Figure 6 - Image of a Trelleburg Uraduct

4.3.2. Overview of Cable Installation Process

The following provides an overview to the electricity export cable installation process:

- **Pre-lay ROV route inspection** – An ROV will be deployed to inspect the cable routes out from the onshore landing point (approx. 500m offshore) to the base of the wind turbine. The surveys performed will include side scan sonar, multibeam echo-sounder, sub bottom profile and camera surveys. The purpose of the surveys is to determine that the route is clear of surface obstructions which may impede the safe surface lay of the cable out from shore to the wind turbine. Any obstructions encountered will be removed, either using the ROV with a lifeline recovery procedure or grappling if necessary.
- **Installation at landfall** – The cable will be supplied with suitable wire sock cable grips which will facilitate the pull-in operations to shore and for the turbine. The cable grip will be connected to messenger wires at the foreshore (secured in position by an anchor plate at the junction pit) and at the turbine for pull-in operations. After the securing of the cable end onshore, the cable is then paid out to the seabed from the cable lay vessel.



Figure 7 - Cable Grip arrangement for the Cable Pull

At the initial installation and shore pull stage of the operation, the vessel will set-up as close to shore as feasible, ideally during highest tide to maximise the working depth. The messenger wire (attached to a winch on the Energy Park) will be towed out to the cable lay vessel by a RIB (rigid-hulled inflatable boat) and then connected to the first end of the cable. The cable will be over-boarded over the vessel chute and pulled into the beach using floats or roller stands as required.

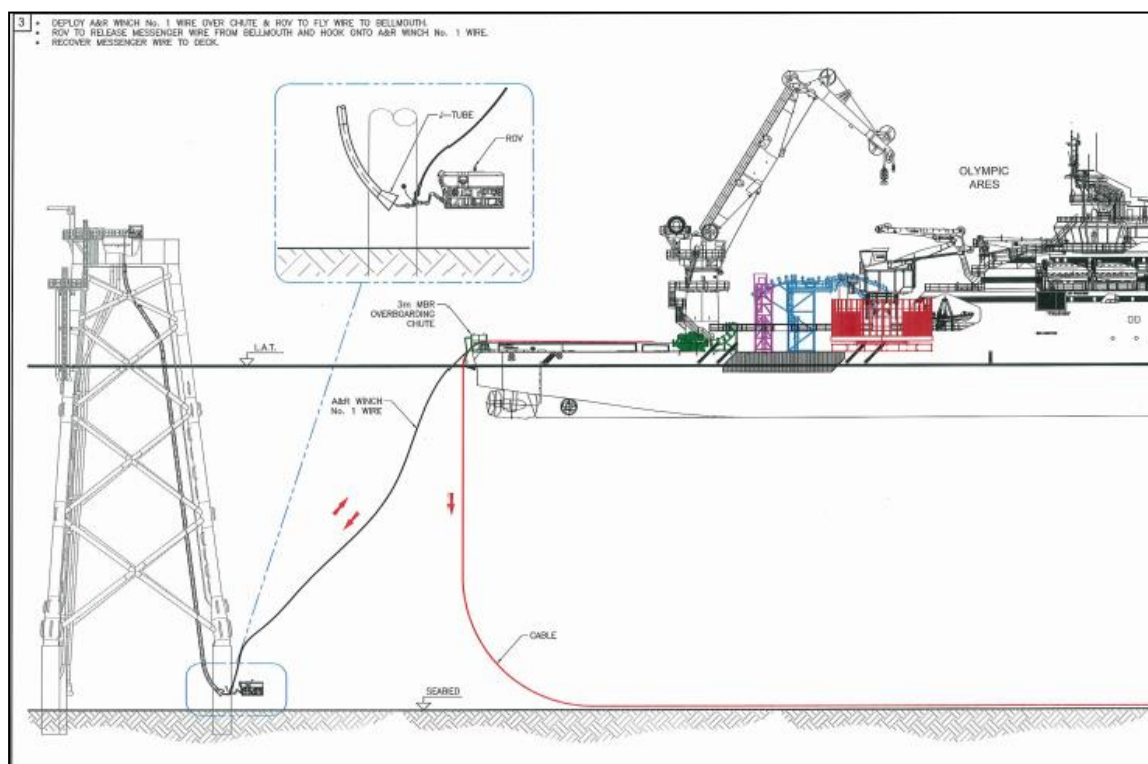


Figure 8 - Installation of the Export Cable to the Wind Turbine

A secondary vessel may also assist in supporting the cable in the shallower water depths and feeding the cable into the shore approach section. The cable will be pulled through the installed duct to the beach area and secured in the jointing pit allowing the lay vessel to move off and commence lay of the remainder of the cable to the turbine.

- Main Cable Lay** – The cable will be laid into a pre-cut trench along the lay route. The cable will be monitored to ensure the appropriate amount of tension and slack as the topography requires. Where required the deck team will install additional protection to the cable at the predetermined locations due to the seabed profile.
- Landing the Cable to the Wind Turbine** – A J-tube is located on one of the turbine legs to guide the cable up through the structure to the wind turbine. Before cable pulling operations begin, all necessary equipment is installed and prepared (on the turbine platform and J-tube) and the area around the entry point surveyed to ensure it is clear from debris. A messenger wire is then passed from the turbine structure through the J tube to the installation vessel. The messenger wire is attached to the main pull wire attached to the cable. The cable will then be pulled into the switchgear and terminated and tested.
- Post Installation Inspection and Burial** – On completion of each cable segment, it will be necessary to carry out a post lay inspection and burial (PLIB) operation along the buried cable route with the aim of determining that the cable has been buried correctly. This inspection will be most likely be carried out by a ROV, which will carry out 2 jetting passes over the route of the two cables after which a further inspection pass will be carried out.

4.4. Onshore Works and Infrastructure

The offshore electricity export cable will make landfall, via an intertidal zone trench, to an onshore junction pit located on the Fife Energy Park. From the junction pit the 66kV cable will connect to a sub-

station near to the entrance of the Energy Park and from there the electricity will be exported via a dedicated cable to the grid substation at Leven.

A provisional cable route on the Fife Energy Park has been agreed with Scottish Enterprise (the owner of the Fife Energy Park) and the final detailed design and layout will be agreed with Scottish Enterprise and Fife Council. Although not anticipated, should there be a requirement for the delivery of abnormal loads, consultation and authorisation from BEAR Scotland will be sought prior to undertaking the delivery.

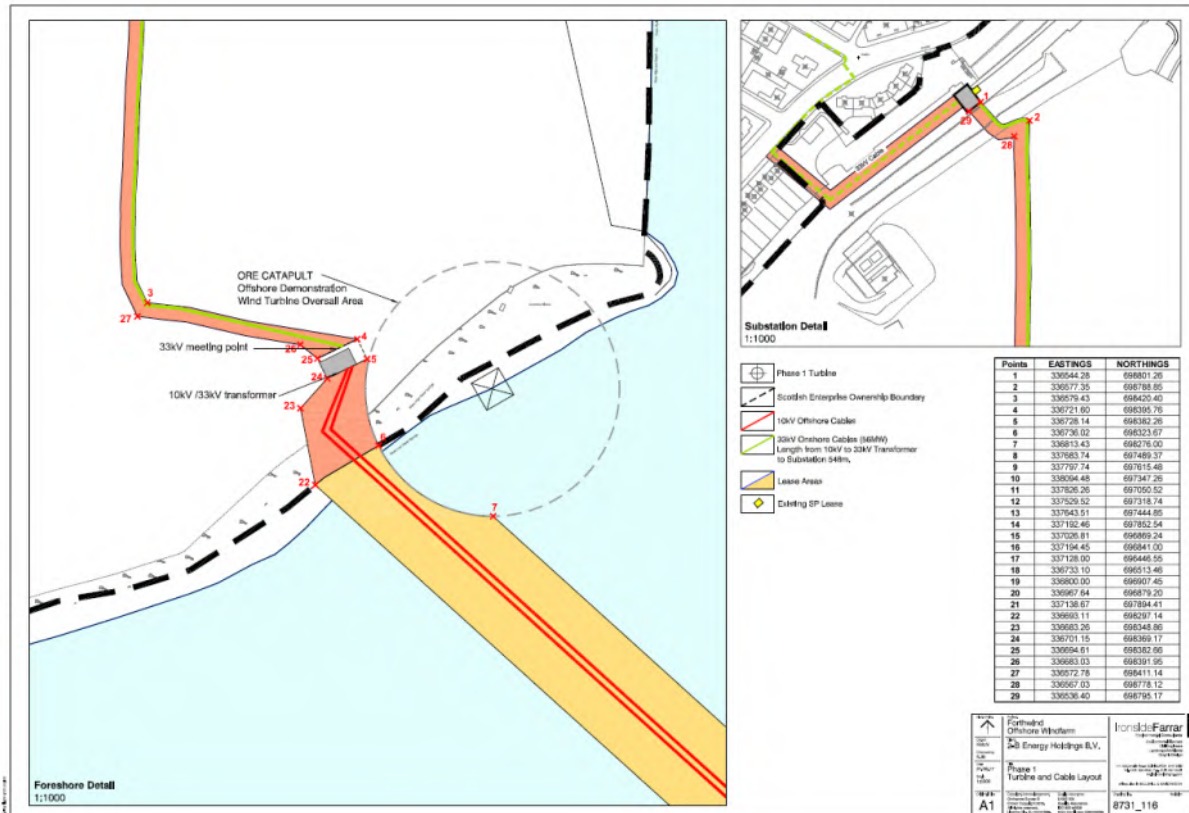


Figure 9 - Indicative Layout of Onshore Works

The cable route between the Fife Energy Park and the Leven substation will follow a route along public roads and the relevant permissions to access and install the required cabling will be made to Fife Council at an appropriate time prior to the installation works.

The arrangements, layout and configuration for onshore substation located on the edge of the Fife Energy Park will go through a design approval process with Scottish Power and once agreed, the detailed plans will be submitted to Fife Council for their approval prior to installation.

4.4.1. Onshore Works Construction Hours and Noise Management

All physical onshore construction work will take place between the hours of 07.00 and 19.00 on Monday to Friday and between 07.00 and 16.00 on Saturdays. No onshore construction work is planned to take place on Sundays or national public holidays. Exceptions to this are activities associated with works required in case of emergency or the testing and commissioning of plant and equipment.

Should other works be required to take place outside these hours, specific approval from Scottish ministers will be obtained in advance of the work being undertaken. In cases where work is required

that is likely to give rise to significant noise levels in hours of darkness, local residents will be notified via a notice in the local paper.

All onshore installation contractors will be required through the implementation and monitoring of their contractual obligations, to ensure compliance with all environmental noise conditions and to employ the best practicable means of reducing noise emissions from plant, machinery and construction activities, in accordance with BS 5528.

4.5. Project Operation and Maintenance Approach

An initial overview of the project Operations and Maintenance (O&M) programme is as follows: the Forthwind project Operations and Maintenance (O&M) programme, in common with O&M processes used on other offshore windfarms across the UK, is expected to be focused on providing maintenance access via a Crew Transfer Vessel (CTV) to a boat landing platform at the base of the turbine structure and Meteorological Mast. The turbine is anticipated to be accessed via a ladder. The jacket/pile will be constructed so that boats servicing the turbine can moor safely against the jacket/pile to gain access to the nacelle via the tower. O&M activities, such as servicing equipment or replacing parts or machinery, are anticipated to be hoisted up to a landing platform on the transition piece directly from the deck of a boat below.

4.5.1. *Maintenance of the cable during operation*

Once the electricity export cables have been installed, an assessment of the potential future risk of cable exposure will be completed. Based on the outcome of the post installation cable risk assessment, visual inspections of the integrity of the subsea cables and their burial condition will be undertaken at an appropriate frequency by the Forthwind appointed O&M contractor. The subsea cables will be inspected using an underwater ROV from the J-tube of the turbine structure along the route of the cable back to the duct entry point close to shore.

In the event of cable failure or exposure, maintenance and rectification work will be undertaken to ensure that the burial condition of the cable is maintained within the cable burial risk assessment parameters. Forthwind will re-bury the cable or if this is not feasible apply additional cable protection material. Forthwind will provide notification to Marine Scotland in instances of cable failure or exposure prior to undertaking any rectification work.

5. PLANNING POLICY

The Forthwind Demonstration Project is endeavouring to implement international and Scottish policy on renewable energy and contribute to the achievement of climate change targets. The analysis of effects on policy will be aimed at the national, regional and local context.

The EIA Report will provide a summary of the legislative, regulatory and planning policy framework relevant to the Development and will be presented under the following headings:

- Energy Policy Context
- Marine and Terrestrial Planning
- Legislative Requirements
- Consents and Licencing
- Local Planning Framework

The ES will provide a summary table of how the development performs against central and local government policies. Where appropriate, mitigation will be proposed to reduce the level of policy contravention, or scheme amendments will be suggested as part of the design process to maximize benefits.

6. AIRBORNE NOISE AND SHADOW FLICKER

6.1. Introduction

Forthwind intend to evaluate the effects of noise from the proposed Development on noise sensitive receptors. All noise impact assessment work will be carried out in accordance with ETSU-R-97 and the IOA Good Practice Guide, drawing on the previous noise assessments for the Levenmouth Demonstration Turbine (operated by Offshore Renewable Energy Catapult) and the previous Forthwind Offshore Wind Demonstration Project.

Shadow flicker is an effect which can occur when the sun passes behind the rotating blades of a wind turbine. Where this occurs through a small opening, such as a window, it can appear that the shadow turns on and off, thus creating the flicker effect. Due to the coastal location of the Development, it is also intended to carry out a shadow flicker assessment.

6.2. Baseline Noise Characterisation

Baseline Noise measurements were carried out for both the Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 and by the ORE Catapult (OREC) Levenmouth Demonstrator Wind Turbine at representative locations around Methil. The measurement locations were agreed with the Environmental Health Department of Fife Council as being representative and appropriate. It is intended that the baseline noise measurements gathered by Forthwind and OREC will be used for noise impact assessment and no additional further baseline noise monitoring will be gathered. Forthwind will engage with the Environmental Health Department of Fife Council to ensure that the baseline noise measurements are still representative and appropriate for use within the EIA report.

6.3. Noise Modelling Assessment

Forthwind will calculate the predicted noise levels from the turbine based upon A-weighted acoustic emission characteristics for normal operation. A calculation of the potential cumulative noise effects with the OREC turbine will also be undertaken. The following guidance, legislation and information sources will be considered in carrying out this assessment:

- The Scottish Government's web-based planning information on onshore wind turbines (last updated May 2014)⁶;
- Planning Advice Note 1/2011 (PAN1/2011): Planning and Noise⁷;
- ETSU-R-97: The Assessment and Rating of Noise from Wind Farms⁸; and
- A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise (the GPG), and its Supplementary Guidance Notes⁹;

Current guidance in the assessment of wind turbines noise remains the same as that considered in the Development's original application and will be applied as applicable for the EIA report.

6.4. Potential Effects

To consider the full assessment of potential effects from the Development, a worst-case scenario of the predicted noise levels from the turbine to the shoreline within the constraints of the turbine hub

⁶ Scottish Government (2014) Onshore wind turbines [online]; available at www.gov.scot/resource/0045/00451413.pdf

⁷ Scottish Government (2011) Planning Advice Note 1/2011: Planning and Noise

⁸ ETSU-R-97 (1996) The Assessment and Rating of Noise from Wind Farms

⁹ Institute of Acoustics (2013) A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

height as detailed within the project description within Chapter 4 will be used for the purposes of the noise assessment.

6.5. Potential Construction Effects

The Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 considered the impact of construction noise for a 2 turbine development (Section 14.9.1). The assessment concluded that as the *“construction noise will be of limited impact and duration, being confined to working hours as agreed with Fife Council through planning condition. The application of mitigation measure where applicable will also ensure that any noise from site will be adequately controlled such that construction noise affects are considered not significant”*.

As the location of the turbine, supporting infrastructure (onshore and offshore), the duration of the construction activities and the construction techniques of the revised design is the same or less than the original consented development, it is proposed that construction noise effects can be scoped out of the assessment.

6.6. Potential Operational Effects – Airborne Noise

The primary noise source during operation is anticipated to be from the motion of the turbine. A full operational noise assessment will be carried in accordance with the guidance set out in ETSU-R-97. The results of the baseline noise survey will be correlated with wind speed to determine noise limits at each of the noise sensitive receptors. Wind shear would be taken into account as described by the methodology set out by a recent agreement between specialists in the field, Prediction and Assessment of Wind Turbine Noise, as published in Vol. 34 No. 2 of the Institute of Acoustics Bulletin.

Noise modelling will be carried out to determine predicted noise levels at the noise sensitive receptors, based on turbine noise source data. The noise modelling will be undertaken in accordance with the methodology set out in the recent agreement between specialists published in the Institute of Acoustics Bulletin (Vol. 34 No. 2).

The results will be compared with the derived noise limits for each receptor for both day and night. Graphical illustrations will show the predicted noise in the context of the derived limits and the existing baseline data.

6.7. Potential Operational Effects – Shadow Flicker

The Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 used a specialist modelling software, WindFarm, to calculate the theoretical times and durations during which shadow flicker effects could be experienced at nearby properties in Buckhaven. It is proposed that this analysis is repeated for the larger turbine design envelope at all suggested locations.

6.8. Potential Decommissioning Effects

Noise during decommissioning will be of a similar nature to that of construction and of relatively short duration. As the location of the turbine, supporting infrastructure (onshore and offshore), the duration and techniques of the decommissioning activities of the revised design is the same or less than the original consented development, it is proposed that decommissioning noise effects can be scoped out of the assessment.

6.9. Potential cumulative effects

The Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 noise impact assessment identified the potential for cumulative operational effects with the OREC

Levenmouth turbine. It is proposed that the cumulative operational noise impact assessment is reassessed based on the revised acoustic emission characteristics for the turbine.

6.10. Summary of potential effects

Table 8 provides a summary of effects relating to Noise and Shadow Flicker. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 8 - Summary of Potential Noise and Shadow Flicker Effects

Potential Effects	Construction	Operation	Decommissioning	Rationale
Airborne Noise	x	✓	x	Airborne noise will be generated during the construction, operational and decommissioning phases.
Cumulative Noise	x	✓	x	A revised cumulative noise assessment with the OREC Levenmouth turbine will be undertaken based on the revised acoustic emission characteristics for the turbine.
Shadow Flicker	x	✓	x	There is the potential for shadow flicker to occur during operation and this will be assessed.

7. SHIPPING AND NAVIGATION

7.1. Introduction

As part of the consenting process there is a requirement to undertake an assessment of the navigational safety issues arising from the establishment of an Offshore Renewable Energy Installation (OREI).

The following presents the planned scope of work to be undertaken for the proposed Development's turbine location to assess the impact and interaction of the development with local marine traffic. The scope of work is designed to meet the requirements of current UK Guidance, in particular the Marine and Coastguard Agency Marine Guidance Note 543 (MCA MGN 543) and the Department of Energy and Climate Change (DECC) Methodology. The aim of the work will be to identify the controls and risk mitigation measures required so that the impact is not significant and As Low As Reasonably Practicable (ALARP).

7.2. Desktop Baseline Characterisation

Desktop data on the baseline navigation features, documented vessel activity in the proposed development area and immediate surroundings will be identified, using the previous Forthwind Navigational Risk Assessment (NRA) (A.15.1 of the Forthwind Offshore Windfarm – Methil Environment Statement) as a starting point. The following data sources shall be reviewed and summarised:

- Forthwind Offshore Windfarm – Methil - Navigational Risk Assessment.
- Admiralty Sailing Directions.
- Nearby Port and Harbours guidance.
- Aids to Navigation.
- Maritime incidents based on MAIB and RNLI data sets.
- Vessel Activity (including commercial, fishing and recreation); and
- Historical Maritime Incidents (Marine Accident Investigation Branch and Royal National Lifeboat Institute).

The aim will be to update the original NRA with up to date traffic assessment and risk modelling carried out. The geographical scope of the shipping and navigation assessment is considered to be the Development site.

7.3. Marine Traffic

Forthwind has opened consultation with Forth Ports Authority on the type of marine traffic data is held by them and what data can be made available to the project. It is proposed that, in agreement with the Port Authority, that due to the nature and scale of the proposed Development, the historical port and anchorage usage data collected by Forth Ports between 2010 and 2020 should be suitable and sufficient for the purposes of assessing the effect on large commercial shipping and navigation.

Automatic Identification System (AIS) data (again made on the assumption that this can be made available by Forth Ports) will be utilised to characterise vessel activity (as per AIS carriage requirements), including seasonal variations (summer/ winter) with the duration to be determined following consultation with Forth Ports.

Small vessel activity (non-AIS vessels such as smaller fishing (i.e., <15m in length) and recreational craft) will be based on the available data sets, including research projects carried out by Marine Scotland on

commercial fishing and recreational sailing. This data will also be combined with any data available from Forth Ports and consultation with local fishing representatives.

The RYA UK Coastal Atlas (2012 edition), shows the entire area of the Firth of Forth as a “General Sailing Area” with a “medium” use coastal; recreational sailing route passing offshore of Methil and south of the proposed development. The Atlas also highlights the small vessel anchorage for use by recreational craft (indicated on the Admiralty charts, just off Methil breakwater). There is no indication of racing activity shown in the area, neither is the port of Methil shown as having an affiliated RYA Club or marina.

The Environment Statement and the NSRA will consider data from the latest edition of the RYA dataset (currently September 2019), which utilises a heat mapping approach indicating a range from light to heavy vessel activity. Forthwind will also request further relevant data (if available) from the RYA on general boating activity within the development area (based on data supplied to the RYA from their affiliated clubs and other sources gathered as part of the 2015 RYA club survey data) to feed into the shipping and navigation impact assessment.

7.4. Commercial Fishing Activity

The relatively small scale and inshore location of the offshore wind demonstration array, the “normal” tools for assessing the fishing activity approach in the vicinity of the development site are not considered appropriate. It is proposed that local fishing organisations are engaged to establish the extent and nature of fishing activity within the location. Organisations considered include:

- The North and East Coast Regional Inshore Fishing Group.
- The Fife Creel Fishermen’s Association.
- The Inshore Fisherman’s Alliance.
- The Scottish Fishermen’s Federation; and
- The Inshore Fisherman’s Alliance.

In addition, should consent be granted, Forthwind will seek to appoint a Fisheries Liaison Officer (FLO) to ensure an appropriate relationship is established with the local fishing fleet and to ensure that a good dialogue is established to ensure that project information is readily available to all interested parties.

Based on the previous application, the nature of fishing in the location is currently understood to be of the following nature:

- The area is part of fishing grounds for squid, nephrops, lobster and velvet crab.
- The main area of activity is inshore of the yellow (special mark) buoy marking the end of the pipeline & diffuser (Diageo’s) off Buckhaven.
- Squid is fished in the whole area including the development area August to October using trawls.
- Creeling takes place in particular around the diffuser off Buckhaven for lobster and in the area of the export cable route (i.e., in the rocky/reef areas).
- There is some scallop dredging (winter) beyond the buoy and around the area of development.
- Nephrops trawling takes place throughout the year on a frequent basis on or close to the southern flank of the development area.
- Vessels involved in fishing this area range from 6m (18ft) creelers up to 15m (50ft) scallopers.
- Recreational fishing occurs but mainly inshore of the yellow buoy.

- In winter, lobster and velvets move out beyond the yellow buoy into the development area into deeper water.
- Fishing vessels in transit up and down the coast will tend to hug the coast but remain outside the yellow buoy keeping clear of the known creeling areas.

Efforts will be undertaken to ensure that the above understanding is either confirmed or updated following consultation with local fishing organisations.

7.5. Navigational Risk Assessment

The NRA is a standalone document required by the statutory stakeholders; it is used to inform the ES. The original NRA will be updated in line with the primary guidance of MGN 543 and the DECC 'Methodology for Assessing Marine Navigational Risk'. The assessment methodology will principally be based on the following:

- DECC Guidance on the Assessment of Offshore Wind Farms 'Methodology for Assessing the Marine Navigational Safety Risk of Offshore Wind Farms' December 2005 (DTI) and as updated 2013; and
- Maritime and Coastguard Agency (MCA) Marine Guidance Note 543 (MGN 543) (M+F) Safety of Navigation: Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response.

The DECC methodology, which was developed with the MCA and Department for Transport (DfT), provides a template for preparing a Navigation Risk Assessment (NRA). The methodology is centred on risk controls and the feedback from risk controls into risk assessment. It requires a submission that shows that sufficient risk controls are, or will be, in place for the assessed risk to be judged as broadly acceptable or tolerable with further controls or actions. Other key guidance and reference materials that will be used throughout the assessment are:

- International Maritime Organisation (IMO) Guidelines for Formal Safety Assessment (IMO, 2007).
- IALA Recommendation O-139 (IALA, 2008). The Marking of Man-Made Offshore Structures. IALA: Brussels.
- DECC Guidance Notes on Safety Zones (DECC 2007, as updated).
- Royal Yachting Association (RYA) – The RYA's Position on Offshore Energy Developments: Paper 1 – Wind Energy (RYA, 2013); and
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendations O-139 (the Marking of Man-Made Offshore Structures, Edition 2) (IALA, December 2013)

The key features of the Marine Safety NRA Methodology are risk assessment (supported by appropriate techniques and tools), creating a hazard log, defining the risk controls (in a Risk Control Log) required to achieve a level of risk that is broadly acceptable (or tolerable with controls or actions implemented), and preparing a submission that includes a claim, based on a reasoned argument, for a positive consent decision. The MCA MGN 543 highlights issues that need to be taken into consideration when assessing the impact of offshore renewable energy developments on navigational safety in the UK. Specific annexes within MGN 543 that highlight particular issues are as follows:

Annex 1 Site position, structures and safety zones;

Annex 2 Navigation, collision avoidance and communications;

- Annex 3** MCA's windfarm shipping template for assessing windfarm boundary distances from shipping routes;
- Annex 4** Safety and mitigation measures recommended for OREI during construction, operation and decommissioning; and
- Annex 5** Search and Rescue (SAR) matters.

A detailed description of the NRA methodology will be presented in the NRA report.

7.6. Hazard Workshop and Development of a Hazard Log

A Hazard Review workshop was undertaken at the Forthwind Offices in Aberdour on 20 October 2017 for the 9 turbine Forthwind Demonstration Array project (as proposed within the 2016 Scoping Report). The workshop identified and discussed scenarios and prioritised them by risk level based on the findings of the original NRA. The workshop proved to be a useful method of identifying additional mitigation measures and the findings and mitigation will be brought forward into the EIA report.

It is intended to use the information gathered at that workshop to inform the updated NRA report. Consultation with the attendees (the MCA, Northern Lighthouse Board, Forth Ports, Forth Yacht Clubs Association, Royal Yachting Association, Fife Fishermen's Association and the Scottish Fishermen's Federation) will be undertaken to ensure that attendees are satisfied that that information gathered remains appropriate and valid for the NRA.

7.7. Risk Control and Mitigation Measures

The risk control measures/options for the different phases of the development will be identified within the hazard ranking process; in line with those already considered as part of the existing NRA. Further potential mitigation measures over and above those already planned will be considered based on the risk results generated to ensure that the risks associated with the site are As Low As Reasonably Practicable (ALARP). The initial mitigation measures identified for this project include:

- A minimum lower tip clearance height of 25m above MHWS.
- Navigational Aids.
- Navigational warnings and procedures.
- Contingency measures (pollution and marine casualties).
- Safety Zones.
- AIS monitoring.
- Guard vessel/s during construction.

7.8. Potential Effects

To consider the full assessment of potential effects from the Development, a worst-case scenario of a minimum blade clearance of 25 metres from the MHWS and that the cables will not be buried but surface laid and protected will be used.

7.8.1. Potential effects during pre-construction / construction phase

The shipping and navigation effects that could arise as a result of the proposed Development during pre-construction (e.g., geotechnical surveys and/or seabed preparation) and construction are identified as follows:

- There will be an increased level of vessel activity within the Development area during the construction phase (including jack-ups / barges, and crew transfer vessels). Construction traffic

and the presence of construction safety zones could lead to an increase in vessel-to-vessel encounters in the area from the baseline conditions.

- Fishing vessels could be affected during the construction phase as a 500 m exclusion / safety zones are expected to be implemented during turbine installation.

It is important to note that the previous impact assessment the significance of effects from construction activities in the area were considered “not significant”, following the implementation of the development design mitigation. As the construction and installation activities are not significantly different from that proposed in the previous ES and this Demonstration Project ES, the overall impact rating is not expected to change.

7.8.2. *Potential effects during operations*

The shipping and navigation effects that could arise as a result of the proposed Development during operation are

- The risk of vessel collision with a Turbine.
- The risk of a wind farm service vessel collision with a Turbine.
- The risk of grounding on a subsea cable protection.
- Effects on Communication, Radar and Positioning Systems; and
- Disruption to Search and Rescue (SAR) operations (including risk management and emergency response).

For the majority of effects identified above, the significance of effects from operational activities in the area were considered “not significant”, following the implementation of the development design mitigation. As the operational activities are not significantly different from that proposed in the previous ES and this Demonstration Project ES, the overall impact rating is not expected to change. The one aspect not considered in the previous assessment is the potential impact on SAR operations; however, as the development is restricted to a single turbine, it is proposed that this issue is scoped out.

7.8.3. *Potential effects during decommissioning and Assessment of Future Shipping*

It is difficult to predict shipping traffic far into the future, however it is anticipated that the effects of the proposed Development during decommissioning will be broadly similar to those identified during construction.

A review of the likely changes in future shipping in this area over the life of the development will be undertaken as part of the NSRA. This will include consideration of the Inch Cape, Firth of Forth and Neart na Gaoithe offshore wind farms projects, as well as in the wider UK context. Specific stakeholder feedback on developments that could affect future levels of activity will be sought, with specific focus on port and ferry operations. This information will feed into the future case risk assessment.

7.8.4. *Potential cumulative effects*

Based on the previous NSRA, it is anticipated that the development will not result in any significant effects. If no significant effects are predicted to occur from the Development on Shipping and Navigation interests, cumulative effect will not be considered.

However, in instances where significant effects are identified the potential cumulative and in-combination effects on shipping (of any nearby developments in the area - such as Inch Cape, Firth of Forth and Neart na Gaoithe offshore wind farms projects) will be reviewed. This will include any proposed developments not yet constructed, but scoped, within the area.

This exercise will be supported by the assessment of likely changes in future shipping in the area, as outlined in section 7.9.3.

7.8.5. Summary of potential effects

Table 9 provides a summary of effects relating to navigation and shipping. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 9 - Summary of Potential Effects relating to Shipping and Navigation

Potential Effects	Construction	Operation	Decommissioning	Rationale
All Shipping and Navigation assessment requirements	✓	x	x	The shipping and navigation risk assessment and risk modelling will be updated.
Collision risk to commercial, fishing and recreational fishing vessels.	✓	✓	✓	There will be an increased level of vessel activity within the Development area during the construction phase (including jack-ups / barges, and crew transfer vessels). The installation of the turbine provides an increased risk of collision with vessels and/or service vessels.
Risk of grounding on a subsea cable protection	x	✓	x	The export cables pass through the inshore area where recreational traffic will potentially be transiting up and down the coast. Reductions to the charted depth in shallow water areas could present a hazard to recreational craft.
EMI Interference	x	x	x	The devices generate alternating current and with the export cables sited below water or on the seabed, there is not expected to be any adverse EMI effects on navigational equipment
Effects on Communication, Radar and Positioning Systems	x	x	x	Studies ¹⁰ have concluded that there are no significant effects on communication, radar and positioning systems from wind farms; except in instances where radar issues associated with identifying small contacts

¹⁰ MCA/QinetiQ Report - Results of the electromagnetic investigations and assessments of marine radar, communications and positioning systems undertaken at the North Hoyle wind farm by QinetiQ and the Maritime and Coastguard Agency 2004 and BWEA /MCA/DTI/PLA Report - Investigation of Technical and Operational Effects on Marine Radar Close to Kentish Flats Offshore Wind Farm 2007

Potential Effects	Construction	Operation	Decommissioning	Rationale
				within an array. As the development is restricted to a single turbine it is proposed that this issue is scoped out.
Disruption to SAR Operations (including risk management and emergency response)	x	x	x	As the developed is restricted to a single turbine it is proposed that this issue is scoped out.

7.9. Stakeholder Consultation

Consultation with the following organisations will be undertaken during the development of the Navigational Safety Risk Assessment:

- Defence Infrastructure Organisation (DIO).
- Fife Fishermen's Association.
- Forth Ports.
- Forth Yacht Clubs Association.
- East Coast Inshore Fisheries Group (ECIFG).
- Marine and Coastguard Agency (MCA).
- Northern Lighthouse Board (NLB).
- Scottish Fishermen's Federation.
- Royal Yachting Association (RYA) Scotland; and
- Chamber of Shipping.

8. COMMERCIAL FISHERIES

The proposal is restricted to one turbine at a location previously assessed in 2015 and subsequently consented. The July 2015 Environment Statement assessed the potential for adverse effects on commercially exploited fish and shellfish populations and concluded there would be no significant effect on the fish and shellfish population. The July 2015 conclusion is based upon the fact that the ecological sensitivity of the local development area is low and the development area has a relatively confined footprint.

This proposal is restricted to one turbine that will have a smaller construction and operational envelope, reducing any small effect even further. Forthwind has always been very transparent in exposing its thinking in relation to its development plans within the area and can categorically state that there are no plans for the deployment of any more turbines or expansion to the Forthwind project.

As identified by Marine Scotland Science in the scoping opinion from 2019 based on the larger 2 turbine proposal *“Previous advice submitted by MSS on this interest found that given the small scale and the location and the work involved, the Development is unlikely to have significant unmitigated effects on commercial fisheries and this remains the case”*.

However, as the East Lothian Council (ELC) identified, that for *“transparency it would be preferable if the impacts as shown in the original ES are included or referred to, to allow members of the public to take a view on the effectiveness of mitigation.”* The ELC also stated that they were *“content that no further studies will need to be done if the turbines are located in the same position as already consented”*.

As the Scottish Ministers in the same scoping opinion stated they required the inclusion of the impact assessment *“shown in the original ES to provide evidence on the effectiveness of mitigation”*, the original assessment will be included with updated information.

The navigational aspects associated with commercial fishery activity will be included within the Navigational Risk Assessment.

9. SEASCAPE, LANDSCAPE AND VISUAL RESOURCES

9.1. Introduction

A Seascape, Landscape and Visual Impact Assessment (SLVIA) will be undertaken as part of the EIA in order to identify the likely significant effects of the proposed development on seascape, landscape and visual amenity. This section provides an initial overview of the baseline seascape, landscape and visual environment; the potentially significant effects of the proposed development to this baseline; the methods proposed to predict these impacts; and an outline of the primary mitigation proposed to avoid, reduce or offset seascape, landscape and visual effects. The proposed development consists of one offshore wind turbine and associated offshore infrastructure, as described in Chapter 4.

9.2. Project Envelope for SLVIA

The proposed development project envelope consists of one turbine with piled foundations and a cable corridor connecting each turbine to an onshore substation located on the Energy Park. The project will have a 25 year operational life.

The proposed development is in the same location and broadly similar in most aspects of the previously consented design envelope. However, the turbine is different to the 2B Energy design provisioned in the original consent. The new technology is visually similar to a 'conventional' offshore wind turbine, although it is larger, has a higher generation capacity and has a different internal technical design).

The SLVIA will be based on this project envelope consisting of a three bladed wind turbine design with a Blade Tip Height of up to 280m (rotor diameter 255m), with pin piled foundation.

A summary of the proposed development project envelope relevant to the seascape, landscape and visual impacts is set out below:

Table 10 - Project Envelope

Key Data and Dimensions of the Forthwind Turbine	
Number of blades	3
Orientation	Upwind
Direction of Rotation	Clockwise
Rotor Diameter	255 metres
Length of rotor	122.5 metres
Blade swept area	45,244 m ²
Hub height	156 m HAT
Tip height above HAT	280 m HAT
Blade Clearance to HAT	25 metres
Rated Capacity	up to 20 MW
Voltage	66kV
Converter	Full size
Structure	Tubular Steel Tower
Number of structure legs	4 legs on Steel Jacket / Transition Piece
Foundation	Pin piles (one per leg)
Design Life	25 years
M&O Access	Boat

Turbine heights are assumed to be above Highest Astronomical Tide (HAT). The turbine is located as shown in Figure 4 of this scoping report. All other figures associated with this chapter are presented in Appendix A of this report.

9.3. Baseline

9.3.1. Study Area for SLVIA

The proposed study area for the SLVIA of the proposed development will cover a radius of 50 km from the site boundary of the proposed development, as illustrated in the Blade Tip Zone of Theoretical Visibility (ZTV) in Figure 9.1. The ZTV indicates areas from where the proposed development is theoretically visible and helps to inform the selection of the study area in which seascape, landscape and visual impacts will be considered in more detail. The 50 km study area is considered to be the outer limit of the area within which likely significant effects could potentially occur, given the height of the turbine that is being considered for the proposed development; the landscape context within which it would be located and in accordance with current best practice and guidance. The 50 km radius SLVIA study area was therefore defined to extend far enough to include all areas within which significant effects could occur, including cumulative impact of wind farms located beyond this distance, using professional judgement.

Within this 50 km study area, the SLVIA will focus on the assessment of seascape, landscape and visual effects within an 'inner study area' of 25 km radius, as shown in Figure 9.1, where the significant seascape, landscape and visual effects are more likely to occur. A 25 km radius inner study area is considered to be the area within which significant landscape and visual effects are more likely to occur, based on review of the ZTV (Figure 9.1), which is in line with previous consultation advice from NatureScot on the consented project, which identified a 10-12km significance zone.

Potential cumulative effect interactions with other offshore wind farms have also influenced the study area for the SLVIA. Other wind farms with which the proposed development may have significant cumulative effects and affect decision making are shown in Figure 9.5. The proposed development is located approximately 1.4 km from the Levenmouth Demonstration Turbine, sited on the coastal edge at Fife Energy Park – a 7MW demonstration offshore wind turbine, one of the largest wind turbines in Scotland (196m blade tip height).

9.4. Defining Impact Significance

The objective of the assessment is to predict the likely significant effects of the proposed development on the seascape, landscape and visual (SL&V) resource. In accordance with the EIA Regulations, SL&V effects will be assessed to be either significant or not significant. The methodology to undertake the SLVIA will reflect the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (GLVIA3) (Landscape Institute 2013). The SLVIA will not define intermediate levels of significance as the EIA Regulations do not provide for these.

The significance of the effect on each seascape/ landscape character receptor will be dependent on all of the factors considered in the sensitivity of the receptor and the magnitude of change resulting from the proposed development. Factors which influence levels of sensitivity and magnitude of change assessed in the SLVIA will be set out in full in the SLVIA as part of the Environmental Statement (ES).

The significance of impacts will be assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor/view and the magnitude of change that will result from the proposed development. In accordance with GLVIA3, the SLVIA methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change the more likely that a significant impact will arise.

Judgements on sensitivity and magnitude of change will be combined to arrive at an overall assessment as to whether the proposed development will have an effect that is significant or not significant on each seascape/ landscape and visual receptor. An assessment of the factors considered in the evaluation of the sensitivity of each seascape/ landscape and visual receptor and the magnitude of the change resulting from the proposed development will be presented, in order that the relevant considerations which have informed the significance can be considered transparently. The matrix in Table 11 helps to inform the threshold of significance when combining sensitivity and magnitude to assess significance.

The SLVIA will determine whether impacts are beneficial, neutral or adverse in accordance with defined criteria. The impacts of the proposed development will also be of variable duration, and will be assessed as short-term or long-term, and permanent or temporary/reversible.

Table 11 - Impact Significance Matrix - Seascape / Landscape Effects

		Magnitude of change					
		High	Medium-high	Medium	Medium-low	Low	Negligible
Sensitivity	High	Significant	Significant	Significant	Significant or not significant	Not significant	Not significant
	Medium-high	Significant	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant
	Medium	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant
	Medium-low	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant	Not significant
	Low	Significant or not significant	Not significant	Not significant	Not significant	Not significant	Not significant

9.5. Potential Impacts

9.5.1. Seascape Character

Seascape, like landscape, is about the relationship between people and place and the part it plays in forming the setting to our everyday lives. Seascape results from the way that the different components of the environment – both natural and cultural - interact together and are understood and experienced by people. Seascape is defined by NatureScot in its offshore renewables guidance (NatureScot, March 2012) as ‘the visual and physical conjunction of land and sea which combines maritime, coast and hinterland character’. Without exception ‘seascape’ will exist in a coastal landscape context and influence its character.

In defining the baseline character of the study area, the SLVIA will utilise the coastal character method described in NatureScot’s Coastal Character Guidance (NatureScot, February 2016), which sets out a method to assess the character and visual qualities of the coastal landscape and seascape. Areas of

consistent seascape character will be defined as 'Coastal character Areas' where they have a strong integrity, such as a specific bay or stretch of coast.

Unlike the series of Landscape Character Assessments that NatureScot commissioned in the 1990's, NatureScot does not intend to conduct a similar exercise for the entirety of the Scottish coastline. Parts of the coast within the study area have, however, been characterised broadly at the national scale by Scott et al (NatureScot, 2005)¹¹; at the regional level by the Forth and Tay Offshore Wind Developers Group (FTOWDG, 2011) in relation to the east coast Scottish offshore wind farms (Inch Cape, Neart na Gaoithe and Seagreen Alpha and Brava Offshore Wind Farms); and at the local level by Forthwind in relation to the Forthwind Offshore Wind Demonstration Project (Forthwind Ltd, Environmental Statement, July 2015). This hierarchy of published coastal character assessments is shown in Figure 9.4b, c and d.

Based on the published coastal character assessments, the proposed development is located offshore from the following seascape/coastal character areas:

- National – Developed Inner Firths (Type 5), near the boundary with Outer Firths (Type 4) within 'Area 2 – Firth of Forth'.
- Regional – Kirkcaldy and Largo Bay (SA14).
- Local – West Wemyss to Buckhaven (E) and Buckhaven/Methil/Leven (F).

The key coastal characteristics for the Firth of Forth area around the proposed development, summarised from these published assessments, are as follows:

- Long sandy beaches interspersed with low rocky headlands, including the wide Largo Bay. The shore is varied, including areas of re-claimed land, including coal mining spoil heaps, protected by sea-defences.
- Backed by arable farmed carse of varying width contained by Lammermuirs in East Lothian; coastal wooded braes contain a narrower coastal edge within Fife.
- Well settled coastal fringe with Edinburgh and other large urban areas present, often with industrial character. Strong cultural history and identity associated with the Firth.
- The seascape is influenced by the presence of masts, large scale industrial development and by the developed coastal edges.
- Industry, bridges and infrastructure are a feature, some oil rigs and ports in Firth.
- The stretch of coast is settled, with lighting associated with the docks and harbours, roads and industrial development dispersed along it. Relatively well-lit with settlements forming an almost continuous lit coastal edge around the Firth at night.
- There is movement from marine activities within the Firth of Forth, around docks at the coastal edge and roads/railways between settlements. Busy seascape with shipping movements fairly constant and air traffic common from Edinburgh airport.

¹¹ To note, the only relevant information in this report is the national coastal/seascape character types (13 in number). The other aspects of this report will not be used as it is no longer relevant.

- Highly visible seascape seen from settlements and routes. High inter-visibility between Fife and Edinburgh/Lothians. Views focus on distinctive islands within Firth, land either side including 'landmark' hills and channelled to open sea beyond inner firth.
- Often highly modified, the area is heavily influenced by large scale development, contrasting with smaller scale coastal villages and accessible recreational coast, with some notable tourist areas, coastal paths, sailing, golf and holiday resorts.
- Areas of highest capacity to accommodate offshore wind turbines are at the transition between Inner and Outer Firths, with the aim of relating to existing industrial structures on the edges of large settlements.

At the local level, the coastline nearest to the proposed development is strongly influenced by urban and industrial development. At Buckhaven, the influence is from residential development and the adjacent Fife Energy Park - an engineering and research zone with easy access to the offshore energy market in the North Sea. The land is formed by industrial development and reclaimed land with a quayside, where large vessels are often moored, large oil-rig sheds, cranes and other heavy engineering equipment. To the north of the Fife Energy Park lies Methil Docks, a bulk commodity distribution centre, with facilities to accommodate the repair, maintenance and supply of offshore drilling rigs and tankers.

The proposed development is located off the 'coal coast' of Fife (Brown, 2004), which has an industrial history and visual context associated with resource utilisation and large coastal structures/landmarks. Dating back to the coal hoists, these structures were used at Methil docks in the late c19th (used to lift coal mined locally onto ships); latterly the Methil Power Station; and currently in the form of renewables fabrication, wind turbine generation and energy park land uses. The Former Methil Power Station (a coal slurry-fired power station) formed a local landmark until it was demolished in 2011. The chimney stack in particular was a major part of the local landscape. Oil rig sheds and yards are now used for the fabrication of renewable energy structures, such as jackets for offshore wind turbines. The Hydrogen Office now has offices nearby which use a ground source heat pump, a wind turbine and a fuel cell to convert the hydrogen back to electricity. Levenmouth Demonstration Turbine (1 x 196m) is within the Energy Park on the coastal edge – a 7MW demonstration offshore wind turbine.

The SLVIA will carry out a local level coastal character assessment of the Fife coastline that may experience significant effects as a result of the proposed development, principally between Kinghorn and Anstruther; and of the East Lothian coastline between the Musselburgh and North Berwick (St Baldred's Boat). This coastal character assessment will draw on and update the 'local seascape character units' identified in Forthwind Demonstration July 2015 ES, in light of more recent coastal character assessment guidance (NatureScot, February 2016).

Effects on coastal character may occur primarily as a result of visibility of the proposed development during operation. In the context of the proposed development, only the visual/perceptual characteristics of coastal character areas are therefore relevant when considering potential effects, given that there will be no alteration to physical features as a result of offshore development. The SLVIA will assess the effects of the proposed development on the visual/perceptual aspects of coastal character within the 25 km radius inner study area where there would be visibility that may influence the perceived character of coastal areas of East Lothian, principally between Musselburgh and North Berwick.

The SLVIA will articulate the regional importance of the Firth of Forth as a gateway and consider the relationship between the northern and southern shores and how this landscape has altered over time.

The likely significant effects of the proposed development on coastal character will be assessed in the SLVIA, focusing on the coastal character areas that are most susceptible to changes resulting from the proposed development.

9.5.2. *Landscape Character*

Landscape character principally applies to terrestrial areas lying to the landward side of the high-water mark, however landscape character contributes to seascape character and vice versa in coastal areas. The baseline landscape character of the study area is described in several published landscape character assessments, including primarily the Fife Landscape Character Assessment (NatureScot, 1999), The Lothians Landscape Character Assessment (NatureScot, 1998) and the Edinburgh Landscape Character Assessment (NatureScot, 2010). The mapping and the associated descriptions of landscape character types (LCTs) or landscape character areas (LCAs) provide a recognised spatial framework (Figure 9.2a and 9.2b).

As the proposed development is located at sea, it does not lie within any LCT, with the nearest being the Urban LCT (19) covering the settlements of Methil, Buckhaven, Leven, East Wemyss, Windygates and Kennoway on the Fife coast. The coastal parts of the Urban LCT are strongly influenced by industrial and infrastructure development including Methil Docks and Fife Energy Park. The combined settlements are located within a broad floodplain, the setting to which is formed by the Coastal Flats (3), Coastal Hills (4), Lowland Dens (9), Lowland River Basin (14) and the Pronounced Volcanic Hills & Craigs (15) LCTs (Figure 9.2a), and by the seascape of the Firth of Forth. Coastal Terraces (6) extend from Elie and Earlsferry along the coast north to Crail.

Of most relevance to the SLVIA of the proposed development are the LCTs which extend along the Fife coastline (Figure 9.4) with visibility of the proposed development, between Kinghorn and Anstruther. The SLVIA will prepare a baseline description of relevant LCTs within the study area and focus on assessing the likely significant effects of the proposed development on the above identified LCTs, which are considered most susceptible to changes as a result of the proposed development.

Despite views across the Fife coastline acting as an important component for the coastal character, significant effects on the landscape character of terrestrial LCTs in the Edinburgh and East Lothian regions are unlikely to arise as a result of the proposed development. This is primarily due to the long distance of the proposed development from East Lothian (approximately 16.3 km from the coast) and the Edinburgh waterfront (22.5 km).

The significance of effects arising as a result of the proposed development on the perceived landscape character of terrestrial areas of the study area will, however, be assessed in the SLVIA, principally along the coastal hinterland of Fife between Kinghorn and Anstruther and East Lothian between Musselburgh and North Berwick, being most relevant to the SLVIA. Likely significant effects of the proposed development on LCTs along this section of coastline within the 25 km radius inner study area will be considered within the SLVIA.

9.5.3. *Landscape Designations*

The proposed development is located outwith any areas subject to international, national or regional landscape designations intended to protect landscape quality, as shown in Figure 9.3a and 9.3b. There are no statutory landscape designations of national importance within the study area.

There are landscape designations of local importance in Fife, East Lothian and Edinburgh which will potentially be affected by the proposed development. A review of the distribution of these areas in relation to the ZTV and the qualities for which the areas are designated will be undertaken as part of the SLVIA, in order to identify whether significant effects would be likely to occur.

The following local landscape designations are likely to be most relevant for assessment in the SLVIA:

Fife Local Landscape Areas (LLA)

- Cullaloe Hills and Coast LLA (12.4 km to the southwest of the proposed development).
- East Neuk LLA (7.4 km to the northeast of the proposed development).
- Largo Law LLA (6.7 km to the northeast of the proposed development).
- Lomond Hills LLA (11.2 km to the northwest of the proposed development); and
- Wemyss Coast LLA (3.8 km to the west of the proposed development).

East Lothian Special Landscape Areas (SLA)

- Fisherrow Sands SLA (23.2 to the south of the proposed development)
- Prestonpans Coast SLA (21.9 km to the south of the proposed development)
- North Berwick to Seton Sands Coast SLA (16.0 km to the southeast of the proposed development).
- Tantallon Coast SLA (17.2 km to the southeast of the proposed development).
- North Berwick Law SLA (21.4 km to the southeast of the proposed development).

Gardens and Designed Landscape (GDLs) are of national importance and while they are not afforded statutory protection, local authorities are required to make provision for the protection of the historic environment when preparing development plans and determining planning applications.

The SLVIA will assess the potential effects of the proposed development upon views to and from GDLs and considers the contribution they make to landscape character and the effects of the proposed development on this aspect. Within the Fife part of the study area, several Inventory GDL sites are identified as lying within areas which have theoretically visibility and will be assessed in full in the SLVIA. These are listed below and are also shown on Figure 9.3a and 9.3b:

- Balbirnie House (adjoins the eastern built-up edge of Glenrothes).
- Balcarres House (lies approximately 5 km north of Earlsferry).
- Charleton House (lies approximately 4.5 km east of Lower Largo).
- Dysart House and Ravenscraig Park (on the coast between Kirkcaldy and Dysart).
- Lahill House (lies approximately 5 km east of Lower Largo).
- Leslie House (within the built-up confines of Glenrothes).
- Letham Glen (adjoins the northern built-up edge of Leven).
- Raith Park & Beveridge Park (adjoins the western built-up edge of Kirkcaldy); and
- Wemyss Castle (on the coast at West Wemyss).

Significant effects on the GDLs in the Edinburgh and East Lothian regions are unlikely to arise as a result of the proposed development, due primarily to the long distance of the proposed development from the designed landscapes and can be scoped out of the SLVIA, with the exception of Newhailes House which has views across the Firth of Forth and will be considered in the SLVIA.

9.5.4. *Visual Receptors and Views*

9.5.3.1. Zone of Theoretical Visibility

Visual effects will occur when the introduction of the proposed development changes or influences the visual amenity and views experienced by people in the area. The visual baseline is defined by the Zone of Theoretical Visibility (ZTV) (Figure 9.1). The ZTV shows the main area in which the development will be visible, highlighting the different groups of people who may experience views of the proposed development and the viewpoints where they may be affected. The ZTV shown in Figure 9.1 is based on the project envelope in Section 9.2 and is representative of the maximum visibility scenario.

The scope of the visual assessment will be based on the ZTV for the proposed development, which assists with the identification of the principal visual receptors and viewpoints, as illustrated in Figure 9.1. The ZTV broadly shows the proposed development will primarily be visible from the inner Firth of Forth, approximately between Kinghorn, Edinburgh, North Berwick and Fife Ness; the Fife coast between Kinghorn and Anstruther, extending inland to the coastal hills of Fife and the Lomond Hills; Edinburgh and its waterfront; the East Lothian coastline and immediate coastal plain between Musselburgh and North Berwick.

Within the study area there are a number of settlements, routes and attractions which may obtain views of the proposed development thereby affecting visual amenity. The principal visual receptors which are likely to be most susceptible to visual effects arising from the proposed development are shown in Figure 9.1. The principal visual receptors in the study area include people within settlements, driving on roads, passengers on main rail routes, visitors to tourist facilities or historic environment assets, and people engaged in recreational activity, such as on walking and cycle routes. These principal visual receptors are described briefly below.

9.5.3.2. Settlements

The coastline opposite the proposed development and to the southwest is more densely settled than the coastline to the northeast. The main coastal settlements are Kirkcaldy, Leven, Methil and Buckhaven with the smaller villages of West Wemyss and East Wemyss lying in between. East of the development along the coast settlements are generally smaller in size and more sparsely distributed. The main settlements are Lundin Links, Lower Largo, Earlsferry, Elie, St. Monans, Pittenweem, Anstruther Wester, Anstruther Easter and Crail. Inland, the main settlement is Glenrothes with Kennoway and Windygates lying immediately to the west of Methil and Leven. The effect of the proposed development on these settlements will be assessed in the SLVIA.

Edinburgh is the main settlement on the south side of the Firth of Forth at a distance of approximately 19.6 km. There are a number of settlements to the east of Edinburgh and on the north coast of East Lothian including Musselburgh, Prestonpans, Cockenzie and Port Seton, Longniddry, Aberlady, Gullane and North Berwick. These settlements look out across the open water of the Firth of Forth and views of the proposed development would potentially be experienced.

Outside the settlements there is an even distribution of farmsteads and rural properties in addition to many small villages and hamlets. It is not possible to visit every residential property that falls within the ZTV shown in Figure 9.1. The SLVIA will therefore consider both the effect of the proposed development on the previously mentioned settlements as well as the effects on rural properties in the assessment of overall effects on visual amenity.

9.5.3.3. Roads

The proposed development is located adjacent to a developed part of the coast with a well-populated expanse of farmland across which is a well distributed network of major and minor roads. The proposed development has the potential to affect a number of roads in the study area to varying degrees. The SLVIA will consider the main roads passing through the study area and in particular those running parallel to the coast. The SLVIA will assess the effects on the A92, A911, A6137, A198/B1348 A912, A914, A915, A916, A917, A921 and A955. Effects on other roads such as the B927, B942, B941 and unclassified roads in the local area will be considered in the assessment of overall effects on visual amenity.

9.5.3.4. Walking Routes

The Fife Coastal Path passes within 2 km of the proposed development and users of the path are likely to be affected by it. The path is 187 km in length following the coast between Kincardine and Newburgh. The effects of the proposed development will be considered in the context of the entire length of the path although the focus is upon the section between Kinghorn and Anstruther West as the ZTV (Figure 9.1) indicates there may be visibility of the proposed development primarily from this stretch of the path.

The John Muir Way is a long distance footpath that passes within approximately 18.1km of the proposed development. The path is 214 km in length running between Helensburgh in the west to Dunbar in the east and passing through many of the northern coastal settlements of East Lothian. The ZTV (Figure 9.1) indicates that users of the footpath would potentially be affected by the proposed development. Local footpaths identified in the Fife Council Core Path network will be assessed in the SLVIA and considered in the assessment of overall effects on visual amenity.

9.5.3.5. Cycle Routes

There are three National Cycle Network (NCN) routes, numbers 1 and 76 and one Regional Cycle Route (RCR), number 63 within the study area and with the potential to be affected by the proposed development.

NCN 1 is a long distance route that connects Dover with Shetland via the east coast of England and Scotland and forms the majority of the British section of the North Sea Cycle Route which follows the coast of countries fringing the North Sea including the UK, Holland, Denmark and Norway. NCN 76 runs from Berwick-upon-Tweed to Edinburgh, Stirling and St Andrews. The route follows the coastline of the Firth of Forth. NCN 766 runs from Kirkcaldy to Milldeans Wood north of Glenrothes linking NCN 1 and NCN 76. The effect of the proposed development on these cycle routes will be assessed in the SLVIA.

9.5.3.6. Country Parks

Country Park is a non-statutory designation. Country Parks are areas of land close to towns and cities that are managed to give people convenient opportunities to enjoy the countryside and for open air recreation. There are three Country Parks in Fife: Craigtoun, Lochore Meadows and Townhill. Of these, only Loch Ore Meadows has the potential to be affected by the proposed development as indicated by the ZTV (Figure 9.1). There is one Country Park in East Lothian: John Muir Country Park, which will not be affected by the proposed development.

9.5.3.7. Regional Parks

Regional Parks are large areas of attractive countryside which lie close to Scotland's larger towns and cities and are popular for outdoor recreation. The parks have been created in order to provide co-ordinated management for recreation alongside other land uses such as farming and forestry.

The Lomond Hills Regional Park (LHRP) is situated within the 25km inner study area, and the Pentland Hills Regional Park (PHRP) is located approximately 32 km to the southwest of the proposed development. The LHRP is centred on the Lomond Hills and covers an area of approximately 6,645 ha. The two most noticeable hills are West Lomond (522 m) and East Lomond (424 m) which are prominent landmarks within Fife and from East Lothian. The southeastern edge of the LHRP lies approximately 9.5 km northwest of the proposed development. The effect of the proposed development on the LHRP will be assessed in the SLVIA.

The ZTV indicates fragmented and partial theoretical visibility of the proposed development from the PHRP. Given the long distance between the PHRP and the proposed development, and the fact that it would be indirectly affected, it is considered unlikely that the proposed development will give rise to significant effects on views from, or the landscape character of, the PHRP and these can be scoped out of the SLVIA.

9.5.3.8. Golf Courses

In response to comment within the Original 2017 Scoping Opinion, an assessment of the effects on views experienced from two golf courses will be assessed within the SLVIA - the Muirfield and the Renaissance at Archerfield, with both affording theoretical visibility of the proposed development, as indicated by the ZTV (Figure 9.1) and the potential for views across the Firth of Forth to be affected by the proposed development.

9.5.3.9. Other Visitor Attractions

Forth Bridges

Informal consultations with Fife Council and NatureScot highlighted the need to consider views of the proposed development from the Forth Road and Rail Bridges. The bridges are distinctive features in the Fife landscape that are recognised internationally in which the Forth Rail Bridge is also classed as a World Heritage Site. The ZTV (Figure 9.1) indicates that the majority of the routes across the Forth Road Bridges have no visibility of the proposed development, largely due to the view being intervened by the Forth Rail Bridge. However, this is based on a 2m viewing height, not the actual deck level of the road bridges. Wireline views from deck level on the southern side of the Forth Road Bridge within the main area of theoretical visibility has been reviewed and indicate very limited visibility of the proposed development, which will be screened in the main by the intervening coastal landforms at Kinghorn Ness.

It is considered that the proposed development is unlikely to result in significant effects on views from the Forth Road Bridges and that views from these bridges can be scoped out of the SLVIA. However, the effect of the proposed development on the eastward views from the train as it crosses the Forth Rail Bridge will be assessed in the SLVIA.

9.5.3.10. Viewpoints

Consultations with Fife Council and NatureScot regarding the viewpoints to be included in the SLVIA have been ongoing and include feedback from the Original 2017 Scoping Opinion. A consolidated viewpoint list for the SLVIA is proposed in Table 12 with locations shown in the ZTV in Figure 9.1,

following consideration of the combined feedback to date, the potential landscape and visual receptors that are described above and the ZTV for the proposed development.

Viewpoints are located around the Fife coastline in order to allow assessment of the effects of the proposed development on views experienced by residents within the local communities, both from the main settlements and road routes; together with people visiting and taking part in recreation particularly along the coast between Kinghorn and Elie/Earlsferry. Further viewpoints are also included from inland areas of Fife with more distant views and from notable hill summits. Viewpoints are also included within Edinburgh and East Lothian on the southern side of the Firth of Forth.

Existing baseline photography is already available from the majority of viewpoint locations in Fife which was undertaken in June 2016 and September 2017 as part of earlier SLVIA work on the Forthwind Project. It is assumed that the baseline viewpoint photography from these viewpoints can be used for the photomontages in the EIAR. Any material changes in the baseline views will be identified and highlighted during survey work, so that an approach to updating photography can be agreed, if necessary, on a case-by-case basis. New viewpoint photographs will be undertaken in summer 2021 for a number of additional viewpoints and the three proposed night-time viewpoints, where a photograph is not currently available.

9.5.3.11. Night-time effects

Due to the height of the proposed turbine, it will require to be lit with a 2,000cd red aviation light (fixed not flashing) at nacelle height and low intensity aid to navigation (marine) lighting at the platform height that have the potential to be visible at night. The met mast is also likely to need an aviation light. The visual effects of these lights at night will be assessed in the SLVIA, with reference to ZTV mapping showing the visibility of the lights in the Study Area and night-time photomontage visualisations showing lighting from three proposed viewpoints at public locations on the Fife Coast (East Wemyss), within Edinburgh (Calton Hill) and on the East Lothian Coast (North Berwick) (as identified in Table 12).

Table 12 - Viewpoints included in the SLVIA

New ID	Old ID	Viewpoint	Easting	Northing	Distance (km)	Rationale
Fife						
1	1	Buckhaven, Shore Street	335930	697809	1.94	Included, view from Buckhaven, one of the closest residential areas
2	3	East Wemyss, Fife Coastal Path	334272	696911	3.56	Included, view from East Wemyss, one of the closest residential areas. Night-time view from this location is proposed to be included.
3	4	West Wemyss, Fife Coastal Path	332696	694664	5.77	Included, view from West Wemyss, one of the closest residential areas. In Wemyss Coast LLA.
4	5	Leven, Fife Coastal Path	338631	700779	3.54	Included, view from settlement of Leven/Fife coastal path to the west.
5	6	A915, Wemyss Coast	333037	698042	4.83	Included, view from closest section of A915 Fife tourist route. In Wemyss Coast LLA.
6	7	Kennoway	335646	701963	5.11	Included, view from Kennoway, residential area representative of view from slightly inland from coast.
7	8	Fife Coastal Path, Lundin Links	340760	702549	5.99	Included, view from Lundin Links, residential area, golf course and Fife Coastal Path.
8	10	Lower Largo	342211	702611	6.87	Included, view from settlement of Lower Largo, beach with recreation and Fife Coastal Path.
9	12	A917 near Drumeldrie	344335	703183	8.76	Included, view from Drumeldrie and A917 road to Elie/Earlsferry with view over Largo Bay. Within Largo Law LLA.
10	13	Largo Law Summit	342672	704968	9.05	Included, view from Largo Law, within Largo Law LLA. Panoramic view over Fife coast and Firth of Forth.
11	14	Kirkcaldy, Esplanade	327956	690308	12.1	Included, view from settlement of Kirkcaldy and Fife Coastal Path.
12	15	Earlsferry, Links Road	348085	699732	10.55	Included, view from edge of settlement of Earlsferry across links. Within East Neuk LLA.
13	17	Elie, The Toft	349382	699909	11.85	Included, view from settlement of Elie, near harbour/beach and Ship Inn. Popular tourist/visitor location, with distinctive sense of place.

New ID	Old ID	Viewpoint	Easting	Northing	Distance (km)	Rationale
14	18	Kinghorn, Fife Coastal Path	327614	687573	14.11	Included, view from Kinghorn, Fife Coastal Path and Cullaloe Hills & Coast LLA.
15	19	East Lomond Summit	324447	706172	16.02	Included, Lomond Hills Regional Park and LLA. Popular walk and distinctive hill summit.
16	26	Benarty Hill	315369	697879	22.45	Included, view from hill summit with panoramic views over Fife, Loch Leven and to the Fife of Forth. Within Loch Ore & Benarty LLA. Requested by Fife Council/NatureScot.
17	N/A	Pettycur Road, Kinghorn	326960	686657	15.22	Included, view from Kinghorn, Fife Coastal Path and Cullaloe Hills & Coast LLA. Requested by Fife Council.
East Lothian						
18	22	Gullane Beach	347739	683165	17.29	Included, view from benches at the car park of the popular beach in closest parts of East Lothian coast. Located within Port Seton & North Berwick Coast cSLA. Requested by East Lothian Council. Replaces previous viewpoint on Marine Terrace.
19	23	Aberlady Bay footbridge	347114	680519	19.2	Included, view from popular recreational area/beach in closest parts of East Lothian coast. Located within Port Seton & North Berwick Coast cSLA. Requested by East Lothian Council. Replaces previous viewpoint on A198 Aberlady Bay.
20	24	North Berwick (north of Harbour)	355362	685665	21.07	Included, view from settlement of North Berwick and popular recreational area/beach in closest parts of East Lothian coast. Located within Tantallon Coast cSLA. Requested by East Lothian Council. Night-time view from this location is proposed to be included.
21	N/A	North Berwick Law	355635	684237	22.13	Included, view from the OS viewpoint at the Whale Jawbone Arch. Popular walk and distinctive hill summit. Requested by East Lothian Council.
Edinburgh						
22	25	Calton Hill, Edinburgh	326268	674272	25.79	Included, view from settlement of Edinburgh and Calton Hill popular tourist/visitor destination to experience panoramic

New ID	Old ID	Viewpoint	Easting	Northing	Distance (km)	Rationale
						<p>views over Edinburgh and the Firth of Forth in which key information boards are located on the lower, north-facing paths promoting the local area.</p> <p>Night-time view from this location is proposed to be included.</p>

9.6. Potential Impacts

9.6.1. *Potential impacts during construction*

The seascape, landscape and visual effects that could arise as a result of the proposed development during construction are identified as follows:

- Effects on coastal/seascape character, within identified seascape character areas primarily as a result of wind turbine installation during construction, either as result of physical effects within the seascape character area, or the visual/perceptual characteristics of seascape character areas.
- Effects on landscape character, within terrestrial landscape character areas and landscape designations, primarily as a result of visibility of wind turbine installation during construction. In the context of the proposed development, only the visual/perceptual characteristics of onshore LCAs with seascape as a defining attribute are relevant when considering potential effects, given that there will be no alteration to physical features as a result of offshore development.
- Visual effects on views, primarily as a result of visibility of wind turbine installation and offshore export cable laying during construction, experienced by visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape.

9.6.2. *Potential impacts during operations*

The seascape, landscape and visual effects that could arise as a result of the Proposed development during operation are identified as follows:

- Effects on coastal/seascape character, within identified seascape character areas, primarily as a result of offshore wind turbine operation, either effecting the pattern of elements that define the character or effecting the visual/perceptual characteristics of seascape character areas.
- Effects on landscape character, within terrestrial landscape types and landscape designations, primarily as a result of visibility of the offshore wind turbines during operation. In the context of the proposed development, only the visual/perceptual characteristics of onshore LCAs with seascape as a defining attribute are relevant when considering potential effects, given that there will be no alteration to physical features as a result of offshore development.
- Visual effects on views, primarily as a result of offshore wind turbine operation, experienced by visual receptors (groups of people) with visibility of the proposed development, on specific views and on their visual amenity/experience of the landscape. Visual effects on views at night-time as a result of navigational lighting and aviation lighting of offshore wind turbines.

9.6.3. *Potential impacts during decommissioning*

The effects of the proposed development during decommissioning will be similar to those identified during construction.

9.6.4. *Potential cumulative impacts*

The SLVIA for the proposed development will fully address the issue of cumulative impact, to assess the combined visual effects of the proposed development with other existing or reasonably foreseeable marine and coastal developments and activities, including offshore and onshore wind energy developments, within the study area. The 50 km will apply to the cumulative assessment study area as well and the SLVIA will include all operational, consented and application stage wind farms. A

provisional wind farm search map for the study area is shown in Figure 9.5, which will be updated during the SLVIA.

The proposed development is located approximately 1.4 km from the Levenmouth Demonstration Turbine, sited on the coastal edge at Fife Energy Park – a 7MW demonstration offshore wind turbine, one of the largest wind turbines in Scotland (196m blade tip height). The SLVIA will also assess the cumulative effect of the proposed development in addition to the following proposed east coast Scottish offshore wind farms - Neart na Gaoithe (44.9 km) and Inch Cape (57.6 km).

The study area includes several onshore wind energy developments, also shown in Figure 9.5, including most notably the nearby operational Methil Docks turbine (1 x 78.5m) and Earlseat Wind Farm (8 x 120.5m).

The cumulative SLVIA will seek to focus detailed assessment on the cumulative effects of the proposed development with other wind farms within a main ‘influencing distance’, primarily those which are located within 25 km of the proposed development and considered to be most pertinent to the potential cumulative effects. The extent to which these cumulative effects may arise will depend primarily on the siting of the proposed development turbines and the height of the turbines. Temporary oil rig berths in the Firth of Forth will also be considered as part of the baseline conditions present in the seascape.

The assessment of effects on representative viewpoints will consider the fact that the operational Levenmouth turbine previously had planning permission for a period of five years and in August 2018 the existing application was varied to extend the operational life of the turbine by 10 years (to 2028).

The key impacts to be considered as part of the CLVIA are likely to be:

- Cumulative effect of the proposed development with the operational Levenmouth Demonstration turbine and Methil Docks Wind Turbine, as the closest wind turbines, to which the proposed development will directly relate and be viewed in combination.
- Extent to which the proposed development may either extend the ZTV or the scale of effects, when considered in combination with these operational turbines.
- Cumulative landscape and visual effects of the proposed development on the closest coastal areas of Fife, particularly the settlements of Buckhaven-Methil-Leven and East Wemyss/West Wemyss, where the proposed development may result in turbines being close to the coast; and where differences in scale will be most noticeable from viewpoints along and close to the coast.
- Cumulative effects on coastal character and views, in succession and sequentially, with the Neart Na Gaoithe offshore wind farm.

9.6.5. Summary of potential impacts

The table below provides a summary of impacts relating to landscape and visual impacts (scoped in (✓) and scoped out (x))

Table 13 – Summary of Potential Effects on Seascape, Landscape and Visual Receptors

Potential Impacts	Construction	Operation	Decommissioning	Rationale
Seascape, landscape and visual, and	x	x	x	

Potential Impacts	Construction	Operation	Decommissioning	Rationale
cumulative effects, of the proposed development on seascape, landscape and visual receptors beyond 50 km radius study area.				50 km radius SLVIA study area accords with relevant guidance (NatureScot, 2014) and represents the outer possible limit for significant effects to arise based on professional experience and review of the visibility of the proposed development on relevant seascape, landscape and visual receptors. SLVIA will focus on assessment within an 'inner study area' of 25 km radius, where significant seascape, landscape and visual effects are more likely to occur.
Effects of the proposed development (including cumulative) on seascape and landscape character of Fife and its Firth of Forth coastline, within 50 km radius study area.	✓	✓	✓	
Visual effects of the proposed development (including cumulative) on visual receptors and views within the ZTV in 50 km radius study area.	✓	✓	✓	
Visual effects of the proposed development (including cumulative) on visual receptors and views within the ZTV in 50 km radius study area at night.	✓	✓	✓	
Effects of the proposed development (including cumulative) on seascape and landscape character of Fife and East Lothian and their Firth of Forth coastlines, within 25 km radius inner study area.	✓	✓	✓	No alteration to physical features of these terrestrial areas as a result of the proposed development, located offshore, only effects on visual/perceptual characteristics. Potential for significant effects on perceived coastal character and landscape character of Fife and East Lothian will be assessed along closest sections of these coastlines within 25 km radius inner study area.
Visual effects of the proposed development (including cumulative) on visual receptors and views outwith the ZTV.	×	×	×	Proposed development will result in no effects on seascape, landscape and visual receptors outwith the ZTV.

9.7. Mitigation

9.7.1. Introduction

Options for mitigation of the identified potential effects which are predicted to arise from the development will be considered, iteratively alongside the assessment. Practical measures will be proposed and agreed to avoid, reduce or off-set these effects. The SLVIA will identify measures for avoiding or reducing the level of significance of potential effects. These measures will potentially include primary mitigation measures embedded into the design; and measures additional to these which would further reduce long term seascape and visual effects.

Potential embedded mitigation measures for effects on seascape and visual effects include the site selection for development, e.g., locating at distance from the coast and the realisation of design objectives for the development, achieved through alterations to layout and design.

The mitigation measures proposed for the development will be dependent upon the final design of the site and the potential effects as determined by the EIA studies. Mitigation options will be discussed with the relevant stakeholders for the SLVIA.

Mitigation measures will be prepared in line with the design statement for the proposed development, illustrating the primary concept setting out known constraints; and a design concept plan considering the impacts of alternative layouts with reference to key guidance including NatureScot (May 2014) *Siting and Designing Wind Farms in the Landscape*.

Principal landscape and visual design considerations will be identified as part of the SLVIA, which will shape an appropriately designed wind farm at this location. Layout design objectives will be influenced by national guidance, such as NatureScot's 'Siting and Designing Wind Farms' (NatureScot, 2014) and are likely to include:

- Landscape/seascape character - layout to relate clearly to coastal character. Potential for the layout to relate to the linear nature of coastline and open seascape, with turbines located at increasing distance offshore.
- Visual effects on key viewpoints - Design of height and number of wind turbines and in response to their potential visual effects on the surroundings. Locating turbines to avoid obscuring views to specific landmarks. Design of lighting to minimise effects on views at night.
- Residential visual amenity – wind farm to be designed in response to potential visual effects on settlements on the coastal edge, particularly Buckhaven, Methil, West Wemyss and East Wemyss; and
- Cumulative effects - the location and design/appearance of the turbines within the context of other wind farms and the potential for cumulative effects to arise. Proposed development likely to introduce a degree of variation from existing wind turbines, but also achieve some consistency of image with features of the existing Levenmouth wind turbine.

9.7.2. *Siting of the Proposed Development – Landscape & Visual Aspects*

The proposed development is sited in a coastal location that has capacity to accommodate wind energy development. The suitability of industrial/urban coastlines, of large scale, where the inherent landscape character has been subject to modification is cited in several siting and design guidance

documents, as outlined above, as a factor which generally increases the capacity of the landscape to accommodate development.

Generally, the introduction of built development into previously undeveloped and remote seascapes can bring about a transformative change to the perception of that seascape. Development in previously developed areas may lead to a gradual rather than transformative change. The developed coast off which the proposed development is located, is less susceptible to character change, as it is in these areas where development of this scale is less likely to have a transformative effect.

The proposed development is located off the 'coal coast' of Fife (Brown, 2004), which has an industrial history and visual context associated with resource utilisation and large coastal structures/landmarks, dating back to the coal hoists used at Methil docks in the late c19th (used to lift coal mining locally onto ships). The settlements of Buckhaven, Methil, East and West Wemyss were all thriving coal mining towns along the coast, housing the local workforce. The Former Methil Power Station (a coal slurry-fired power station) formed a local landmark since the 1960's until it was demolished in 2011. The chimney stack, in particular, was a major part of the local landscape.

The character of the immediate coastline is now influenced by Energy Park Fife, an engineering and research zone within the energy sector with easy access to the offshore energy market in the North Sea. The Energy Park is an area of industrial development and reclaimed land with an abrupt seaward boundary with the shingle beach having been removed and replaced with a quayside against which barges, and other vessels are often moored. Oil rig sheds and yards are now used for the fabrication of renewable energy structures, such as jackets for offshore wind turbines; and there are existing large scale wind turbines at Methil Docks and the Levenmouth Demonstration Turbine (1 x 196m) on the coastal edge – a 7MW demonstration offshore wind turbine.

The proposed development will often be viewed from land in a flat expanse of sea, in combination with three existing oil rigs, which will be the main scale comparison and precedent feature in the water. The existing oil rigs are large scale features, which a larger massing and vertical form, with a comparable lattice/jacket form. The seascape is of medium to large scale, relatively open, with large scaling elements present.

Offshore wind farm development can conflict in scale with an intricate coastline made up of smaller scale seascapes and offshore islands. At this location, there is potential for the proposed development to better relate to the simple, open, relatively flat coastline. The immediate Fife coastline and the backdrop of East Lothian coast is relatively simple and linear in form, such that the proposed development can relate more easily to its context.

The proposed development avoids nationally designated/valued coastal landscapes. The coast has limited qualities of remoteness, tranquillity and dark skies associated with coast, due to the influence of existing urban and industrial development. The stretch of coast is relatively well-lit, with lighting associated with settlement, docks/harbours, roads and industrial development dispersed along it. Further lighting of the turbines within the proposed development would be seen in the context of this existing lighting.

There is potential for the proposed development to conflict with the small scale, traditional/historic settlements along the coast, such as at East and West Wemyss, however the proposed development would also relate to the existing larger scale infrastructure that already exists in the setting of these settlements.

There is some complexity to the existing land-use pattern along the coast, due to the variety in land use, but there is a general absence of focal points. With the exception of Largo Law, the main focal points are the existing two wind turbines at Methil Docks/Levenmouth, where there is scope to site development that relates to the existing wind turbine influence.

Movement is present in the existing seascape, ranging from the regular, sweeping movements of the existing wind turbines at Methil Docks/Levenmouth, the movements of large scale shipping in the water and docks. The proposed development will relate to the existing visual movement that is already characteristic of this seascape.

Exposure to the elements gives a good rationale for the siting of wind energy developments. This rationale would be served by siting windfarms in most places at distance offshore, but some seas are perceived as being more exposed than others. The inner Firth of Forth has relatively sheltered waters, where there is a risk that large scale wind energy developments may appear disproportionate to the perceived wind resource. The proposed development is sited near to the transition between the Inner and outer Firth of Forth, where the moderate number of turbines proposed would appear proportionate and rational to the wind resource.

The siting of the proposed development within an appropriate seascape that has the capacity to accommodate change is one of the primary mitigation measures that contribute to a reduction in potentially significant effects. Further primary mitigation measures are also proposed to be incorporated in the layout design of the Forthwind demonstration array.

9.8. Approach to Assessment and Data Gathering

Forthwind will be undertaking consultation with relevant consultees, including Fife Council and NatureScot, in order to define the scope of the SLVIA required for the proposed development.

The assessment would be undertaken in accordance with the methods outlined in the following best practice guidance documents:

- The Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment. Third Edition.
- NatureScot (March 2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments.
- NatureScot (February 2017). Visual Representation of Wind Farms: Version 2.2.
- The Landscape Institute (September 2019). Technical Guidance Note 06/19, Visual Representation of Development Proposals.
- NatureScot, (March 2012). Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape. Guidance for Scoping an Environmental Statement.
- NatureScot, (July 2018). Guidance Note Coastal Character Assessment Version 1a - July 2018.

Data would be gathered from official, reliable and the most up-to-date sources. This would include Ordnance Survey map based data, as well as data on landscape characterisation, landscape designations and other Governmental and local authority data of relevance.

The full methodology for the SLVIA would be agreed through further consultations with Fife Council and NatureScot and will address the 'Guidelines for the Assessment of Landscape and Visual Impacts: Third Edition'.

The objective of the assessment of the proposed development is to predict the significant effects on the landscape and visual resource. In accordance with the Environmental Impact Assessment Regulations 2011, the LVIA effects are assessed to be either significant or not significant.

The significance of effects is assessed through a combination of two considerations – the sensitivity of the landscape or visual receptor and the magnitude of change that will result from the proposed development. In accordance with the Landscape Institute's GLVIA3, the LVIA author's methodology requires the application of professional judgement, but generally, the higher the sensitivity and the higher the magnitude of change, the more likely a significant effect will be.

The objective of the cumulative SLVIA is to describe, visually represent and assess the ways in which the proposed development will have additional effects when considered together with other existing, consented or application stage developments and to identify related significant cumulative effects arising from the proposed development. The guiding principle in preparing the cumulative SLVIA is to focus on the likely significant effects and in particular those which are likely to influence the outcome of the consenting process.

The LVIA will determine whether effects are beneficial, neutral or adverse in accordance with defined criteria.

The effects of the proposed development are of variable duration, and are assessed as short-term or long-term, and permanent or temporary/reversible.

9.9. References

Brown, Hamish, 2004. Along The Fife Coastal Path.

Forth and Tay Offshore Wind Developers Group (FTOWDG, 2011). Scottish Offshore Wind Farms – East Coast. Regional Seascape Character Assessment: Aberdeen to Holy Island.

NatureScot, March 2012. Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape. Guidance for Scoping an Environmental Statement.

NatureScot, July 2018. Guidance Note Coastal Character Assessment Version 1a - July 2018 NatureScot.

NatureScot, 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06).

NatureScot, 1999. Fife Landscape Character Assessment.

NatureScot, 1999. The Lothians Landscape Character Assessment.

NatureScot, 2010. Edinburgh Landscape Character Assessment.

NatureScot, May 2017. Siting and Designing Wind Farms in the Landscape Version 3a.

10. ARCHAEOLOGY AND CULTURAL HERITAGE

10.1. Introduction

This section describes the consideration potential effects on the terrestrial cultural heritage resource. Cultural heritage resources include designated sites such as Scheduled Monuments, Listed Buildings, Conservation Areas, Inventoried Gardens and Designed Landscapes and World Heritage Sites, as well as non-designated archaeological remains and other archaeological sites as indicated by the Council's Historic Environment Record (HER).

10.2. Proposed Scope of the Archaeology and Cultural Heritage Assessment

The potential archaeological and cultural heritage assets to be affected directly (e.g., through physical disturbance during construction) is confined only to the onshore elements of the Development. This has a small footprint and is contained within the previously disturbed, made-ground at the Fife Energy Park site or on the managed shoreline. The potential for direct effects by the Development has already been assessed within Chapter 12 of the Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015, supported by the technical appendix A12.1: Archaeological Desk Based Assessment, which concluded that that no direct effects are anticipated during the construction, operation or decommissioning of the onshore work of the development. As the onshore scope of works (including direct effects at the cable landfall site), as described in Chapter 3 of the Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015, is the same for this application, the direct effects on archaeological and cultural heritage assets are scoped out.

The assessment will aim to identify archaeological and cultural heritage sites which may be affected, indirectly (e.g., through visual changes to the historic or archaeological setting) by the Development. In order to identify the cultural heritage features with the potential for their settings to be indirectly affected (visually) by the Development, an initial search area based on boundary 15 km radius of the Development is proposed.

Also, to note, this section addresses the effects on the terrestrial resource only, marine archaeology is addressed separately in section 16 of this scoping report.

10.3. Desktop Baseline Information

Data on heritage assets will be collected from the datasets held by Historic Scotland out to 35 km from the Development, in order to identify those cultural heritage assets which may receive a likely significant effect on their settings, thereby requiring detailed assessment.

Distance will be used as the principal criterion in determining the likelihood of a significant visual effect on setting for the purposes of a preliminary assessment and will be supplemented by information provided from the landscape and visual assessment once it is available.

Detailed assessment will be given to nationally important features within approximately 5 km of the Development, as based on conclusions of the previous ES of July 2015, these were judged to have the potential to receive a likely significant effect upon their settings. It is anticipated that the most significant effects on the settings of cultural heritage features will potentially occur within a 5 km radius of the Development and is what will be defined as the study area. Consideration will also be given to assets lying within the Zone of Theoretical Visibility (ZTV), and also to views where heritage assets and the Development might be seen together.

The final assessment will be based on the final site layout and distances to cultural heritage features are taken from the nearest proposed infrastructure or turbine rather than the Development application boundary.

10.4. Potential Effects

As stated previously the assessment will take account of the potential for effects on the settings of internationally and nationally important designated cultural heritage features situated within the Zone of Theoretical Visibility (ZTV) and within 35 km of the Development. A worst case scenario is based on a proposed maximum turbine tip height of 280m above HAT. The landfall/onshore element will not be considered in respect of indirect effects and will not cause any direct harm to archaeological interests (as it will be situated in made ground), and so will not be included in the worst case scenario.

The following key potential effects are considered within this scoping report:

10.4.1. Potential Effects during the construction phase

No effects are anticipated from construction upon any nationally important designated or non-designated cultural heritage features. It is proposed that this aspect is scoped out and is not considered further in the EIA process for this development application.

10.4.2. Potential Effects during the operational phase

There are potential indirect, visual effects upon the settings of some cultural heritage features within 5 km of the Development. These features will be identified and agreed with Historic Scotland.

10.4.3. Potential Effects during the decommissioning phase

No direct effects are anticipated from the decommissioning of the Development. No additional significant indirect effects are anticipated from the short term presence of plant, etc., required during this phase. It is proposed that this aspect is scoped out and is not considered further in the EIA process for this development application.

10.4.4. Summary of potential effects

The table below provides a summary of effects relating to cultural heritage from the proposed development. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 14 - Summary of Potential Effects on Archaeology and Cultural Heritage

Potential Effects	Construction	Operation	Decommissioning	Rationale
Direct physical effects	x	x	x	The onshore footprint is small and on a heavily modified site of reclaimed land. A previous Archaeological Desk Based Assessment of the site concluded that no direct effect will be experienced
Indirect, visual effects	x	✓	x	The presence of the turbine offers the potential indirect, visual effects upon the settings of some cultural heritage features situated within the Zone of Theoretical Visibility (ZTV) and within 35 km of the Development

11. OFFSHORE ECOLOGY (ORNITHOLOGY, MARINE MAMMALS AND FISH / SHELLFISH)

11.1. Introduction

This section of the Scoping Report covers the proposed approach to Ornithology, Marine Mammals and Fish / Shellfish Ecology. This report will outline consultations which have taken place, the proposed survey methods, baseline data sources and methods for the assessment of baseline data.

The EIA will be presented alongside the Habitats Regulations Assessment (HRA) Report.

A brief summary of marine mammal survey results and bird survey results are summarised in section 11.4.2 of this Scoping Report. The bird survey results are also presented as an appendix to this report and two excel spreadsheets of the MMO observations are also provided to accompany this scoping report. However, Forthwind will seek further guidance from NatureScot and MSS on the preferred output and presentation of the boat based survey data.

11.2. Background

This proposed Development is the fourth iteration, with previous iterations receiving various amounts of consultation feedback. The 'original project' comprised of a nine-turbine development; the second iteration of the project consisted of two two-blade turbines; whereas this Development proposal only comprises of a single three-bladed turbine. The turbine proposed in this Scoping Report does alter in specification to those consented in 2016, the single turbine proposal parameters are presented below.

Table 15 - Design Specifications of the Proposed Development

Key Data and Dimensions of the Forthwind Turbine	
Number of blades	3
Orientation	Upwind
Direction of Rotation	Clockwise
Rotor Diameter	255 metres
Length of rotor	122.5 metres
Blade swept area	45,244 m ²
Hub height	156 m HAT
Tip height above HAT	280 m HAT
Blade Clearance to HAT	25 metres
Rated Capacity	up to 20 MW
Voltage	66kV
Converter	Full size
Structure	Tubular Steel Tower
Number of structure legs	Up to 4 legs on Steel Jacket / Transition Piece
Foundation	Pin piles (one per leg) or Monopile
Design Life	25 years
M&O Access	Boat

11.3. Summary of Scoping Opinion to 'Original Project'

Each stage of scoping through the various iterations of the project has provided the Forthwind Development with large amounts of consultation feedback. The reduction in turbine number from the original consent has resulted in a proportional review of the previous scoping responses received.

Table 16 below details the relevant responses to the proposed Development from the 2016 Scoping Opinion, as well as the 2019 Scoping Opinion, and how Forthwind have responded. It should be noted that the responses received in the 2019 Scoping Opinion were for a design envelope including two two-bladed turbines.

Table 16 - Offshore Ecology consultation with Stakeholders throughout the Forthwind Development Project

Date	Consultee	Details of Consultation	Project Response
Ornithology			
29/06/16	SNH MSS	Initial meeting with MS and SNH to discuss the extended Forthwind Demonstration Project (FDP). FDP advised to prepare a document describing its approach to the process of scoping and HRA screening	An 'Approach' document was produced and submitted to SNH, MSS and MS LOT on 22/07/2016.
01/09/16	SNH	SNH response to the 'Approach' document. SNH commented over the use of boat surveys for site characterisation, methods had not previously been discussed with SNH or MSS input prior to survey commencement, it was latterly agreed on 07/09/2016 with both organisations that boat based surveys would be acceptable, and there would be no need for aerial surveys, so long as the baseline surveys for the Development were undertaken over a period of two years.	<p>The boat surveys were designed by independent, suitably qualified and experienced consultants (see Appendix 2 of ES for CVs).</p> <p>Ideally the methods would have been discussed with SNH and MSS prior to commencement, but this did not take place as determination on the Stage 1 two turbine application was ongoing. The baseline surveys continued until end of February 2017, giving two years of baseline data.</p>
01/09/16	SNH	Proposed development area is within the draft Forth and Tay Bay Complex pSPA and hotspot for a number of non-breeding bird interests. Many of these species are known to be sensitive to boat movements and may flush, and the lead surveyor has observed 70% of red-throated diver flushing within 200m of the boat. There is not adequate description on how this will be overcome. There is also no information on whether other species have been observed flushing.	The issue is rectified by scanning ahead. The survey team are very experienced and have an intimate knowledge of birds in the Firth of Forth. The survey team are confident that divers, and other species were not being missed as a result of flushing. Divers are most sensitive to flushing, but the majority (c. 70% being flushed based on observations) remain in situ at distances of less than 200 m from the vessel, (which is well within the survey sweep) rather than 70% being flushed outside 200 m. Other species have been observed as being more tolerant to disturbance than red-throated diver.
01/09/16	SNH	It is noted that bird densities are broadly in agreement with other surveys, however this is not the case for eider or long-tailed duck.	Long-tailed duck and eider tend to aggregate closer to the coast than the extent of the survey

Date	Consultee	Details of Consultation	Project Response
		Densities for these species are lower than vantage point densities and minimum aerial survey densities. Decrease in birds in the site condition monitoring has been highlighted, which SNH concur with.	transects in Year 1. However, the Year 2 surveys have extended transects, to capture the original two turbine application. Data will also be augmented with existing sources such as WeBS sector counts and the Fife Bird Report.
01/09/16	SNH	SNH note that the inclusion of distance sampling as part of the data analysis and welcome this. SNH recommend consideration is given as to how the data violate the assumption all birds of distances of 0m are detected, and how this can be overcome in the analyses (e.g., chapter 6 of Advanced Distance Sampling book. Buckland et al. 2004. Advanced Distance Sampling. Oxford University Press.)	The surveyors scanned ahead to capture all birds to avoid issues with the distance sampling correction factor. We also note that distance sampling can be adversely affected in the event only a small sample size is available and, accordingly distance sampling was used on a species by species basis, dependent on whether the sample size is large enough.
01/09/16	SNH	While the key consideration for this development is likely to be effect on birds, the section on marine mammals is very brief and would benefit from more detailed information being presented about data sources and analyses as well as assessment of effects for marine mammals, notably given the proximity of SACs for seals and the possibility of cetaceans (European Protected Species – EPS) being in the vicinity.	This scoping report provides further information on our marine mammal approach, namely: Specification of background record sources; which marine mammal SAC's will be considered; and an outline of our methods for assessment of effects, with consideration given to EPS legislation under the Habitats Directive.
12/09/16	MSS	It may be appropriate to consider a buffer of >1 km for the species more sensitive to disturbance (notably common scoter and red-throated diver)	Consideration has been given to this, but as the majority of birds including scoters and divers are remaining in situ to distances of less than 200m, a 1 km buffer is considered to be appropriate in this case.
12/09/16	MSS	Potential for flushing birds ahead of the vessel and from adjacent transects must be considered. The suggestion that 70% of birds were flushed at 200m indicates that an issue may exist. However, it is unclear what this 70% figure is based on, and flushing data should be presented.	See above.

Date	Consultee	Details of Consultation	Project Response
12/09/16	MSS	It is unclear whether differences in density estimates presented are due to method, spatial coverage, year, or flushing response.	Densities for the majority of species are broadly similar to known population data. The main differences are with long-tailed duck and eider numbers, birds that tend to aggregate closer to the coast than the extent of the survey transects in Year 1. However, the Year 2 surveys have extended transects, to augment the baseline for birds using the water closer to the coast. Data will also be augmented with existing sources such as WeBS sector counts and the Fife Bird Report.
12/09/16	MSS	The text relating to Kentish flats appears to relate to a comparison of relative abundance at this windfarm. In that case as long as any flushing response was consistent over space and time, it would not necessarily be an issue. The Forthwind surveys are to estimate an absolute abundance so that an impact assessment can be carried out.	It is proposed to present an estimate of absolute abundance from the completed results of the Forthwind surveys.
12/09/16	MSS	In relation to habituation to shipping traffic, the application should distinguish between shipping that is predictable & regular over space and time, and unpredictable & irregular shipping, the former may be expected to result in a greater level of habituation than the latter.	Vessel movements related to the ongoing/current use of the survey area were recorded as part of the baseline survey work. This will be compared with any additional movements related to the development in the ornithology assessment for the ES. Potential disturbance and habituation effects will be considered accordingly and, where possible, contrasted and compared with offshore developments considered as part of the cumulative assessment for the application.
12/09/16	MSS	No information is presented on bird flight heights. Are flight heights estimated during the boat based surveys, what height bands are being used, and how are flight height estimates validated?	Bird heights are recorded during boat based surveys. Five height bands were selected in relation to potential turbine specifications as outlined in the Project Description section of this Scoping Request. Flight heights are estimated using very experienced ESAS surveyors who

Date	Consultee	Details of Consultation	Project Response
			regularly watch the Firth of Forth and are familiar with local features and avian species flight behaviour.
26/11/2019	SNH	SNH raised some concerns about the use of boat-based surveys to collect bird data in an area where species sensitive to disturbance from boats are present.	The data gathered from the boat-based surveys can be supplemented by vantage point data if required. As noted above, the risk of disturbing sensitive species during the survey was rectified by scanning ahead. The survey team were very experienced and had an intimate knowledge of birds in the Firth of Forth. The survey team were confident that divers, and other species were not being missed as a result of flushing.
	SNH	SNH states that they do not consider the Scoping Report sufficiently clarifies how impacts to ornithological interest will be addressed for this new application. It provides advice relating to how existing data can be best used, but strongly advises that further pre-application dialogue is required with the Developer to agree a written draft method statement for ornithological impact assessment before application submission.	The potential impacts of the proposed Development on ornithological interests will be addressed as detailed within this Scoping Report. NatureScot, MSS and RSPB Scotland will be consulted with prior to the assessment.
	SNH	SNH states that the previously collected land based Vantage Point data should not be used in this new assessment; data should instead come from previously undertaken boat-based surveys due to the increase turbine heights proposed for the Development.	This response was with regards to the previous iteration of the project design. This included turbines that were further from shore in which vantage point data was not considered to be appropriate. The vantage point data is considered to adequately cover the location of the proposed Development and is suitable for use for the relevant assessments.
	SNH	SNH has supplied a table within its response specifying the Special Protected Areas (SPA's) that should be assessed for potential connectivity with the Development, the potential for impacts from collision, displacement, barrier effects and impacts on supporting	The SPAs noted by SNH have been included within this Scoping Report and have been considered for further assessment.

Date	Consultee	Details of Consultation	Project Response
		habitats. The Scottish Ministers agree that these effects should be scoped into the EIA Report.	A description of the approach to collision risk assessment is included within this Scoping Report.
	SNH	SNH have also provided advice in relation to the offshore band model they recommend should be used to estimate collision risk.	A description of the approach to collision risk assessment is included within this Scoping Report.
	SNH	SNH has provided a list of species and designated sites that it recommends should be assessed for displacement / barrier effects, as well as suggested displacement rates.	<p>The SPAs and Special Areas of Conservation (SACs) noted by SNH have been included within this Scoping Report and have been considered for further assessment.</p> <p>A description of how displacement and barrier effects has been included in this Scoping Report.</p>
	SNH	SNH refers to guidance on apportioning impacts but highlights the requirements to further discussion and agreement on non-breeding season qualifiers.	A description of the approach to apportioning impacts will be approached is described in this Scoping Report.
	SNH	SNH provides advice on Population Viability Assessment models and state that impacts should be assessed over 25 years with no recovery period.	A description of the approach towards Population Viability Assessments is included within this Scoping Report.
	SNH	SNH also provides advice relating to impacts on supporting habitats and states that assessment should focus on those species of the Outer Firth of Forth and St Andrews Bay proposed Special Protected Area (“pSPA”) occurring in the nearshore environment that were observed in the site in notable numbers.	A description of how the proposed Development will impact on designated sites and their associated species is included within this Scoping Report.
	MSS	MSS states that it is standard practice for data collection and survey methodologies to be based on the proposed project parameters. In the current situation the data have been gathered and consideration is being given to if / how they may have applied to new proposed project	The proposed Development differs from previous design iterations by a reduction in wind turbine numbers (from two to one), and an increase in turbine height. The survey data collected historically was considered appropriate for the location of the proposed Development turbine. The survey data adequately covers the proposed Development. Where required, supplementary

Date	Consultee	Details of Consultation	Project Response
			vantage point data can be utilised to ensure a comprehensive assessment is carried out.
	MSS	The size of the proposed wind turbines wind turbines is considerably greater than those considered previously, and the anticipated displacement effect footprint may be expected to be greater than the 2 km assumed. As highlighted in correspondence in relation to a previous iteration of the project, for some of the species present in the area (divers and scoter) displacement effects may be anticipated at considerably greater distances than 2km. MSS highlight that in light of this, there are questions over the appropriateness of the 2 km buffer.	The proposed Development differs from previous design iterations by a reduction in wind turbine numbers (from two to one), reducing the overall footprint of the Development. Displacement effects are anticipated to be less than that of the consented development comprising of two turbines.
	MSS	Similarly, survey transect spacing of 1 km may not be sufficient to prevent evasive movement of sensitive species either along the transect being surveyed or adjacent surveys. There are therefore questions over the representativeness of the density and distribution estimates produced.	The survey data is considered to be representative of the density and distribution estimates. Where required, vantage point data can be utilised to supplement the boat-based survey data.
	MSS	MSS requests clarification on whether the flight height data gathered during the boat based surveys are in a format that allows them to be used in collision risk modelling for the revised turbine specifications, which will have different rotor swept height minima and maxima.	The flight height data gathered during the boat-based surveys are in a format that allows them to be used in the collision risk modelling for the proposed Development. A description of the approach to collision risk assessment is included within this Scoping Report.
	MSS	Scottish Ministers require that the assessments and assessment methodology for ornithological impacts is agreed with SNH, MSS and RSPB Scotland prior to undertaking any assessments.	Early consultation with NatureScot, MSS and the RSPB Scotland will be carried out prior to undertaking any assessments.
Marine Mammals			
26/11/2019	MSS	Based on consultation responses received, the Scottish Ministers require the impacts of underwater noise on marine mammals during decommissioning to be scoped in.	The potential impacts of underwater noise from the proposed Development during decommissioning has been scoped into the assessment.

11.4. Offshore Ecology (Ornithology and Marine Mammals) Baseline

11.4.1. *Scope of the Assessment*

The assessment focusses on the key species and designated sites considered to have connectivity and potential adverse effects on receptors as a result of the Development. The potential adverse effects were identified during the baseline surveys, and through consultation with relevant stakeholders. The Study Area of the surveys focusses on the location of the proposed turbine.

11.4.2. *Overview of birds and marine mammals*

In the summer months the most abundant seabird species observed in the survey area were common gull, cormorant, gannet, great black-backed gull, guillemot, herring gull, kittiwake, lesser black-backed gull, puffin, razorbill and shag. Common tern were also present, albeit in smaller numbers. All these species breed in colonies along the adjacent coast and on islands within the Firth of Forth, such as on the Isle of May and on Bass Rock.

In the winter, larger numbers of sea-duck such as eider, long-tailed duck and scoter species (common and velvet) are likely to aggregate within the survey area as well as low numbers of red-throated divers. There were also abundant numbers of gull species and auks (guillemot and razorbill only) with puffin being very infrequent at during this period, there was also a large passage of little auk recorded during the early winter of the 2015 survey. Seaduck species such as scoters (velvet and common scoter) and long-tailed duck numbers were generally higher in the survey area during the winter months, however a large raft of eider was present in the summer of 2016. Long-tailed duck were recorded in higher numbers in Year 2; however, the majority of these birds were recorded in the shoreward extensions (applicable to Transect 3 to Transect 7 inclusive) as added to the survey area in Year 2 only. Low numbers of red-throated number were recorded in the survey period, with this species present predominantly in the winter period, when they are not at their freshwater breeding lochs.

The assemblage of bird species present in this survey area appears consistent with that recorded during surveys undertaken for Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015. However, as the survey area stretched further seaward into the Firth of Forth it higher numbers of pelagic species such as gannet and kittiwake were also recorded. Conversely, it is expected that species which favour areas adjacent to the coast such as eider and long-tailed duck may be lower than those recorded for the 2015 application.

In terms of marine mammals' low numbers of grey seal and harbour porpoise were frequently recorded within the survey area. Bottlenose dolphin recorded on two occasions, likely relating to small pods foraging far from the Moray Firth to the north.

11.4.3. *Desktop Review*

Designated Sites (Statutory)

Information about any statutory designated sites for marine mammal or bird interest relating to the area will be obtained from the NatureScot online (formerly Scottish Natural Heritage Information Service (SNHi)).

Statutory designated sites are protected by EU and UK legislation:

- Special Protection Areas (SPA).
- Special Areas of Conservation (SAC).
- Sites of Special Scientific Interest (SSSI).

- Ramsar sites.
- National Nature Reserves (NNR); and
- Local Nature Reserves (LNR).

Following consultation from the relevant stakeholders (SNH and MSS), the following designated sites have been listed as requiring further consideration within this impact assessment:

- Outer Firth of Forth and Tay Bay Complex SPA.
- Firth of Forth SPA.
- Forth Islands SPA.
- Cameron Reservoir SPA.
- Loch Leven SPA.
- Firth of Tay Eden Estuary SAC.
- Isle of May SAC; and
- Moray Firth SAC.

Information about the above listed statutory designated sites is detailed within Table 17.

Table 17 - Sites Designated for Nature Conservation

Site Name	Designation	Distance from Site	Site Description	Qualifying Features
Outer Firth of Forth and Tay Bay Complex	SPA	0 km	The site is located within the Outer Firth of Forth and Tay Bay Complex SPA is a large estuarine/marine area comprising of a belt of mud-rich sediments, with areas of sandy gravels and shell material. The area supports a wide variety of both pelagic and demersal fish.	<p>The Outer Firth of Forth and Tay Bay Complex SPA qualifies under Article 4.1; by regularly supporting non-breeding population of European importance including red-throated diver (5.0% of the GB population); Slavonian grebe (2.7% of the GB population); Little Gull, common tern and arctic tern. This designated site also qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory waterfowl species: Common eider (2.1% of the biogeographic population, and 35.9% of the GB population).</p> <p>Due to the proposed Development being located within this designated site and the potential adverse effects on the features designated within the Outer Firth of Forth and Tay Bay Complex SPA, this site is scoped in to the environmental impact assessment.</p>
Firth of Forth	SPA	1.7 km N	This designated site comprises of estuarine and coastal habitats in south-east Scotland stretching from Alloa to the coasts of Fife and East Lothian. The site includes extensive invertebrate-rich intertidal flats and rocky shores, areas of saltmarsh, lagoons and sand dune.	<p>The Firth of Forth SPA is classified under Article 4.1 Qualification, and Article 4.2 Qualification for the following over-wintering bird populations: Gavia stellata (2% of the GB population); Podiceps auratus (21% of the GB population); Pluvialis apricaria (1% of the GB population); Limosa lapponica (4% of the GB population); answer brachyrhynchus (6% of the Eastern Greenland / Iceland/ UK Biogeographic population); Tadoma (2% of the Northwestern Europe biogeographic population); Calidris canutus (3% of the Northeastern Canada/ Greenland/ Iceland/ Northwestern Europe biogeographic population). On passage this designated site regularly supports: Sterna sandvicensis (6% of the GB population).</p> <p>This designated site is also designated for its internationally important assemblage of birds in the non-breeding season as it supports individual seabirds, including but not limited to; Aythya marila, Podiceps auratus, and Pluviasli apricaria (JNCC, 2021).</p>

Site Name	Designation	Distance from Site	Site Description	Qualifying Features
				Due to the close proximity of the proposed Development and the potential adverse effects on the features designated within this site, the Firth of Forth SPA is scoped in to the environmental impact assessment.
Forth Islands	SPA	13.1 km SE	The Forth Islands SPA consists of a series of islands supporting the main seabird colonies in the Firth of Forth.	<p>The Forth Islands SPA qualifies under Article 4.1 by regularly supporting populations of European importance including Artic tern (1.2% of GB population), roseate tern (13% of the GB population); common tern (3% of the GB population); and sandwich tern (3% of the GB population). This designated site also qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species including: northern gannet (8.2% of the world biogeographic population); European shag (1.9% of the N Europe biogeographic population); lesser black-backed gull (1.2% of total biogeographic population) and Atlantic puffin (1.5% of the total biogeographic population).</p> <p>The Forth Islands SPA also qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds.</p> <p>Due to the intervening distance the proposed Development will not impact upon the designated features the Forth Islands SAC. Therefore, it is scoped out from further assessment consideration.</p>
Cameron Reservoir	SPA	16 km N	Cameron Reservoir SPA is a mesotrophic reservoir with a grassland and willow <i>Salix</i> carr fringe, covering 64.4 ha in Fife, Scotland. The site is of international importance for its wintering pink-footed geese	<p>The site qualifies under Article 4.2 of the EC Birds Directive by regularly supporting internationally important wintering numbers of Icelandic/Greenlandic population of pink-footed geese (6% of the Icelandic/Greenlandic population).</p> <p>Due to the nature of the ornithological feature, Cameron Reservoir SPA, no further assessment is considered necessary for this designated site and therefore it is scoped out from the EIA.</p>
Loch Leven	SPA	20 km W	Loch Leven SPA in central Scotland is the largest natural eutrophic lake in Britain. It is a relatively shallow loch, surrounded by farmland, with a diverse aquatic flora and shoreline vegetation. The boundary of the Loch Leven SPA follows that of the Loch	The site qualifies under Article 4.1 by supporting a population of European importance of wintering Icelandic whooper swan (97.2% of British population).

Site Name	Designation	Distance from Site	Site Description	Qualifying Features
			Leven SSSI except for the exclusion of 4 ha of SSSI towards the northern end of the loch. It is also a National Nature Reserve (NNR).	<p>Loch Leven SPA qualifies under Article 4.2 by regularly supporting populations of European importance of wintering Icelandic/Greenlandic pink-footed geese and shoveler (5% of British population).</p> <p>Loch Leven SPA further qualifies under Article 4.2 by regularly supporting a wintering waterfowl assemblage of European importance which includes large populations of cormorant, gadwall, teal, pochard, tufted duck, and goldeneye.</p> <p>Due to the nature of the ornithological features, Loch Leven SPA, no further assessment is considered necessary for this designated site and therefore it is scoped out from the EIA.</p>
Firth of Tay and Eden Estuary	SAC	23.5 km N	The Firth of Tay and Eden Estuary are two high-quality estuarine areas. The two estuaries have been proposed within a single site because they are integral components of a large, geomorphologically complex area that incorporates a mosaic of estuarine and coastal habitats. The abundance, distribution and composition of the associated plant and animal communities are ecologically representative of northern North Sea estuaries.	<p>The Firth of Tay and Eden Estuary SAC is designated for estuaries, intertidal mudflats and sandflats, common seal and subtidal sandbanks.</p> <p>Due to the potential connectivity between the Development and the site with respect to impacts from underwater noise on Common Seals, including cumulative effects, the Firth of Tay and Eden Estuary SAC will be scoped in to the EIA.</p>
Isle of May	SAC	27 km E	The Isle of May SAC comprises of subtidal rock (including rocky reefs), cliffs and islands.	Due to the potential connectivity between the Development and the site with respect to impacts from underwater noise, including cumulative effects, the Isle of May SAC will be scoped in to the EIA.
Moray Firth	SAC	170 km N	The Moray Firth in north-east Scotland supports the only known resident population of bottlenose dolphin in the North Sea. The population is estimated to be around 130 individuals. Dolphins are present all year round, and while they	<p>This site is designated for sandbanks and bottlenose dolphin.</p> <p>Due to the potential connectivity between the Development and the site with respect to impacts from underwater noise on Bottlenose Dolphins, including cumulative effects, Moray Firth SAC will be scoped in to the EIA.</p>

Site Name	Designation	Distance from Site	Site Description	Qualifying Features
			range widely in the Moray Firth, they appear to favour particular areas.	

It is noted that the SPA and SAC populations of each qualifying feature may have changed since designation and information is requested from NatureScot/MSS on the appropriate reference populations to be used for assessment.

Ecology Data

During the assessment process historical ecological records will be used to inform the baseline assessment through desktop study. Existing data will be sourced from but not limited to the following organisations / resources:

- British Divers Marine Life Rescue (BDMLR).
- Fife Biodiversity Action Plan.
- Fife Records Centre.
- Forth Seabird Group (FSG).
- General literature review.
- Joint Nature Conservation Committee (JNCC).
- Lothian Wildlife Information Centre (LWIC).
- MarLIN.
- National Biodiversity Network.
- NatureScot.
- Scottish Natural Heritage.
- Sea Mammal Research Unit (SMRU).
- Sea Watch Foundation (SWF).
- SNH and CEH (Isle of May Reports); and
- UK Biodiversity Action Plan.

In addition to these sources, previous survey data will be used which is in the public domain and relates to the area, including:

- Methil Wind Turbine Demonstration Project. Environmental Impact Assessment - Scoping Report (2B Energy/Arup, 2009).
- Methil Offshore Wind Demonstration Wind Turbine. Environmental Statement - Chapter 7: Ecology (2B Energy/Arcus Renewable Energy Consulting, 2010).
- Scoping opinion for the proposed Section 36 application for a wind turbine demonstration project located at Methil, Fife. (SNH, 2010).
- SNH Position and Summary of Advice (Letter to Marine Scotland) [in relation to Section 36 application for a wind turbine at Fife Energy Park] (SNHI, 2010).
- Environmental Statements and Appropriate Assessments relevant to the Firth of Forth at <http://www.gov.scot/Topics/marine/Licensing/marine/scoping>; and
- CSOH 103 (2016) Opinion of Lord Stewart in the petition of the Royal Society for the Protection of Birds for a Judicial Review of a decision of the Scottish Ministers dated 10 October 2014.

11.4.4. *Baseline survey methods*

Survey Extent and Frequency

The site is constrained to the northwest by its proximity to the shore (minimum distance from the nearest turbine to MLWS is approximately 1.25 km) and to the southeast at a greater distance by shipping lanes for the Forth ports. It is also constrained to the east by the Forth Ports Methil anchorage

areas. The survey area and route were originally based on a previous layout iteration for the seven new turbines.

Surveys commenced in March 2015 and continued up to and including February 2017. Surveys were largely conducted on a twice monthly basis, with two exceptions. Only a single visit was undertaken in April 2016 (however this was augmented by a third survey visit in early May 2016), and no visits were undertaken in January 2017. Data collected in each survey was recorded in a manner suitable to inform an Ecological Impact Assessment (EclA) and Habitats Regulations Assessment (HRA). Survey dates are presented in Table 18.

A series of eight boat driven parallel transects (each 4 km in length), which lie 1 km apart and perpendicular to the coastline were driven on each survey day to record the presence of seabird species at the site. Survey transect coverage order was reversed (alternated) for each visit to ensure that each transect was covered at different times of day and during the full range of tidal states, to record the influences of these variables on bird/marine mammal activity within the site and the use of the site by these groups. Following the completion of the first year of surveys in February 2016, five of the eight transects were extended by 1 km to provide additional data for the original two turbine locations and to augment data for near shore favouring species, such as long-tailed duck. Surveys of the extended transects commenced in March 2016 and continued for year two, completing in February 2017. Surveyors logged the commencement of each transect extension on each survey, in order to ensure the data from year one will be directly comparable with the data from year two and the five transect extensions could also be analysed in isolation.

Surveys took place on board The Conserver vessel, piloted by Captain Bill Simpson. The vessel is Maritime and Coastguard Agency (MCA) Category 2 certified to operate within a range of 60 nautical miles from a safe haven. It has an operational limit of Beaufort Scale Sea state 4-5. The Conserver is equipped with a viewing platform (deck) which sits at 5 m above sea level, thus meeting the minimum height requirements for undertaking boat-based ornithology survey transects. Transects were driven at a speed of approximately 7 knots, to allow surveyors sufficient time to accurately identify species and activity.

Weather conditions were recorded at the beginning of each transect on each survey day. All surveys were conducted during favourable weather conditions within Beaufort conditions of 4 or less and periods of good visibility (always >2 km).

These methods were followed for both seabirds and marine mammals.

Table 18 - Dates when Boat Surveys were undertaken

Year 1 (March 2015- February 2016)											
Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
26/03	16/04	08/05	04/06	19/07	07/08	09/09	08/10	05/11	03/12	14/01	17/02
27/03	28/04	15/05	09/06	22/07	19/08	25/09	27/10	22/11	14/12	27/01	18/02
Year 2 (March 2016- February 2017)											
Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
21/03	22/04	17/05	08/06	27/07	15/08	13/09	10/10	10/11	05/12	None**	27/02
29/03	07/05*	14/05	09/06	29/07	30/08	30/09	21/10	24/11	15/12	None**	28/02

* To make up for only one survey visit in April 2016

** Surveys on hold in January 2017

Survey Limitations

It has been necessary for the vessel to deviate from the survey route due to the arrival of rigs within the survey area (reflecting the existing industrial nature of the proposed Development area).

Table 19 - Survey Deviation Summary

Rig Name	Dates Present	Transect Affected	Deviation Start (lat/long)	Deviation End (lat/long)	Deviation Length
Mike 2	22/07/15 – 28/02/17	T 6	56.145583/2.974066	NA (Transect ceased at this point)	1.48 km
Mike 3	02/07/15 – 6/11/15 and 09/03/16 - 28/02/17	T 5	56.139500/-2.98527	56.150566/2.999300	1.52 km
Mike 5	15/10/16 - 28/02/17	T 7	56.15168/-2.96393	56.16442/-2.97827	1.7 km

Within the Impact Assessment, a full and detailed justification to demonstrate that the underlying survey data is adequate and suitably robust for the purposes of defining the potential impacts will be included. Similarly, any uncertainty in the assessment outputs will be detailed within the impact assessment also.

Seabirds

The survey methodology followed the visual line transect survey methodology prescribed in COWRIE guidelines as described in Camphuysen et al. (2004) and updated by Maclean et al. (2009). Additionally, surveyors used binoculars to scan ahead to ensure that species more susceptible to flushing, such as red-throated diver, were not missed during survey. Surveyors were able to see distances of at least 2km from the vessel.

For each transect all bird species were recorded within a 300m long 90° arc scanned from the bow of the vessel. This was viewed either from the port or starboard side of the vessel, dependent upon climatic conditions, such as sun glare or rain direction. By surveying an area of 300 m in width along eight 4km transects (varied as described above), a total survey area of approximately 10 km² was covered during each survey. Exact lengths and areas will be provided in the ES and used for the purpose of density calculation.

Surveys of the survey area along each transect, were partitioned into 1-minute intervals (with a snapshot of birds in flight taken once per minute). Birds recorded on the water within the survey area were sub-divided into five distance bands respective to the position of the surveyor, namely Band A: 0-50 m, Band B: 50-100 m, Band C: 100-200 m, Band D: 200-300 m and Band E: >300 m (outwith transect). Similarly, bird in flight observations were also allocated into five distinct height bands, which were selected with consideration of the range of dimensions of the proposed turbines, namely Band 1: 0-5m, Band 2: 5-20 m, Band 3: 20-100 m, Band 4: 100-200 m and Band 5: >200m. For the purposes of collision modelling birds recorded flying at height Bands 3-5 are considered to be at 'risk height'.

During each transect two bird European Seabirds At Sea (ESAS) accredited surveyors acted as a team, taking it in turns either to count birds or to scribe the data observed, thus preventing observer fatigue. Bird detection was primarily undertaken with the naked eye, with binoculars used to scan ahead as required.

Ornithological target species included all swans, geese, ducks, divers, grebes, shearwaters, petrels, gannets, cormorants, herons, birds of prey, waders, skuas, gulls, terns and auks. All other species were also recorded (e.g., passerines) to allow assessment of flight heights of migrant birds.

Data gathered for birds in flight and on the sea included information on the following: species/taxon, number of birds, distance from the survey vessel, flight height and where possible, flight direction (for birds in flight), age, sex of obviously dimorphic species, behaviour, moult status and plumage.

Marine Mammals

Surveys were undertaken concurrently with the bird surveys on the same vessel and following the same route as described above.

A single MMO was present on each survey visit. The surveyor in the MMO role was JNCC qualified and followed JNCC Marine Mammal Observer (MMO) approved survey methods (JNCC, 2010). MMOs were always equipped with binoculars, a copy of the JNCC guidelines and the 'Marine Mammal Recording Form' during each survey. The MMO positioned themselves to scan the same area as the bird surveyors and recorded visually any sightings of marine mammal species within this area. The bird surveyors also highlighted any marine mammal sightings to the MMO. Marine mammal target species included all seal, porpoise, dolphin, and cetacean species.

Transects were driven at a speed of approximately 7 knots, to allow the surveyor sufficient time to accurately identify species, behaviour, distance, age and count the number of marine mammals per species present.

11.4.5. *Assessment Methods*

Potential effects on seabirds, marine mammals and fish/shellfish will be assessed following guidance from the Chartered Institute for Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in Britain and Ireland (Marine and Coastal) (CIEEM, 2010) and, for specific effects, guidance from SNH.

11.4.6. *Assessing Significance*

Ecological Impact Assessment (EclA) is based on a number of factors, primarily consideration of the value of a site or feature being assessed, and the anticipated magnitude of the potential effect.

The assessment of the potential effects of the Development on ecological interests is a staged process that involves:

- Determining the nature conservation value of the ecological interests present within the survey area that may be affected by the Development.
- Identifying potential effects based on the nature of the construction, operation and decommissioning of the Development.
- Determining the character and magnitude of the potential effects i.e., the size of the change in the population of the receptor as a result of the Development. This includes consideration of the behavioural sensitivity of the receptor and the duration and reversibility of the potential effect.
- Determining the significance of the effects based on the interaction between the magnitude of the effect and the nature conservation value of the ecological interests likely to be affected. Ultimately, this is a consideration of the effects of the Development on the integrity of a defined population.

- Identifying mitigation measures proposed to avoid, reduce or remedy significant adverse effects; and
- Determining the residual effect significance after the proposed mitigation measures have been implemented, including a description of any legal and policy consequences.

CIEEM guidance emphasises that quantitative effect descriptions should be used wherever possible. For this reason, a series of tables are reproduced below to define categories of receptor value and sensitivity, effect magnitude and duration. These can then be used to consistently describe potential effects.

11.4.7. Nature Conservation Value

The nature conservation value of the bird interests present at the Development site are defined according to Table 20 below (adapted from Percival 2007).

Table 20 - Determining Value of Receptor

Level of Value	Examples
Very High	An internationally or nationally designated site SPA, SAC or SSSI designation. The qualifying feature of a SPA or SAC or notified interest of a SSSI. Species present in internationally important numbers (>1% of biogeographic populations).
High	Species that contribute to the integrity of a SPA, SAC or SSSI but which are not cited as species for which the site is designated (SPA or SAC) or notified (SSSIs). Species present in nationally important numbers (>1% UK population). European Protected Species (EPS), or Species listed on Annex 1 of the EC Birds Directive or breeding species listed on Schedule 1 of the Wildlife and Countryside Act. Regularly occurring relevant migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding,
Medium	Seal species protected under the Marine (Scotland) Act 2010. Species present in regionally important numbers. Species occurring within SPAs, SACs and SSSIs but not crucial to the integrity of the site.
Low	Other species of conservation interest, e.g., red- or amber-listed species of Birds of Conservation Concern not covered above.
Negligible	All other species not included in the above categories, such as small populations of green-listed bird species.

11.4.8. Characterisation of Potential Effects

The characterisation of each effect is based on the following parameters:

- Negative or positive effect.
- Direct, indirect or cumulative effect.
- Reversibility of effect: irreversible or reversible.
- Frequency of effect: single event, recurring or constant; and
- Duration of effect: short term (< 5 years), medium term (5 – 15 years), long term (> 15 years but not permanent) or permanent.

It is important to consider the likelihood that a predicted effect will occur. The scale used will be:

- Certain/near certain: probability estimated at 95% chance or higher.
- Probable: probability estimated above 50% but below 95%.
- Unlikely: probability estimated above 5% but less than 50%.
- Extremely unlikely: probability estimated at less than 5%.

11.4.9. *Effect Magnitude*

Once the nature conservation value of the bird species/populations in the survey area has been established and the character of the potential effects has been determined, the next step is to identify and assess the magnitude of the potential effects that might occur on those species/populations. An effect is defined as the change in the assemblage of bird species present during (or beyond) the life of the Development and can be adverse, neutral or positive. The assessment of effect magnitude seeks to determine the changes in the extent or population of an ornithological receptor.

Effect magnitude can be negative (very high, high, moderate, low or negligible) or positive. High magnitude effects could include large-scale permanent and/or high probability changes that affect the receptor's population or extent. Low magnitude effects would typically be small in scale or possibly temporary in their effect. The criteria used in this assessment for describing the overall magnitude of a potential effect are summarised in Table 21 below. The concept of receptor integrity is defined in the subsequent paragraphs relating to the significance of effects.

Table 21 - Offshore Ecology Effect Magnitude

Effect Magnitude	Examples
Very High Negative	Very high magnitude effects would result in total or almost complete loss of a population and would result in a permanent adverse effect on the integrity of the population. The conservation status of the receptor would be affected. Guide >80% population affected.
High Negative	High magnitude effects may include those that result in large-scale, permanent changes in an ecological receptor, and likely to change its ecological integrity. These effects are therefore likely to result in overall changes in the conservation status of a species population at the location(s) under consideration. Guide 21-80% population affected.
Moderate Negative	Medium magnitude effects may include moderate-scale permanent changes in an ecological receptor, or larger-scale temporary changes, but the integrity of the population is not likely to be affected. This may mean that there are temporary changes in the conservation status of a species-population at the location(s) under consideration, but these are reversible and unlikely to be long-term. Guide 6-20% population affected.
Low Negative	Low magnitude effects may include those that are small in nature, have small-scale temporary changes, and where integrity is not affected. These effects are unlikely to result in overall changes in the conservation status of a species population at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required. Guide 1-5% population affected.

Effect Magnitude	Examples
Negligible	There is no perceptible change in the ornithological receptor. Guide: <1% population affected.
Positive	The changes in the ornithological receptor are considered to be beneficial.

In the case of SPAs and SACs magnitude is assessed in respect of the size of the cited population. For non-designated sites, magnitude is assessed in respect of an appropriate scale based on known population data and on professional judgement. The difference in assessing the significance of effects on species from protected sites and those from populations without specific designation or protection is one of scale. Designated populations receive stronger protection because threats to the integrity of the designated population are considered significant. Effects on non-designated populations are considered significant if they threaten the integrity of the regional or national populations.

11.4.10. *Significance*

A significant effect is defined in ecological terms as an effect on the integrity or conservation status of a defined site, habitat or species. The significance of an effect is determined by considering the combination of the nature conservation value of the receptor and the magnitude of the effect and applying professional judgement as to whether the integrity of the receptor will be affected.

The term integrity is used here in accordance with the definition adopted by the Circular 06/2005 on Biodiversity and Geological Conservation whereby designated site integrity refers to “...*coherence of ecological structure and function...that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified*”. For non-designated sites/species this can be amended to “*the coherence of ecological structure and function, that enables it (in this case, the area being considered) to maintain the levels of populations of species in its/their pre-development condition*”. Integrity therefore refers to the maintenance of the conservation status of a species population at a specific location or geographical scale.

Effects are more likely to be considered significant where they affect receptors of higher conservation value or where the magnitude of the effect is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened and are likely to involve effects on receptors of lower conservation value or where the magnitude of the effect is low. Clearly, effects of negligible magnitude, or effects on receptors of negligible conservation value are not considered to be significant.

Mitigation measures and detailed design work are required to reduce potentially significant effects, but it is also best practice to propose mitigation measures to reduce negative effects that are not significant. In this assessment, an effect that threatens the integrity of a receptor is considered to be significant in terms of the EIA Regulations. Effects assessed as not significant should be considered as not significant in terms of the EIA Regulations. It should be noted that, alongside the criteria provided, professional judgment is applied in determining the significance of potential effect.

11.4.11. *Ornithological Impact Assessment*

Following ornithological surveys, the potential effects of the Development to be assessed are presented in Table 22. A summary ES Ornithology Chapter will be produced using the assessment methodology described above, with the following more detailed Technical Reports included as appendices to the ES:

- Collision Risk Modelling – the key species identified through scoping and the baseline assessment as requiring collision risk modelling will be assessed using the HiDef stochastic collision risk model (sCRM), unless advised by NatureScot. This will detail turbine and wind farm parameters, and the “realistic” worst case scenario from the development envelope.
- Displacement and Barrier Effects – present guidance is to use the matrix method for assessing the potential for displacement (and barrier effects) outlined in current statutory nature conservation body (SNCB) guidance (Anon., 2017).
- Consideration of Population Level Consequences – where EIA impacts are not trivial there will be consideration of the population level consequences. During the summer breeding seas, these will be considered against regional breeding populations and during the non-breeding season biologically defined minimum population scales (BDMPS) will be used. Regional breeding populations, against which impacts will be assessed, will be obtained from contemporary data from the seabird monitoring programme database. Population viability analysis (PVA) will only be carried out against regional populations if requested by NatureScot.
- HRA Ornithology Report – The HRA process applies to those seabird species which are qualifying interests of SPA’s within foraging range. The first step in the HRA process is to screen out those SPA seabirds where there would be no likely significant effect (LSE) as a result of the construction, operation and decommissioning of the proposed wind farm. There are three critical elements to determining no LSE for a project: connectivity, route to impact and trivial abundance.
 - Apportioning – for seabirds during the summer breeding seas, a number of different SPA’s may lie within foraging range of the proposed Development site. For each qualifying interest recorded on-site, an apportioning calculation is required to determine the numbers to be assigned to each SPA. The apportioning calculation methodology will follow the recommended NatureScot guidance.
 - Population Viability Analysis – once impacts to SPA seabirds have been calculated, these will need to be assessed using population models as part of a population viability analysis (PVA). This is likely to only be necessary for some seabird species, as it is expected that some levels of predicted impact may be sufficiently small to be able to conclude no adverse effect on site integrity without the need to model population size change. The results will then be used to assess each SPA seabird interest in a robust and transparent manner. Population models would be based on stochastic Leslie matrix models, as this fulfils the current recommendations to assess population viability using ratios and end of population size and population growth rate, and the relative probability of end population size change (Jitlal et al. 2017).
- Cumulative Impact Assessment – the cumulative impact assessment will follow the approaches agreed with Marine Scotland and NatureScot.

The technical reports will describe survey timings and conditions and survey results in full. To feed into the impact assessment, digital aerial survey data will be collected, analysed and reported on for the EIA Ornithology Report and HRA for Ornithology.

Predicted effects on birds and the methods used for the assessment of these effects is presented in Table 22 below.

Table 22 - Assessment of Ornithological Effects

Impact	Description of Impact and Approach
Collision	<p>Collision assessment will be based on the HiDef Stochastic Collision Risk Model (sCRM).</p> <p>The report will aim to scope out species from collision assessment where evidence is available to do so e.g., where species have not been recorded at collision risk height or where strategic level collision risk modelling has been undertaken e.g., for geese and waders.</p>
Displacement	<p>Displacement assessment will be presented using the Statutory Nature Conservation Body (SNCB) approved matrix method (Anon., 2017) and conclusions will be supported by empirical evidence derived from literature review.</p>
Barrier Effects	<p>Barrier effects will be presented using the present guidance – to use the matrix method for assessing the potential for barrier effects, outlined in current statutory nature conservation body (SNCB) guidance (Anon, 2017)</p>
Indirect Effects	<p>Indirect effects such as the reduction in benthic habitat (and the subsequent loss of a seabird foraging resource) are likely to be negligible as benthic surveys undertaken for the 2015 ES indicate that the site does not lie on an area of seabed, which supports important, spawning, nursery or foraging habitat for fish or shellfish. In addition, other indirect effects such as turbidity and smothering of benthos were also considered to be negligible in the 2015 ES and as such it is proposed that these are scoped out.</p>
Cumulative Effects	<p>A cumulative assessment will be undertaken to consider potential additive effects arising from nearby similar development projects.</p>

11.5. Marine Mammal Impact Assessment

Similarly, to the bird assessment, it is proposed that the data will be presented in a Technical Appendix which will support a Marine Mammal chapter in the ES which will be produced using the assessment methodology described above.

To date three confirmed and one unconfirmed marine mammal species have been recorded during the surveys undertaken for the development as summarised below:

11.5.1. Grey Seal

The Firth of Forth supports good numbers of grey seal and the Isle of May SAC at the mouth of the Firth of Forth is designated for supporting the largest grey seal population on the east coast of Scotland (the fourth largest in the UK) accounting for 4.5 % of the UK seal ‘pupping’ population (JNCC Website).

Low numbers of grey seal have been recorded on all survey visits, with between one and two animals seen by the MMO at any given time. The nearest designated site for grey seal is the Isle of May SAC. (27 east km from the proposed Development).

11.5.2. *Harbour (common) Seal*

By contrast, harbour or common seal are present in the Firth of Forth in lower numbers. There appears to have been a downward trend for this species with only 213 individuals recorded on the east coast of Scotland in 2013 (Duck and Morris, 2014). There has been a single sighting of a possible harbour seal during the surveys undertaken for the Development. This sighting was inconclusive due to distance from the MMO (> 500 m).

11.5.3. *Harbour Porpoise*

Harbour porpoise are the smallest and most common cetacean species in UK waters and are regularly encountered in the Firth of Forth (Seawatch Foundation website).

Harbour porpoise have been recorded in c. 50 % of the survey visits, with records also relating to the presence of only one or two individuals at any given time.

11.5.4. *Bottlenose Dolphin*

A pod of eight bottlenose dolphin have been recorded on two occasions (considered to be the same pod) in the survey area during one survey visit in June 2016. A small pod (five animals) was also observed on route to the survey area in August 2016. The closest nature conservation site designated for bottlenose dolphin is the Moray Firth SAC, which lies several hundred km north of the Development site. Low numbers of bottlenose dolphin are regularly seen of the Fife coast, albeit from more often from the area around Fife Ness approximately 30 km from the Development site (Colin Nisbet pers. obs.).

There is one population of approximately 200 bottlenose dolphins on the East coast of Scotland, resident to the Moray Firth (the Moray Firth SAC population). This is the only known resident population of bottlenose dolphins in the North Sea. (Quick et al., 2014).

Long term studies conducted by Aberdeen University and the Sea Mammal Research Unit (SMRU) have established that the same individual dolphins in Moray Firth SAC are frequenting a significant proportion of the east coast of Scotland (Wilson et al., 2004). While bottlenose dolphins are a highly mobile species, it is widely recognized that they also display high levels of site fidelity and will favour an area of coastline with adequate resource to sustain their population sufficiently. This is evidenced in the Scottish east coast population through high levels of sightings and stranding data in Moray Firth, compared to other potential regions of use such as the Firth of Forth.

A comprehensive study did not recognise the Firth of Forth as a key region for bottlenose dolphin activity and thus excluded it from the two-year photographic cataloguing of the East coast bottlenose dolphin population (Cheney et al. 2013). Additionally, Sea Watch Foundation distribution maps for bottlenose dolphin show no records for being present in the Firth of Forth at any time of year (<http://www.seawatchfoundation.org.uk/bottlenose-dolphin-distribution-maps/>).

Although dolphins are recorded as being present in the Firth of Forth, these sightings are occasional and in low numbers compared to Moray Firth SAC; and contain between-year variation. Considering this, the abundance of bottlenose dolphins in the Firth of Forth is likely to be variable and highly dependent on weather conditions, seasonality, and food availability. Consequently, the connectivity between the Firth of Forth and the Moray Firth SAC is considered to be of a low level.

No other marine mammal species have been recorded during any of the surveys undertaken for the Development and as such, advice is sought from NatureScot and MSS as to whether other marine mammals can be scoped out of the ES.

The EIA chapter will summarise the results and the assessment will focus on a 'worst case' scenario in terms, based on existing research, of potential adverse effects resulting from the Development. The worst-case scenario for this development is assumed to be the installation of one turbine utilising pin piled foundations. The assessment, including cumulative effects, will be informed by the impact assessments and Appropriate Assessments of other projects within range of the Development e.g., those in the outer Firth of Forth, and will take into account advice received from NatureScot and MSS. Where necessary, mitigation will be implemented to reduce adverse effects.

The Impact Assessment will determine the severity of effects, their duration, vulnerability and significance to determine the impact of marine mammals within the vicinity of the Development. The potential adverse effect potentially arising from the Development to be considered within the EIA report is underwater noise. It is intended that the desk based assessment provided in post consent compliance Forthwind Construction Plan (FW1.PLN.004 section 3.2) is updated to take account of the larger pile size and is provided within the Environmental Impact Assessment Report.

Due to the short-term nature of the construction period, the small scale of deployment, the industrial nature of the location and relatively low presence of marine mammals within the development area, operational effects such as increased vessel movements and EMF from the export cable are scoped out.

As with birds above it is considered that indirect effects, such as the loss of foraging are likely to be negligible as the small seabed area within the vicinity of the Site is not considered to be an important area for fish and shellfish food sources.

The Impact Assessment will determine the severity of effects, their duration, vulnerability and significance to determine the effect of marine mammals within the vicinity of the Development. The adverse effects which could arise from the Development are as follows:

- Increased underwater noise.
- Increased vessel presence; and
- Changes in electromagnetic fields.

SNH specifically raised the possibility of marine mammal entanglement with moorings in their response to the 2019 scoping opinion, however as the scope of this application relates to fixed foundations and does not consider floating wind, marine mammal entanglement will be not be considered within the scope of the assessment.

As with birds above it is considered that indirect effects, such as the loss of foraging are likely to be negligible as the seabed area within the site is not considered to be an important area for fish and shellfish food sources.

The projects considered for cumulative assessment remains the same as for birds, as presented in Section 11.8.

The Impact Assessment will determine the severity of effects, their duration, vulnerability and significance to determine the effect of marine mammals within the vicinity of the Development.

11.6. Fish/Shellfish

11.6.1. Fish and Shellfish Species present in the Local Area

Chapter 13 of the 2015 ES (Fish and Shellfish Ecology – (Forthwind Ltd, 2015)) indicates typical shellfish species associated with the Firth of Forth include Norway lobster, scallop and the common whelk. Crustaceans such as the European lobster and brown crab inhabit rocky inshore areas. These species also provide a vital source of prey for larger fish and marine mammals.

The region is also used by migratory fish species, such as Atlantic salmon, sea lamprey, river lamprey and the European eel, which traverse the Firth of Forth en route to freshwater habitats in the rivers Forth and Teith. This means that there is potential for migratory species to pass through the wider study area.

Resident fish species within the wider study area are broadly represented by the three community assemblages, as outlined below.

Demersal species

Demersal species are mostly bottom feeders that live on or near the seabed. Their distribution is often related to sediment type, hydrography, bathymetry, predator-prey interactions and competition for space. Characteristic demersal species of the Firth of Forth include cod, whiting, monkfish and plaice. Two members of the cod family, whiting and cod are regularly recorded in the Firth Estuary and the Firth of Forth. Other smaller-bodied species, like the gobies, dragonets and blennies, are present in the Firth of Forth. These smaller demersal species provide an important food resource to another demersal group, the elasmobranchs. Elasmobranchs such as the thornback ray and small-spotted catshark are also present within the Firth of Forth.

Benthopelagic species

Benthopelagic species live in close association with the seafloor, but mainly feed in mid-water. Such species include the lesser sandeel and spurdog, both of which are of conservation importance.

Pelagic species

Pelagic species inhabit the water column including the near surface where they feed on small zooplankton and other swimming animals. The spatial distributions of these fish are strongly influenced by hydrodynamic factors and may vary annually within the region. They can undergo extensive migrations linked to spawning and foraging opportunities. Typical pelagic species within the region include herring and sprat.

An incidental record of a single basking shark was recorded on one occasion in November 2015 during the ongoing bird and marine mammal survey work. This is a very rare record for the Firth of Forth. In a Scottish context basking sharks are largely located on the west coast of Scotland, with concentrations around the islands of Coll and Tiree and the Small Isles (Speedie et al., 2009). As such, it is considered unlikely that this species of fish will be affected by the Development.

11.6.2. *Potential Effects on Shellfish*

Based on the results of the 2015 ES the beam trawl survey demonstrated that the seabed habitats within the site were not considered to be an important, spawning, nursery or foraging resource for fish or shellfish.

In terms of sites designated for fish fauna, there is a single site (the River Teith SAC), that tributes into the Firth of Forth. The River Teith is designated for four species of fish fauna, three of which are migratory and therefore entering the Firth of Forth itself. These are Atlantic salmon, river lamprey and sea lamprey. By contrast, the Forth species, brook lamprey are confined to freshwater for their lifespan.

The 2015 ES reported that, following the implementation of mitigation measures (namely covering subsea cabling to minimise any electromagnetic fields, and commitment to a Pollution Prevention Plan), all residual effects on the SAC and its qualifying features during construction, operation and decommissioning, was considered to be negligible for all SAC features.

Based on the above it is proposed to scope out these receptors for the current assessment on the basis that the likelihood and potential scale of effects on these receptors will remain commensurate (i.e., negligible).

11.7. Cumulative Assessment of Effects

Advice is sought from NatureScot/MSS on the proposed projects (listed below) considered for the cumulative assessment:

- European Offshore Wind Deployment Centre.
- Hywind Scotland Pilot Park.
- Inch Cape Offshore Farm.
- Kincardine Offshore Windfarm.
- Levenmouth Demonstration Turbine (ornithology only).
- Moray East Offshore Windfarm (marine mammals only).
- Moray West Offshore Windfarm (marine mammals only).
- Neart na Gaoithe Offshore Windfarm.
- Seagreen Alpha Offshore Windfarm; and
- Seagreen Bravo Offshore Windfarm.

11.8. Summary of Effects

Table 23 provides a summary of effects relating to birds, marine mammals and fish / shellfish. Those that area scoped in are marked (✓) and those scoped out marked as (x).

Table 23 - Summary of Potential Effects on Offshore Ecology

Potential Effects	Construction	Operation	Decommissioning	Rationale
Birds				
Collision	x	✓	X	Once the turbines are operational, there will be a collision risk to birds flying through the wind farm. Collision risk to bird species will be assessed using survey data and collision modelling.
Displacement	✓	✓	✓	There is the potential for some displacement to bird species at all stages of the project. During both the construction and decommissioning phases, there will be increased vessel traffic to build and dismantle the wind farm. During operation there is the potential for some

Potential Effects	Construction	Operation	Decommissioning	Rationale
				displacement from the presence of the turbines themselves.
Barrier Effects	x	✓	x	Due to the small scale of the proposed wind farm the potential barrier effects on birds are minimal. However, consideration will be given to this potential impact within the EIA and accordingly it is scoped in .
Indirect Effects	x	x	x	As mentioned above it is considered that, based on the results of the benthic surveys undertaken for the 2015 ES that the benthic habitats do not provide key spawning, nursery or foraging habitat for fish/shellfish fauna and consequently are extremely unlikely to provide a key foraging resource for birds. Other indirect effects such as turbidity and smothering of benthos were considered to be negligible in the original Forthwind ES and as such it is proposed that they will be scoped out .
Cumulative Effects	✓	✓	✓	Section 11.13 contains a list of Developments considered for cumulative effect.
Marine Mammals				
Increased underwater noise	✓	x	✓	The foundation solution used (e.g., drill piles) has the potential for underwater noise during construction and decommissioning due to increased vessel and works activities. As the location, scale and nature of the development, is smaller than that already consented, an updated desk

Potential Effects	Construction	Operation	Decommissioning	Rationale
				based assessment provided in the previous Forthwind construction plan will be updated and provided within the EIR.
Increased vessel presence	x	x	x	Due to the location, scale and nature of the development, the risk of collision or disturbance to marine mammals during the construction and decommissioning phases of the Development is negligible.
Changes in electromagnetic fields	x	x	x	The cables will either be buried to a depth of 1m or covered by protective material, meaning that the significance of the EMF effect will be negligible. In addition, the location, scale and nature of the development means that the risk of electromagnetic fields from the export cables affecting the navigational ability of marine mammal species is negligible.
Entanglement	x	x	x	There are no moorings associated with offshore turbines.
Indirect effects	x	x	x	As mentioned above indirect effects such as the loss of foraging are likely to be negligible as the seabed in this area is not considered to be an important fish/shellfish resource. As such, it is proposed to scope these out.
Cumulative effects	✓	✓	✓	Section 11.8 provides a list of Developments considered for cumulative effect.
Fish / Shellfish				

Potential Effects	Construction	Operation	Decommissioning	Rationale
Direct effect	x	x	x	The development site has reduced considerably in scale. As such direct effects on, spawning, nursery or foraging resource for fish or shellfish are predicted to be negligible.
EMF effect	x	x	x	The implementation of mitigation measures, namely covering subsea cabling to minimise any electromagnetic fields, all residual effects on the SAC and its qualifying features are considered to be negligible.
Accidental Spillage	x	x	x	The implementation of mitigation measures, namely implementation of a Pollution Prevention Plan), all residual effects on the SAC and its qualifying features are considered to be negligible.

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12. BENTHIC ECOLOGY

12.1. Introduction

This section reviews the potential effects from the construction, operation and decommissioning of the Forthwind Demonstration Project on the benthic ecology of the development area. Potential effects have been identified based on a description of the baseline conditions, informed by a desk-based study and the results of a geophysical survey, geotechnical investigation and ecological surveys undertaken in the Development site as part of the Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 (provided in Chapter 10 and Appendix A10.1).

12.2. Scope of Assessment

The scope of this review for physical processes and water quality has been based on baseline information gathered to identify the characteristics of the local benthic ecology to support the previous EIA investigations relating to the July 2015 ES application. This section assesses of the potential effects of the proposals on both the intertidal and subtidal ecology.

12.3. Benthic Baseline Information

The Development is located just offshore of Methil, on the northern side of the Firth of Forth, Scotland. Water depths in the Development area range between 0 and 24m, depth increasing with distance offshore. The predominant sediment in the Firth are silts and clays however the Development area is characterised in part by coarser substrates (including areas of mixed gravelly muddy sands and sandy gravels / gravelly sands) interspersed by rocky outcrops. The seabed within the Development is mostly featureless, except for scattered boulders.

There is already a considerable quantity of information available on the characteristics of the local benthic ecology as a result of previous EIA investigations relating to the July 2015 ES application. These investigations included seabed grab sampling, small (2m) scientific beam trawling and seabed video surveillance in and around the proposed development site (Fugro EMU, 2014). Six principal biotopes were identified from this sampling effort as follows:

- SS.SMx.CMx.OphMx (brittlestars *Ophiothrix fragilis* and/or *Ophiocomina nigra* on sublittoral mixed sediment).
- SS.SMx.CMx (circalittoral mixed sediments).
- SS.SSA.IMuSa.FfabMag (the bivalve *Fabulina fabula* and polychaete *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand).
- SS.SSA.OSa (deep circalittoral sand).
- SS.SMu.CSaMu (Circalittoral sandy mud); and
- SS.SMu.CFiMu circalittoral fine mud).

Figure 10 shows the distribution these biotopes overlaid with broad habitat descriptions. It was noted that these biotopes broadly correspond with the wider Firth of Forth area and are typical for the region.

The seabed was dominated by sandy gravel, slightly gravelly sand and sandy gravel sediments and were characterised by the bivalve *Kurtiella bidentata*, the polychaetes *Owenia borealis*, *Lumbrineris cingulata*, *Spiophanes bombyx*, horseshoe worm *Phoronis*, the amphipod, *Ampelisca tenuicornis* and the brittlestar *Amphiura filiformis*. Common species recorded from the video surveillance and trawl sampling included the common starfish *Asterias rubens*, gobies *Gobidae*, swimming crab *Liocarcinus*, dead man's fingers *Alcyonium digitatum*, hermit crab *Paguridae*, edible sea urchin *Echinus esculentus*,

sea squirts *Asciella* and plaice *Pleuronectes platessa*. Seapens *Pennatula phosphorea* and *Virgularia mirabilis* were also observed during the video surveys at a number of fine sediment locations in comparatively deeper water and further offshore.

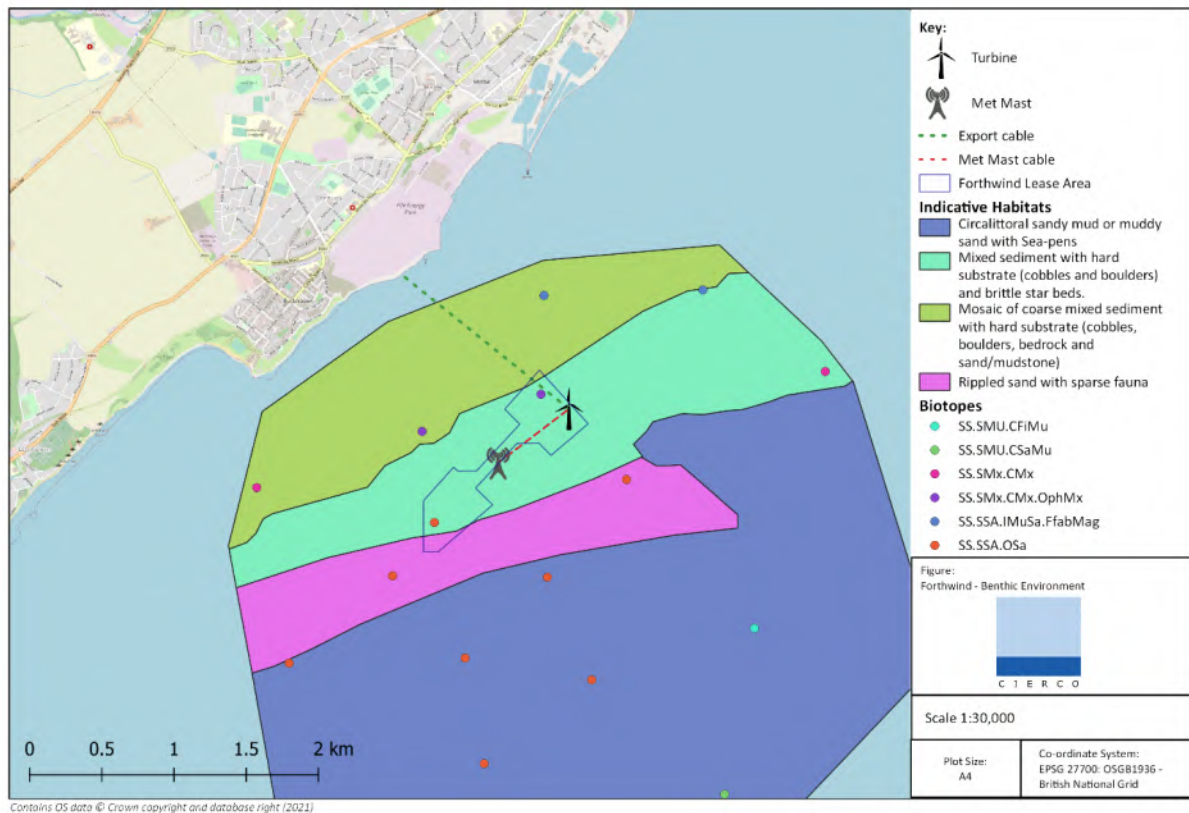


Figure 10 - Map of Benthic Survey Results and Turbine Locations

Features of ecological interest recorded include burrowed mud habitat with seapens which is a Priority Marine Feature (PMF) in Scotland's seas and is on the OSPAR list of threatened and declining habitats. Areas of stony reef were also noted at some locations, but these only exhibited 'medium' or 'low' reefiness compared to Annex I reef criteria.

Areas of mud/sandstone with large holes bored into the surface were observed at two sites and appeared to be consistent with the UK BAP habitat 'Peat and Clay Exposures with Piddocks'. Species of conservation importance recorded within the survey area included sandeel *Ammodytes*, Sand goby *Pomatoschistus minutus* and Cod *Gadus morhua* and which are included on the PMF list for Scotland

The coast adjacent to the site is relatively narrow (approx. 30 m width) and consists of reclaimed land made of colliery waste together with more natural areas of mobile cobbles and pebbles with occasional outcrops of sandstone bedrock or patches of boulders. Biotopes are relatively limited and include barren upper shores and lichen dominated mid-shores with limpets, barnacles, bladderwrack *Fucus vesiculosus* and red seaweeds¹².

The survey area covers the full extent of the proposed development, it is reasonable to anticipate that there is sufficient baseline information available for the purposes of assessment and no further survey work is proposed to support the EIA process for this development application.

¹² Posford Haskoning (2002). Broad scale intertidal survey of the Firth of Forth. Scottish Natural Heritage Commissioned Report F01AA407

12.4. Potential Effects

12.4.1. Worst Case Scenario

Table 24 details the aspects of the Development that represent the worst case scenario for each of the potential effects on benthic habitat. To consider the potential effects from the Development, a worst case scenario of 4 x 3.5 m pin piles for the turbine, one 8 m gravity base for the met mast (or monopile where relevant) and that the cables will be buried utilising jetting (trench dimensions being 3 x 1.5m).

The effects of decommissioning activities are considered to be comparable to those of construction but of a reduced magnitude, and as such, they have been grouped together with construction activities.

Table 24 – Worst Case Scenario design parameters relevant to Benthic Habitat

Potential Effect	Worst Case Scenario	Justification
Construction and Decommissioning		
Temporary direct seabed habitat disturbance	Foundation: Maximum of four pin piles with a diameter of 3.5m for the turbine and one 8 m diameter gravity base for the Met Mast totalling 88.5 m ² of seabed disturbance.	The four pin pile and one gravity base foundation disturb the greatest area of seabed due to the ground preparation/levelling works (e.g., dredging).
	Turbines: Installed by a single jack-up vessel with six feet, each with a surface area of 12 m ² , totalling 72 m ² of seabed disturbance.	Installation is anticipated to take two days and is anticipated to be finished after four allowing for de-rigging and transit.
	Cables: Complete burial of the export cables will require a 3 m corridor either side of the 3 m trench to allow seabed trenching machinery to operate (BERR, 2008). This will disturb a maximum volume of 13,500m ³ for the electrical export cable and 5,598 m ³ for the met mast utility cable i.e., a total volume of 19,098 m ³ . Cable laying vessels will deploy anchor along the export cable route. There may be up to eight 12 tonne anchors with a footprint of 193 m ² per deployment (BERR, 2008). This will disturb a maximum area of 3,181 m ² .	Trenching assessed as disturbing more sediment than other installation techniques. It should also be noted that the sediment from the trench will be piled either side. The spoil will erode and naturalise over time becoming part of the natural seabed landscape. Anchor 'scars' will be left on the seabed following deployment. These will be similar to the size of the anchor. The total areas are precautionary as complete burial is unlikely.
Temporary increased suspended solid concentrations	Foundation: Maximum of four pin piles with a diameter of 3.5m for the turbine and one 8 m diameter gravity base for the Met Mast totalling 88.5 m ² of seabed disturbance.	The four pin pile and one gravity base foundation disturb the greatest area of seabed due to the ground preparation/levelling works (e.g., dredging).

Potential Effect	Worst Case Scenario	Justification
	Cables: Complete burial of the export cables via jetting. This will disturb a maximum volume of 13,500m ³ for the electrical export cable and 5,598 m ³ for the met mast utility cable i.e., a total of 19,098 m ³ .	Jetting assessed as releasing more sediment than other installation techniques. The total volumes are precautionary as complete burial is unlikely and the volume of disturbed sediment will be less.
Temporary increases in sediment deposition	Foundation: Maximum of four pin piles with a diameter of 3.5m for the turbine and one 8 m diameter gravity base for the Met Mast totalling 88.5 m ² of seabed disturbance.	The four pin pile and one gravity base foundation disturb the greatest area of seabed due to the ground preparation/levelling works (e.g., dredging).
	Cables: Complete burial of the export cables via jetting. This will disturb a maximum volume of 13,500m ³ for the electrical export cable and 5,598 m ³ for the met mast utility cable i.e., a total of 19,098 m ³ .	Jetting assessed as being worst case. The total volumes are likely to be less for the reasons explained above.
Temporary release of sediment contaminants from seabed disturbance.	Foundation: Maximum of four pin piles with a diameter of 3.5m for the turbine and one 8 m diameter gravity base for the Met Mast totalling 88.5 m ² of seabed disturbance.	The four pin pile and one gravity base foundation disturb the greatest area of seabed due to the ground preparation/levelling works (e.g., dredging).
	Cables: Complete burial of the export cables via jetting. This will disturb a maximum volume of 13,500m ³ for the electrical export cable and 5,598 m ³ for the met mast utility cable i.e., a total of 19,098 m ³ .	Jetting assessed as releasing more sediment than other installation techniques. The total volumes are precautionary as complete burial is unlikely and the volume of disturbed sediment will be less.
Noise	Foundations: One turbine with maximum of 4 x 3.5 m diameter pin piles each drilled to a target depth of approximately 50 m and one met mast monopile with 3.5m diameter up to 50m.	Pin piles will generate more noise than gravity base foundations due to the need to drill (NB: ground conditions are not suitable for hammering).
	Cables: One 1500 m of electrical export cable and one 622 m met mast utility cable i.e., a total distance of 2,122 m (for both cables) with complete burial via jetting.	Jetting represents the noisiest means of cable installation.

Potential Effect	Worst Case Scenario	Justification
Intertidal temporary direct seabed habitat disturbance	One cable installed over the intertidal area (assumed to be no more than 30 m) by trenching. Trenches will be dug by a JCB or similar and the dimension will be 3 m wide. Total surface area affected is therefore 90 m ² .	Trenching will be used for crossing the intertidal area with potential effects on the benthic ecology.
Intertidal temporary increased suspended solid concentrations, sediment deposition and release of contaminants	One cable installed over the intertidal area by trenching. Trenches will be dug by a JCB or similar and the dimension will be 3 m wide by up to 1.5 m deep. Total volume of area affected is therefore 135 m ³ .	Trenching will be used for crossing the intertidal area with potential effects on the benthic ecology.
Accidental spillages of chemicals.	Accidental uncontrolled release of chemicals.	
Operation		
Net loss of original habitat	Foundations: Maximum of four pin piles with a diameter of 3.5m for the turbine and one 8 m diameter gravity base for the Met Mast totalling 88.5 m ² of seabed disturbance. (plus, scour protection).	Gravity base foundations are likely to have the greatest potential to effect benthic receptors as they have the largest footprint compared to other foundation options. It is acknowledged that the loss of seabed habitat through the construction phase (3-6 months) would be incremental as a result of successive placement of turbine foundations and scour protection materials.
	Cables: Complete surface lay of electricity and utility cables with associated protection materials (dimensions 5 m x 1 m). This will result in a maximum seabed loss of 10,610 m ² for both cables.	Maximum cable requiring protection would result in maximum area of seabed habitat removal. However, this is precautionary as the preferred option would be to bury the cables.
Introduction of new hard substrate for colonisation including non-native species	Foundations: 5 x 3.5m (4 for the turbine, one for the met mast) diameter pile foundations.	New vertical surfaces would be provided associated with the turbines and foundations within the water column, scour protection and rock placement material. This increases habitat complexity.
	Cables: Complete surface lay of electricity and utility cables with associated protection materials (dimensions 5 m x 1 m). This will	New vertical surfaces associated with cable protection material. It increases habitat complexity.

Potential Effect	Worst Case Scenario	Justification
	result in a maximum new surface area of 10,610 m ² for both cables.	Maximum new habitat would be introduced by assuming complete surface laid cabling.
Changes to the hydrodynamic regime	Foundations: 5 x 3.5m (4 for the turbine, one for the met mast) diameter pile foundations (plus scour protection).	The Piles represent a potential effect on tidal, wave and sediment regimes and associated scour effects.
Temporary habitat disturbance	The maintenance of the wind turbine may involve the use of jack up vessels for intermittent maintenance.	It is estimated that the turbine might be visited once every ten years for a significant maintenance visit involving a jack up vessel. Other maintenance vessels may also be used but it is anticipated that these will be small vessels (<15m) which would anchor to the structure.
Electromagnetic field generation / Heat effects	The export cable will be 66kV and installed in a single trench to a target burial depth of 1 m. The total length of the export cable will be 1,500m.	The scenario represents the maximum anticipated length of the cable.
Accidental spillages of chemicals.	Accidental uncontrolled release of chemicals.	

The following key potential effects are considered within this scoping report:

12.4.2. *Potential Effects during the construction phase*

The issues that could affect the benthic ecological receptors as a result of the proposed development during construction both in the offshore and in the intertidal zone include the following aspects:

- Temporary direct habitat disturbance
- Temporary increase in suspended sediment concentrations
- Temporary increases in sediment deposition and smothering
- Temporary releases of sediment contaminants from seabed disturbance
- Underwater noise and vibration

12.4.3. *Temporary direct habitat disturbance*

The sources of temporary physical disturbance to benthic habitats during the construction phase derive from the jacking up and anchoring of construction vessels, the placement of jacket foundations and the installation of export cables. These aspects were assessed within the 2015 ES (Section 10.7.2.1), which concluded that the effect is not significant. Considering that the installation techniques proposed to be utilised are similar to those described in the 2015 ES, the scale of the development is smaller, the low sensitivity of the benthic environment as assessed within the 2015 ES and the relative short duration of the construction programme, it is proposed that temporary direct

habitat disturbance is scoped out and is not considered further in the EIA process for this development application.

12.4.4. *Temporary increase in suspended sediment concentrations*

This aspect is considered within section 17.5.2.1 of this scoping report. For the same reasons outlined in section 17.5.2.1 of this scoping report and the low sensitivity of the benthic environment as assessed within the 2015 ES (10.7.2.2), it is proposed that this effect is scoped out and is not considered further in the EIA process for this development application.

12.4.5. *Temporary increases in sediment deposition and smothering*

The sources of potential deposition and smothering of benthic habitats during the construction phase derive from the jacking up and anchoring of construction vessels, the placement of jacket foundations and the installation of export cables. This aspect was also assessed within the July 2015 ES (10.7.2.3) which concluded that the significance of this effect is negligible. Considering that the installation techniques proposed to be utilised are similar to those described in the 2015 ES, the scale of the deployment is the smaller (one turbine), the low sensitivity of the benthic environment as assessed within the 2015 ES and the relative short duration of the construction programme, it is proposed that temporary increases in sediment deposition and smothering is scoped out and is not considered further in the EIA process for this development application

12.4.6. *Temporary releases of sediment contaminants from seabed disturbance*

This aspect is considered within section 17.5.2.3 of this scoping report. For the same reasons outlined in section 17.5.2.1 and considering the potential of encountering contaminated sediment being low as identified in the July 2015 ES (10.7.2.4) it is proposed that this aspect is scoped out and is not considered further in the EIA process for this development application.

12.4.7. *Underwater noise and vibration*

The sources of potential noise and vibration arise from the piling and drilling activities during installation of the turbine and met mast foundations and jetting activities to install the cables within the offshore array. This aspect was considered within the July 2015 ES (10.7.2.3) which concluded that the significance of this effect is negligible. As the proposed installation techniques are like that assessed within the 2015 ES, the scale of development is the smaller (i.e., 1 turbine), the localised nature of the effect and the relatively short duration of the construction programme, it is proposed that underwater noise and vibration disturbance to the benthic habitat is scoped out and is not considered further in the EIA process for this development application.

12.4.8. *Potential Effects during the operational phase*

The issues that could affect the benthic ecological receptors as a result of the proposed development during operation of the development both in the offshore and in the intertidal zone include the following aspects:

- Loss of original habitat
- Introduction of a new hard substrate for colonisation including non-native species
- Changes to the Hydrodynamic regime; and
- EMF and heat effects

12.4.9. *Loss of original habitat*

The source of potential loss of original habitat arises from the placement of turbine foundations within the seafloor. However as assessed within the 2015 ES (Section 10.7.3.1), the sensitivity of the receptor

is considered to be low. In addition, the magnitude of the loss of seabed from the proposed development is quantifiable and small in the wider geographic context.

The only Priority Marine Feature (PMF) habitat present (burrowed mud with seapens) is relatively insensitive to the impacts identified therefore should therefore be scoped out from further assessment.

In addition, although a number of PMFs were recorded (burrowed mud with seapens, sandeel, sand goby and cod), given the scale of the development any potential impact should not be of significance at regional or national levels.

Finally, within the small areas where the effect could be experienced, the effect will last only during the operational phase and is reversible. As a consequence, this effect is proposed to be is scoped out and not considered further in the EIA process for this development application.

12.4.10. *Introduction of a new hard substrate for colonisation including non-native species*

The potential of introducing a new substrate for colonisation for new species, including non-native species is presented by the removal of original seabed habitat and introducing new potential colonisation features such as foundation scour protection, cable protection material and the engineered framework of the turbine foundations.

These aspects were considered in the July 2015 ES (10.7.3.2) which concluded that, from the point of view of the potential of colonisation from native species, the spatial scale of the potential change is very limited and, although the duration is long, the species colonizing the newly available surfaces and niches within the area will be the same as those already present within the wider Firth of Forth area and as a consequence the significance of the effect is negligible. As the proposed development will offer the same opportunities for colonization, although at a relatively smaller scale and not large in the regional context of the Firth of Forth, it is proposed that this effect is scoped out and not considered further in the EIA process for this development application.

The potential of colonization of non-native species on the newly available surfaces was also considered in the July 2015 ES (10.7.3.2) which concluded that no specific information was available to suggest that reefs associated with offshore wind farms provide uniquely beneficial opportunities not currently available to alien species to assist their invasion in UK waters. In the context of the wider geographic region of the Firth of Forth, the development will only represent a very small contribution to any increased risk of spreading non-native species, as there are already other artificial hard structures present in the area (e.g., the semi-submersible oil drill rigs in cold storage since 2015) and which may be equally suitable for colonisation. In addition, the benthic survey (provided in appendix A10.1 of the July 2015 ES) did not identify the presence of any invasive non-native species in the core study area.

It is proposed that the development and implementation of a ballast water and anti-fouling management plans for the construction and maintenance vessels will reduce the risk of introducing marine non-native species during the life of the Development, which should ensure that the risk of introducing non-native species into the development area remains low. As a consequence, it is proposed that this effect is scoped out and not considered further in the EIA process for this development application.

12.4.11. *Changes to the Hydrodynamic regime*

This aspect is addressed in Section 13 Physical Process and Water Quality of this scoping report. The placement of the wind turbine foundations can alter the water flow around them, causing changes to

water levels, wave heights and currents in the area. However, as the scale of development is small (only 1 turbine) and smaller to the original 2015 ES assessment which concluded the hydrodynamic receptor is low, the magnitude of the effect and so is not considered further and scoped out.

12.4.12. *EMF and heat effects*

EMF and heat emissions from the export cables will be generated during the operation of the proposed development.

The issue of EMF within the development location was considered by the 2015 ES (section 10.7.3.5), which concluded that the overall effect of EMFs from the electricity export cables is thought to be highly localised around the cable and although the effect will be long term, lasting throughout the operational phase of the development, it is reversible upon decommissioning.

In addition, the footprint of the inter-array and export cables is relatively small in the wider geographical context of the Firth of Forth and the sensitivity of the benthic ecology within the area is considered to be low; meaning that the conclusion of the July 2015 of the EMF effect being negligible should be the same for this development application.

Furthermore, all subsea electricity cables will be buried, subject to ground conditions, or covered with cable protection material. As such any heating or EMF effects which might have directly influenced sensitive habitats or species will be limited. As a consequence, it is proposed that the effect from EMF on benthic ecology is scoped out and not considered further in the EIA process for this development application.

All electrical cables have resistance, and the resistance manifests itself as heat. The amount of heat is proportional to the power transmitted. Thermal radiation will be emitted from the inter-array and export cables during the life span of the proposed development. This has the potential to increase the temperature of the surrounding environment. However, in line with the conclusions of the July 2015 ES (section 10.7.3.5), given the highly localised effect predicted (within a few centimetres of the cable) the magnitude of this potential effect is considered to be negligible. In addition, again in line with the 2015 ES, the receptor sensitivity is considered to be low given that cables will either be buried to a depth of 1m or covered by protective material, meaning that the significance of the heat effect within the development area is negligible. As a consequence, it is proposed that the effect from heat on benthic ecology is scoped out and not considered further in the EIA process for this development application.

12.4.13. *Potential effects during decommissioning*

Decommissioning works will typically be very similar in nature to the construction works identified in 17.5.2 except in reverse order and involving similar operations and equipment. Therefore, potential effects are anticipated to be very similar to those discussed for construction operations and it is proposed to scope these aspects out from further assessment.

12.4.14. *Potential cumulative effects*

Should the construction or operation of the projects identified within Table 25 overlap with the Development then there is potential for cumulative effects.

Table 25 - Cumulative Effects Projects Considered

Project	Distance (km)	Status	Effects identified
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inch cape	40	Consented	Habitat disturbance, increase in suspended solids concentrations, Increase in sediment deposition, release of sediment contaminants, effects of underwater noise and vibration, loss of Habitat, effects of the introduction of new habitat; and EMF/ Heat effects
Inch Cape Windfarm	65	Consented	
Seagreen Windfarms	60	Consented	

However, as concluded in the July 2015 ES (10.9.2), it is unlikely that any of these cumulative effects will have a significant effect on the benthic ecology of the development of the area as the magnitude of effect will be small and the sensitivity low. Therefore, the potential for cumulative effects on the benthic environment are scoped out and will not be considered further in the EIA process for this development application.

12.4.15. Summary of potential effects

Table 26 provides a summary of effects relating to the benthic environment from the proposed development. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 26 - Summary of Potential Effects relating to the Benthic Environment

Potential Effects	Construction	Operation	Decommissioning	Rationale
Habitat disturbance / Loss	x	x	x	The construction programme is relatively short, and as assessed in the July 2015 ES the sensitivity of the benthic environment in the area is low, the scale of effect is relatively small in the geographic context of the Firth of Forth and the effect is quantifiable and reversible.
Temporary increase in suspended sediment concentrations	x	x	x	As established by the 2015 ES, the magnitude of effect is considered small and the receiving benthic environment sensitivity is considered low, so the potential effect is not significant.

Potential Effects	Construction	Operation	Decommissioning	Rationale
Temporary increase in sediment deposition and smothering	×	×	×	The construction programme is relatively short, and as assessed in the July 2015 ES the sensitivity of the benthic environment in the area is low, the scale of effect is relatively small in the geographic context of the Firth of Forth and the effect is quantifiable and reversible
Releases of sediment contaminants from seabed disturbance	×	×	×	The majority of the contaminants analysed from samples taken within the development area showed concentrations below the Marine Scotland Action Levels, indicating that no significant environmental effects would be anticipated from the resuspension of these sediments. The only high level of contamination recorded (TPH) would not seem to have negative effect on the biological communities present.
Underwater noise and vibration	×	×	×	As established by the 2015 ES, the magnitude of effect is considered to be small and localised, the relative insensitivity of the identified benthic receptors within the area to noise and the relatively short duration of the construction programme
Introduction of a new hard substrate for colonisation including non-native species	×	×	×	The spatial scale of the development means that the potential of colonisation from new native species is

Potential Effects	Construction	Operation	Decommissioning	Rationale
				<p>very limited, and it is likely that the species colonizing within the area will be the same as those already present within the wider Firth of Forth area.</p> <p>Should the proposal be consented, Forthwind will ensure that the biosecurity risk will be assessed, and mitigation provided within the Construction Environmental Management Plan (CEMP) as soon as the contracted vessels are known (including the development and implementation of a ballast water and anti-fouling management plan for the construction and maintenance vessels).</p>
Changes to the Hydrodynamic regime	x	x	x	This aspect will be considered within the Physical Processes and Water Quality assessment.
EMF and heat effects	x	x	x	The cables will either be buried to a depth of 1m or covered by protective material, meaning that the significance of the heat and EMF effect will be negligible. In addition, the sensitivity of the benthic ecology within the area is considered to be low.
Cumulative effects	x	x	x	It is unlikely that the identified projects have the potential to interact on a significant scale with the proposed development.

In the 2019 scoping opinion, Marine Scotland Science recommended that all priority marine features and habitats listed under OSPAR to be scoped into the assessment - meaning that seapens and burrowing megafauna should be scoped in. However, the worst case scenario in this scoping proposal is smaller than that proposed in the consented ES and significantly smaller than that proposed in the 2019 scoping request (which proposed an additional turbine further offshore).

The priority marine features have already been assessed within the 2015 Forthwind environment Statement. The identified biotope SS.SMu.CFiMu.SpNMeg (that confirmed the presence of the PMF habitat 'burrowed mud' and the OSPAR habitat 'seapens and burrowing megafauna communities') is located over 2km from the proposed turbine and met mast. The 2015 Environment Statement considered the potential effects for construction, operational and decommissioning phases. These included: habitat disturbance, increased suspended sediment, sediment deposition and smothering, underwater noise and vibration, release of environmentally harmful substances, introduction of new habitats, EMF and heat effects and a change to the local hydrodynamic regime. Each of these effects was assessed in terms of their likely effects on benthic ecological receptors. As a result, a significance level was produced to easily compare the results against a known scale. No specific mitigation measures were suggested for construction or operational effects as all effects and cumulative effects assessed are considered to be of negligible or minor significance.

As the revised development proposal is in the same location, of smaller scale and of a lesser seabed special scale than that originally consented there is no reason to conclude that the outcome would be any different to that already assessed. Therefore, Forthwind propose that Benthic Impact should be scoped out.

13. PHYSICAL PROCESS AND WATER QUALITY

13.1. Introduction

The purpose of this review is to assess the potential effects from the construction, operation and decommissioning of the Forthwind Demonstration Project on the physical processes and water quality of the area. Potential effects have been identified based on a description of the baseline conditions, informed by a desk based study and the results of a geophysical survey, geotechnical investigation and ecological survey undertaken in the Development site as part of the Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 (provided in Chapter 6 and Appendix A10.1)). The study area comprises the coastal cell in which the Development is located.

13.2. Scope of Assessment

The scope of this review for physical processes and water quality has been based on information gathered during the baseline assessment. The assessment will also draw upon specific guidance and best practice as described in 13.5.

13.3. Geographical Scope

The Development is located on the northern shore of the Firth of Forth at Methil, Scotland. In terms of physical processes, the coastal zone can be divided in cells, or regions within which the geology and geomorphology are similar, and the sediment transport is self-contained, or nearly completely self-contained. As such, any changes to the sediment transport patterns within a cell are unlikely to have any effect on adjacent cells. Limits between cells are marked by areas where the littoral drift divides (normally due to an abrupt change in the orientation of the coastline) or the presence of a sediment sink.

HR Wallingford presented a study of the coastal cells in Scotland. The Development is contained within the St. Abb's Head to Fife Ness cell. Within this cell, the Development is located in the Inner Firth of Forth to Ellie Ness subcell, where the presence of the inner Forth estuary and the Ellie Ness headland act as natural boundaries for the sediment transport in the area. This subcell also contains key receptors considered in the assessment, such as the Firth of Forth SSSI and designated water bodies.

Therefore, the geographical scope of this assessment ranges from the inner Firth of Forth estuary to the Ellie Ness headland.

13.4. Baseline Information

A desk based review of available information was undertaken to identify and describe the physical characteristics within and in the vicinity of the study area. Data sources to inform this review were gathered from existing literature and survey reports, including, where data are available and applicable:

- Admiralty charts.
- British Oceanographic Data Centre (BODC).
- Dynamic Coast – National Coastal Change Assessment: Cell 1 – St Abb's Head to Fife Ness.
- Forthwind Data gathered from previous geophysical surveys conducted at the site.
- Geological and seabed sediment data, literature and charts from the BGS.
- Marine European Seabed Habitat (MESH) data.
- Marine Scotland Web Mapping Portal
- Maritime and Coastguard Agency (MCA) survey data (where available/applicable).
- Met Office.

- Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015
- Scottish Natural Heritage – Coastal cells, SMPs and analogous studies.
- Site-specific coastal and geological publications and other grey literature.
- Strategic Environmental Assessment Area 5 report.
- The Crown Estate (TCE).
- UK Atlas of Renewable Energy; and
- United Kingdom Hydrographic Office (UKHO)

A geophysical survey of the site has been carried out to support the 'original' 2015 application and it is proposed that this survey information is used to support this application. It is considered that the information gathered to date is sufficient for the purposes of impact assessment and there is no intent to carry out further geophysical surveys to provide additional baseline information.

13.5. Assessment Methodology

The following legislation guidance, consultation and government agency literature is applicable to the assessment of effects on the physical environment from marine development projects and will be taken into account in relation to the proposed Methil demonstrator site development:

- Bathing Water (Scotland) Regulations 2008 (as amended).
- Bathing Water Directive 2006/7/EC.
- CEFAS, (2012). Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects. Defra project code ME5403.
- Department for Business, Enterprise and Regulatory Reform (BERR): Review of cabling techniques and environmental effects applicable to the offshore wind farm industry (2008).
- Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998.
- JNCC, (2001). Marine Monitoring Handbook (2001). Davies, J., Baxter, J., Bradley, M., Connor, D., Khan, J., Murray, E., Sanderson, W., Turnbull, C. Vincent, M.
- Marine (Scotland) Act, 2010.
- Marine Strategy Framework Directive (2008/56/EC).
- MMO, JNCC, NE, CCW (2010). Guidance on the assessment of effects on the environment and cultural heritage from marine renewable developments.
- OSPAR (Convention for the Protection of the Marine Environment of the North East Atlantic) (2012) CEMP 2011 assessment report OSPAR Commission Monitoring and Assessment Series, Publication Number: 563/2012
- Scottish Natural Heritage (SNH) (2013) A handbook on environmental impact assessment: Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland. 4th Edition.
- Shellfish Hygiene Directive 1991/492/EEC.
- The Scotland River Basin District (Standards) Directions 2014.
- The Scotland River Basin District (Status) Directions 2014.
- The Wildlife and Countryside Act 1981.
- Water Environment and Water Services (Scotland) Act 2003.
- Water Framework Directive (2000/60/EC)
- Seabed.
- Hydrodynamics and coastal processes.
- Adjacent coastline.

- Geologically designated features within the Development area and its vicinity; and
- Water quality, including designated water bodies within the area.

13.6. Potential Effects

The potential effects from the construction, operation and decommissioning of the Development are identified using a worst-case scenario from all foundation types being considered (i.e., piled) and that the cables will be buried utilising jetting (trench dimensions being 3 x 1.5m).

13.6.1. Worst Case Scenario

Table 27 details the aspects of the Development that represent the worst-case scenario for each of the potential effects on physical processes and water quality.

The effects of decommissioning activities are considered to be comparable to those of construction but of a reduced magnitude, and as such, they have been grouped together with construction activities.

Table 27 - Worst Case Scenario design parameter relevant to Physical Processes

Potential Effect	Worst Case Scenario	Justification
Construction and Decommissioning		
Increased suspended sediment levels	The proposed pile foundation will require 4 pin piles (1 per leg) of up to 3.5 m diameter pile to a maximum depth of 50 m. The temporary met mast will utilise a gravity base foundation, that will require pre-construction preparation resulting in up to 15,000 m ³ of material to be removed. .	Due to the composition of the sediment at the site, only pile foundations are considered suitable for the proposed turbine.
Deposition of sediment plumes	Cables: Complete burial of the export cables will require a 3 m corridor either side of the 3 m trench to allow seabed trenching machinery to operate (BERR, 2008). This will disturb a maximum volume of 13,500m ² for the electrical export cable and 5,598 m ² for the met mast utility cable i.e., a total volume of 19,098 m ³ .	Cable installation by means of jetting results in the higher level of suspended sediment during construction works than other potential techniques (ploughing or protective mattresses).
Release of sediment contaminants		
Damage and obstruction of intertidal rock outcrops notified as a geological interest in the East Wemyss to Buckhaven Coast SSSI		Trenching a cable through the intertidal area will directly impact upon outcropping formations.
Operation		
Changes to hydrodynamics (waves, tides and currents)	Piled foundations result in a turbulent wake may extend approximately 200 m down current of the	The use of multiple pin piles will have a larger impact than that of a monopile due to the larger foundation base

Potential Effect	Worst Case Scenario	Justification
	foundation, with additional hydrodynamic changes off each side. Scour can occur adjacent to scour pads.	
Changes to sediment transport, including scour around foundations	Piles foundations may have similar effect to monopiles. Pin Piles may have smaller effects if installed by piling (much smaller piles), and even less effect if installed with suction caissons. Jack-up would have less effects than monopiles. Fewer effects during operations due to decreased scour potential.	Changes to hydrodynamics due to the presence of the foundation may lead to altered sediment transport patterns.
Effects on the adjacent coastline	4 pin piles (one for each leg of the turbine) at 3.5 m diameter to a depth of up to 50m, with a footprint of 1924m ² per foundation, including scour protection. The temporary met mast will utilise a gravity base foundation which will be up to 8 m in diameter.	Any alterations on hydrodynamics or sediment transport in the area may affect the adjacent coastline.

No sandbanks or large mobile bedforms have been identified in the area as a result of previous baseline data collection or the geophysical survey undertaken in the Development area. Hence, we suggest these features are scoped out without the need for further assessment.

13.6.1.1. Potential Effects during the construction phase

The physical process and water quality issues that could arise as a result of the proposed Development during construction arise primarily from the following aspects:

- Increased suspended sediments levels.
- Deposition of sediment plumes.
- Release of Sediment contaminants.
- Cable Landfall Works causing damage and obstruction of intertidal rock outcrops notified as a geological interest in the East Wemyss to Buckhaven CoastSSSI; and
- Accidental Spillage.

13.6.1.2. Increase in Suspended Sediments Levels

Increased suspended sediment levels can have an effect on water quality in the area. The extent to which the sediment plume will disperse depends on the local hydrodynamics (i.e., current velocity) and the sediment size. Coarser sediments such as gravel or coarse sand will settle down on the seabed rapidly, while fine sediment can remain suspended for a longer period of time, during which they are transported by the currents over a wider area¹³.

The Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 concluded that the seabed sediments in the Development area comprises mainly muddy sand, slightly gravelly sand, increasing towards gravel and sandy gravel in areas closer to the coast (based on the results of the benthic survey – see appendix A10.1 of the 2015 ES). As stated in the July 2015 ES the area around location of the proposed turbine (turbine 2(a) of the consented turbine) site comprises mainly of coarse material, any sediment plume generated by the construction would be limited to the immediate vicinity of the working area before settling back on the seabed, resulting in a localised and temporary effect. The July 2015 ES concluded that dispersion of finer materials present in the sediment, such as silts and clays, may occur over a greater area, however, the amount of fines present in the sediments of the working area is small. The sediment plumes are not anticipated to have any significant effects on the water quality of the water bodies in the area or affect nearby Bathing Waters or Shellfish Production Areas. The July 2015 ES also concluded that due to the localised and temporary nature of the development, the magnitude of the effect of increased suspended sediment concentrations is assessed as small. The water body around the Development has been classified as having a ‘Moderate’ status by SEPA in 2013, hence its overall sensitivity is considered medium.

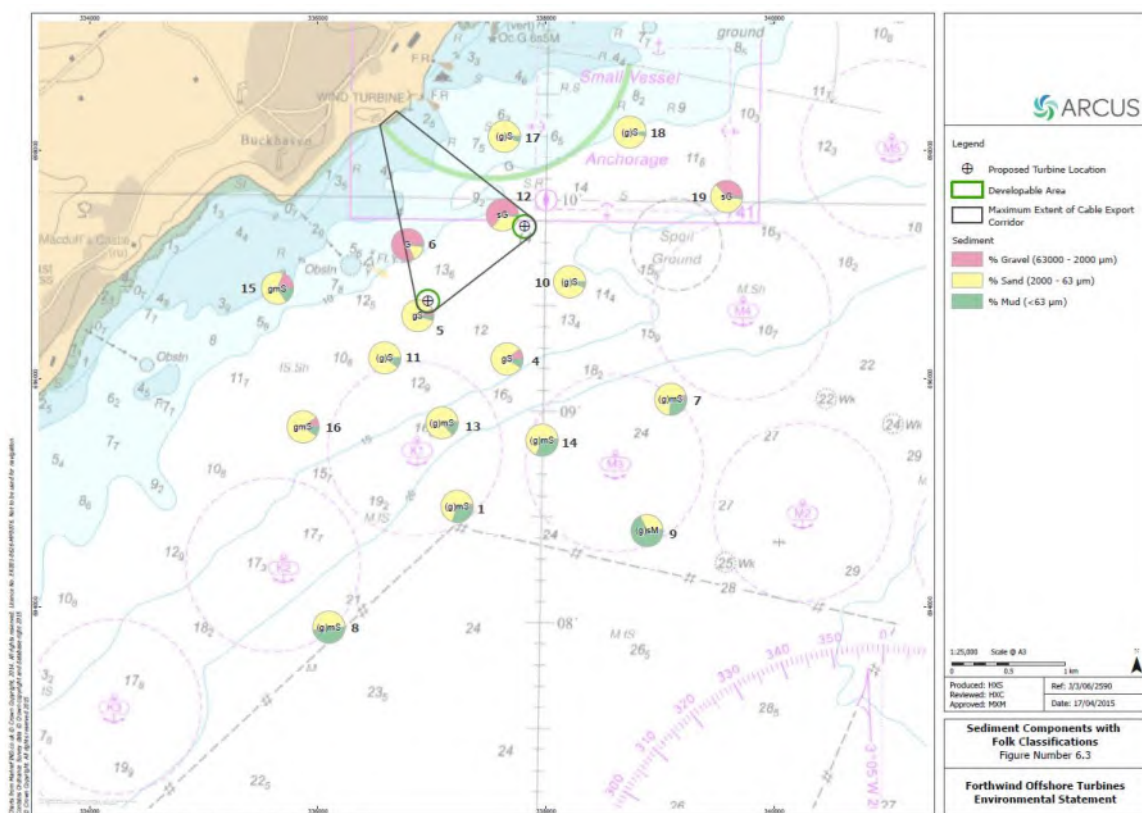


Figure 11 - Sediment Components and Folk Classification - Plate 6.3 of 2015 ES

¹³ BERR (Department for Business, Enterprise and Regulatory Reform), 2008. Review of cabling techniques and environmental effects applicable to the offshore wind farm industry. Technical Report, January 2008.

The significance of the effect is considered to be minor and therefore not significant. The construction activities and methods for the turbines are the similar to the 'original' 2015 assessment, so it is reasonable to conclude that the assessment outcome for the revised Development design would be the same as the 2015 ES (i.e., not significant); therefore, consideration of the effect of increased suspended solids are scoped out of further consideration.

13.6.1.3. Deposition of Sediment Plumes

In a similar fashion, the 2015 ES concluded that due to the coarse particle sizes found in the area, any sediment plume generated by the construction of wind turbines in the area would rapidly settle back on the seabed. Deposition would occur over a small area estimated to be limited to be up to 42 m on either side of the works for spring tides. Dispersion of finer materials present in the sediment, such as silts and clays, may occur over a greater area. However, the thickness of these deposits is likely to be very thin, due the small number of fines in the working area and the wider zone over which they would be dispersed. Therefore, the significance of the effect was considered negligible, and the effect considered not significant. Again, the construction activities and methods for this development are of similar nature to those considered back in 2015, as a consequence the construction effects are considered not to be significantly different. It is therefore proposed that deposition of sediment plumes is scoped out and is not considered further in the EIA process for this Development application.

13.6.1.4. Release of Sediment Contaminants

Sediments in the Development area were analysed for contaminants as part of the intertidal ecology survey (see Appendix A10.1 of the 2015 ES and Figure 21). The majority of the contaminants analysed showed concentrations below the Marine Scotland Action Levels, indicating that no significant environmental effects would be anticipated from the resuspension of these sediments. Although higher levels of TPH were recorded next to the Development (above the Action Levels), these do not seem to be having a negative effect on the biological communities¹⁴.

It is therefore proposed that consideration of the effect of release of Sediment Contaminants are scoped out from further consideration within the EIA process for this revised design development application.

13.6.1.5. Cable landfall works causing damage and obstruction of intertidal rock outcrops

The ES of July 2015 also considered the impact of cable landfall works causing damage and obstruction of intertidal rock outcrops notified as a geological interest in the East Wemyss to Buckhaven coast SSSI. The cable landfall area for the Forthwind Demonstration Project is located on the Fife Energy Park; a coastline extending from Buckhaven to Methil which is defended by a rock armour revetment (except for a sheet pile quay at the shorefront of the Fife Energy Park -see figure 12). As established by the 2015 ES, this area is of little geological interest and does not contribute to the SSSI designation feature (Section 6.7.2.4 of the July ES) and therefore this aspect will be scoped out for further assessment.

In addition, the ES of July 2015 also considered the risk and impact of accidental spillage and/or releases of chemicals (such as drilling chemicals, fuels and/or oils) to sea during the construction phase. It concluded that the severity of this effect on the water receptor depends upon the quantities and nature of the spill and the dilution and dispersion it would undergo under the effect of currents and waves. However, adherence to a pollution/spill prevention plan reduces the magnitude of the

¹⁴ *Fugro EMU, 2015. Methil Offshore Wind Demonstrator - Benthic Sub-Tidal Ecology Survey Report. Report No. 15/I/3/03/2590/1782. March 2015.*

effect to negligible by minimising the potential for occurrence of these accidental spills. The ES identified the water environment receptor as of medium sensitivity and therefore, predicted that the effect of an accidental spill or release would be of negligible significance meaning these effects are considered to be “not significant”. The duration of the construction programme for this Development is shorter than the consented development (from 3 – 6 months, to 2 – 3 months) the same as the consented development (and as such the risk and impact of accidental spillage and/or releases of chemicals into the surrounding waters is reduced. As a Pollution Prevention Plan will be adopted for the construction and decommissioning stages of this development it is proposed that this effect is scoped out for further consideration.

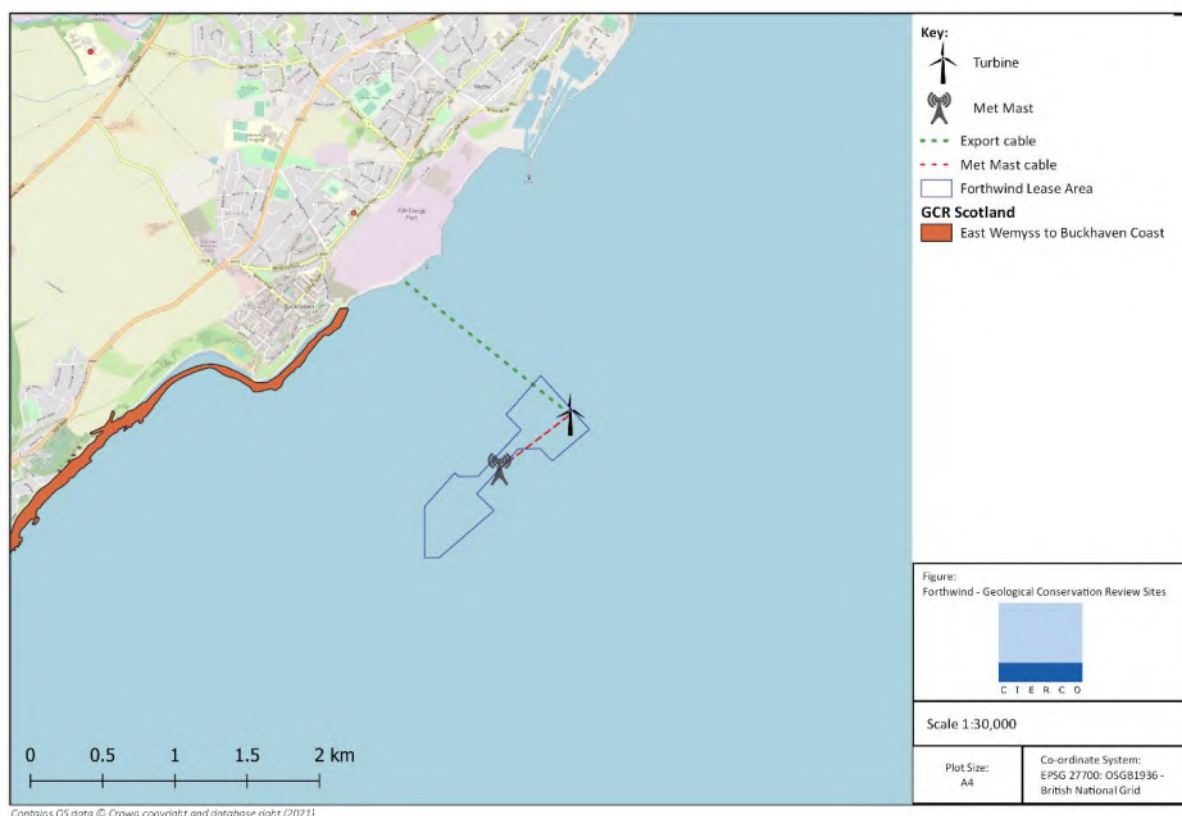


Figure 12 - Scottish GCR Sites

13.6.2. Potential effects during operations

The main aspect that could arise as a result of the proposed Development during operation relates to the how water flows around the installed wind turbine foundation resulting in changes to currents, water levels and wave heights in the area. However, in line with the previous 2015 EIA, the worst-case scenario is a 4 pin pile foundation, and any associated hydrodynamic effects are likely to be very small, within the natural variation and limited to the immediate vicinity of the infrastructure and no significant effects on tidal levels or current speeds are expected. Any secondary scour around the edges of the scour protection material from locally accelerated near bottom currents would last for the operational lifespan of the project (approximately 25 years) and would be reversible on decommissioning.

As concluded with the 2015 ES, the physical processes and water quality receptors may experience some very localised modification but little different to which might naturally occur and therefore remain negligible. As such it is proposed that the operational effects of changes to hydrodynamics, sediment transport and adjacent coastline are scoped out from further consideration.

As advised in the previous 2019 scoping opinion, a review of the Dynamic Coast, Coastal Change Assessment Report (Cell 1 - St Abb's Head to Fife Ness)¹⁵ has been undertaken. The proposed landfall is located within an area (Site 12, Buckhaven). The area, although vulnerable and consists of made ground (colliery waste), it does have sea defences in place and the cable landfall and duct will be designed to address potential impacts from localised erosion due to climate change impacts over its 25 year operational life.

13.6.3. *Potential effects during decommissioning*

Decommissioning works will typically be very similar in nature to the construction works identified in 17.5.2 except in reverse order and involving similar operations and equipment. Therefore, potential effects are anticipated to be very similar to those discussed for construction operations and it is proposed to scope these aspects out for further assessment.

13.6.4. *Potential cumulative effects*

The projects considered for the cumulative assessment were those for which a potential overlap between activities and receptors may take place with the Development area.

Potential cumulative effects were identified as:

- Increases in suspended sediment levels.
- Increases in sediment redeposition; and
- Effects on water quality.

Table 28 - Cumulative Effect Projects Considered

Project	Distance (km)	Status	Effects identified
Near na Gaoithe Windfarm	40	Under construction	Increased suspended sediment concentrations, sediment deposition, effects on water quality.
Inch Cape Windfarm	65	Consented – Revised Design Under review	
Seagreen Alpha and Bravo Windfarms	60	Consented – Optimised Design Under review	

Should the construction of one or more of the windfarm projects identified in Table 28 overlap with the proposed Development, there is potential for cumulative effects to arise as a result of the seabed preparation operations and dredging required for the installation of the turbine foundations and cables.

Cumulative effects may occur where the plumes of re-suspended sediments resulting from dredging and disposal activities interact with neighbouring dredging or sea disposal activities, producing a greater spatial extent of sediment plume than individual activities in isolation. This would have effects on the seabed and water quality.

The projects identified in Table 28 may require dredging for seabed preparation works. However, the associated plumes are not likely to extend as far as the Development area. It is likely that the best practicable environmental option would be to dispose of the dredged material close to where it is

¹⁵ Accessed from: <https://www.dynamiccoast.com/files/reports/NCCA%20-%20Cell%201%20-%20St%20Abb's%20Head%20to%20Fife%20Ness.pdf>

dredged, reducing the extent of the sediment plume. Therefore, this potential cumulative effect is scoped out for further consideration.

13.6.5. Summary of potential effects

Table 29 provides a summary of effects relating to the physical process and water quality from the proposed development. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 29 - Summary of Potential Effects on Physical Processes and Water Quality

Potential Effects	Construction	Operation	Decommissioning	Rationale
Effect on sandbanks or large mobile bedforms	x	x	x	The presence of these aspects has not been identified in the area.
Increased suspended sediments	x	x	x	As established by the 2015 ES, the magnitude of effect is considered small and the receiving water body is classified as moderate, so the potential effect is not significant.
Sediment Deposition	x	x	x	Based on survey data, due to the coarse particle sizes found in the area any sediment plume generated by the construction of wind turbines would rapidly settle back on the seabed. Dispersion of finer materials present in the sediment could occur; however, the thickness of these deposits at the location of the turbine is likely to be very thin, due the small amount of fines in the working area and the wider zone over which they would be dispersed.
Release of contaminants from sediment	x	x	x	The majority of the contaminants analysed showed concentrations below the Marine Scotland

Potential Effects	Construction	Operation	Decommissioning	Rationale
				Action Levels, indicating that no significant environmental effects would be anticipated from the resuspension of these sediments. The only high level of contamination recorded (TPH) would not seem to have negative effect on the biological communities present.
Damage and obstruction to intertidal rock outcrops classified as a SSSI	x	x	x	As established by the 2015 ES, the development cable landfall area is of little geological interest and does not contribute to the SSSI designation feature.
Accidental Spills	x	x	x	According to the 2015 ES, the receiving water environment receptor is considered of medium sensitivity. Adherence to a pollution/spill prevention plan reduces the magnitude of the effect to negligible.
Changes to hydrodynamics	x	x	x	The placement of the wind turbine foundations can alter the water flow around them, causing changes to water levels, wave heights and currents in the area. However, as the scale of development is small (only one turbine) and comparable to the original 2015 ES assessment which concluded the hydrodynamic receptor is low, the magnitude of the effect was determined to be negligible.

Potential Effects	Construction	Operation	Decommissioning	Rationale
Changes to Sediment transport	x	x	x	Alterations of the hydrodynamics in the Development area could lead to changes in the sediment transport systems; however, given the small scale of the development and the seabed receptor is considered to be low (as per the 2015 ES), the potential effect is not significant.
Changes to the adjacent coastline	x	x	x	Interaction of the foundations with local hydrodynamics can lead to effects in the adjacent coastline due to altered hydrodynamics and sediment transport patterns. However, as the landing location is the same as considered in the 2015 ES, the potential effect has been considered as not significant.
Cumulative effects	x	x	x	It is unlikely that the identified projects have the potential to interact with the proposed Development.

14. SOCIO-ECONOMICS

14.1. Introduction

This section describes the socio-economic interests relevant to the Forthwind Demonstration Project

14.2. Scope of the Assessment

Consideration will be given to the national, regional and local baseline socio-economic situation and the effect of the Forthwind Demonstration Project relevant to each receptor. Tourism and Recreational effects are address within section 18 of this scoping report.

14.3. Baseline Characterisation

The baseline socioeconomic conditions have been established as part of the Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 (provided in Chapter 16). This information will be updated, to reflect changes to the economic and political landscape within the locality, Scotland and the UK since July 2015, through further desktop studies, site visits and consultations. The following sources of information will be used to inform the baseline description:

- National Statistics Online (www.statistics.gov.uk).
- NOMIS Official Labour Market Statistics (www.nomisweb.co.uk).
- Fife Council (www.fife.gov.uk).
- Visit Scotland (www.visitscotland.com).
- Renewable UK (www.renewableuk.com); and
- Crown Estate (<http://www.thecrownestate.co.uk/>).

The socio-economic baseline will identify and characterise the following receptors for consideration:

- The economic value of the UK Offshore Wind Energy Industry.
- The Fife region population and economy.
- The local Methil ward population and economy.
- Fife Energy Park; and
- Local infrastructure improvements.

14.4. Potential Effects

The assessment of socio-economic effects will aim to predict the likely effects (both positive and negative) arising from the Development, which can be divided into:

Direct effects: opportunities that can be created as an immediate effect of the Development, for example opportunities in the construction and operation of the site.

Indirect effects: opportunities that will be created by the Development further down the supply chain. For example, companies providing services to the proposed Development during construction and operation; and

Induced effects: for example, employments created by the additional spend of wages into the local economy and the purchasing of basic materials, equipment and office space for staff.

14.4.1. Potential Effects during the construction phase

The socio-economic issues that could be affected as a result of the proposed Development during construction include the following aspects:

- Direct job opportunities (permanent and temporary contract).

- Supply chain opportunities.
- Local infrastructure improvements.

14.4.2. *Potential Effects during the operational phase*

The socioeconomic issues that could be affected as a result of the proposed Development during operational phase include the following aspects:

- Direct job opportunities (permanent and temporary contract).
- Supply chain opportunities.
- Local infrastructure improvements (grid, local harbour infrastructure, etc.)
- Cost reduction in wider offshore wind industry as a result of the development.

14.4.3. *Potential Effects during the decommissioning phase*

It is anticipated that the socio-economic issues that could be affected as a result of the proposed Development during decommissioning will typically be very similar in nature to the construction phase.

14.4.4. *Potential cumulative effects*

Should the construction or operation of the projects identified within Table 30 overlap with the Development then there is potential for cumulative effects.

Table 30 - Cumulative Effect Projects Considered

Project	Distance (km)	Status	Effects identified
Levenmouth Demonstration Turbine	1.7	Operational	Direct job opportunities (permanent and temporary contract), Supply chain opportunities, Local infrastructure improvements (grid, local harbour infrastructure, etc.), Cost reduction in wider offshore wind industry as a result of the development
Neart na Gaoithe Windfarm	40	Consented	
Inch Cape Windfarm	65	Consented – Revised Design Under review	
Seagreen Alpha and Bravo Windfarms	60	Consented – Optimised Design Under review	

14.4.5. *Summary of potential effects*

Table 31 provides a summary of effects relating to socio-economics from the proposed Development. Those that are scoped in are marked (✓) and those scoped out marked as (x).

Table 31 - Summary of Effects relating to Socioeconomics

Potential Effects	Construction	Operation	Decommissioning	Rationale
Direct job opportunities	✓	✓	✓	All phases of the development will create job opportunities
Supply chain opportunities	✓	✓	✓	All phases of the development will create supply chain opportunities
Local infrastructure improvements	×	✓	×	The development will lead to improvements in the local grid and harbour infrastructure
Cost reduction in the offshore wind industry	×	✓	×	The purpose of the Demonstration project is to demonstrate the capability of the Forthwind technology to reduce the cost of offshore wind.
Impact on the demography of the local community, including potential impacts on demand for public services (health, education, etc), incomes, poverty, etc.	×	×	×	The proposal relates to the installation of a single turbine, with little potential to directly impact local demographics, community services or wider socio-economic considerations.

15. OTHER MARINE USERS

15.1. Military Activities

Areas in and around the Firth of Forth are predominantly used by the Navy for submarine exercises, mine countermeasures and minesweeping, and explosive trials (DTI, 2004). The Firth of Forth at Fife is partially covered by a MOD Safeguarding consultation zone, the Firth of Forth is also partially covered by two airspace restriction zones and numerous naval activity areas. The Development falls within an area of naval activity area for general practice, mine countermeasures and of aviation practice/areas of concern (DTI, 2004). Consultation with the Defence Infrastructure Organisation (DIO) and although it is anticipated that no effects should arise from the Development on their facilities, this will be confirmed within the EIA Report.

The Army controlled safeguarded military base Leuchars is the nearest military airfield to the development, located approximately 23.4 km northeast of the site. An email from the DIO confirmed that development does not lie within a safeguarding zone which, are zones that safeguard the airspace surrounding airfields; however, this will be re-checked and included within the EIA Report prior to submission.

It is assumed that the DIO will require lighting to be placed on the turbine and a proposed Lighting and Navigation Marking plan will be submitted to the appropriate authorities for approval prior to construction. Confirmation from the DIO that military activities will not be affected by the proposed development will be addressed within the EIA Report for this development application.

15.2. Civilian Aviation Activities

The closest civilian airport (Edinburgh Airport) with radar is approximately 33 km to the southwest of the Development area. Recent correspondence with the Edinburgh Airport Aerodrome Safeguarding and Compliance Officer confirmed that an IFP (Instrument Flight Procedures) safeguarding assessment may be required. Forthwind will work with Edinburgh Airport to conduct an "Instrument Flight Procedure Safeguarding Assessment" to assess IFP impacts and identify mitigation activity if necessary. The outcome will be provided as part of the Environmental Impact Report.

Data will be obtained from the National Air Traffic Services (NATS) to establish potential interference with NERL infrastructure. Based on previous interaction with Edinburgh airport and NATS it is anticipated that the proposed Forthwind Demonstration Project will not influence NATS En-Route's infrastructure and operations; however, this will be confirmed, and evidence will be provided in the Environmental Impact Report.

Again, it assumed that the CAA would require lighting to be placed on the turbine, as aviation lights would be required to remain compliant with the following requirements:

- CAA Civil Aviation Publication (CAP) 764 "CAA Policy and Guidelines on Wind Turbines", sixth edition February 2016
- DAP Policy "Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level", June 2017
- Ministry of Defence Obstruction Lighting Guidance, November 2014
- CAA Civil Aviation Publication (CAP) 393 Air Navigation: The Order and Regulations, Fifth edition 25 August 2016 – In particular Part 8, Chapter 2, Article 223 Lighting of wind turbine generators in United Kingdom territorial waters.

It will also be necessary to chart the Development on Civil Aviation Maps, as it is a requirement for all structures taller than 300 feet (91 m) to be charted. A proposed Lighting and Navigation Marking plan will be submitted to the appropriate authorities for approval prior to construction.

15.3. Radio Links and Telecommunications

The Joint Radio Company (JRC) will be consulted on the proposed location and turbine dimensions of the Forthwind Demonstration Project proposal to establish if the development has the potential to have an impact on the radio link infrastructure operated by the local electricity utility and Scotia Gas Networks.

Table 32 - Summary of Effects relating to Other Marine Users

Potential Effects	Construction	Operation	Decommissioning	Rationale
Military Activities	✓	✓	✓	The DIO will be consulted to ensure that the Forthwind Demonstration Project proposal will not impact military activities in the area.
Civilian Aviation Activities	x	✓	x	The CAA, Edinburgh Airport and NATS will be consulted to ensure that the Forthwind Demonstration Project operations will not impact civilian aviation activities
Radio Links and Telecommunications	x	✓	x	The JRC will be consulted to ensure that the Forthwind Demonstration Project proposal will not impact radio links and telecommunications.

16. ISSUES TO BE SCOPED OUT

The previous sections have identified environmental issues that are proposed to be included in the ES that will be carried out by Forthwind Ltd; however, there are issues that have not been addressed in the previous sections but have been considered by Forthwind. Based on detailed information and environmental assessment undertaken by Forthwind for the previous consent application in 2015 as part of the Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015, and supported by subsequent inquiries and updates, it is apparent these issues will not be affected by the Development proposal and are suggested to be scoped out at this stage. These issues are:

16.1. Access and Transport

The majority of the turbine components (abnormal loads) will either be assembled on site or delivered to site by sea, either directly or via a suitable port. Therefore, an abnormal loads study is not required.

Vehicular access to the onshore elements of the development will utilise the existing access to the Fife Energy Park, which is suitable for Heavy Goods Vehicles (HGVs).

Overall, the traffic generated during the construction of the Development will be minimal, essentially limited to the transportation of the equipment required for landfall and the delivery of a number of onshore elements to the Fife Energy Park. There may be some vehicular movements of construction personnel to the Fife Energy Park during construction, although these will be small in number and will be within the variability of the existing traffic using the Fife Energy Park on a daily basis.

This traffic will utilise the surrounding trunk road network, with no upgrades required, and as such, it is considered there is no potential for likely significant effects on the surrounding road network resulting from the construction of the Development.

The traffic generated during the operation of the Development will be less than that during construction and is therefore not considered to have the potential to give rise to a likely significant effect.

Decommissioning of the Development is likely to give rise to traffic levels below that of the construction phase and is therefore not considered to have the potential to give rise to a likely significant effect.

Given the limited traffic generated by the Development, and the lack of potential for likely significant effects to arise, a detailed assessment of traffic effects as a result of the Development is scoped out of the EIA, although a traffic management plan would be agreed regarding access to the Fife Energy Park to ensure that vehicles are operated safely and in a similar manner to the existing vehicular use of the Fife Energy Park.

16.2. Air Quality

The movement of vehicles and plant to and from the Fife Energy Park during the construction of the Development would create exhaust emissions, as would the movement of vessels involved in the construction of the offshore elements of the Development.

The potential effects of exhaust emissions during construction are likely to be very low given the small number of vehicles and vessels anticipated to be involved in the construction of the Development. In addition, the zone of any effects would be highly localised to the vehicle or vessel in question. As a result, it is considered that there is no potential for likely significant effects as a result of emissions associated with the construction of the Development. As the operation and decommissioning of the

Development will require fewer vehicle movements than construction, the same conclusion therefore applies in relation to effects during these phases.

16.3. Marine Aggregate Extraction

Within the Firth of Forth there is one licensed marine aggregate extraction site located within the inner Firth of Forth Southwest of Methil. It is unclear as to whether this site has been previously utilised. However, evidence from the Sustainable Aggregates Information Gateway and the Department for Business Innovation and Skills, Monthly Statistics of Building Materials and components suggests that no aggregate has been extracted from marine sources in Scotland within recent years and that no landings have been made of marine aggregates in Scotland. Therefore, for the purposes of this assessment marine aggregates have been scoped out of any further assessment.

16.4. Marine Archaeology

The Forthwind Demonstration Project footprint has previously been surveyed with no anomalies of archaeological potential found. Previous desk studies for the July 2015 ES (Chapter 11) also found no recorded wrecks within the area. Ten shipwrecks have been identified dating from the 19th century within grid square NT 36 97, and associated with the settlements and shoreline of Buckhaven, Methil, and Largo Bay. A recent review of the Historic Marine Protected Areas in Scottish territorial waters database provided by Historic Environment Scotland (<http://portal.historicenvironment.scot/spatialdownloads>) undertaken on 25 July 2021, identified only one Historic MPA (Campania) within the area at around 20 km away from the development site (See Figure 13).

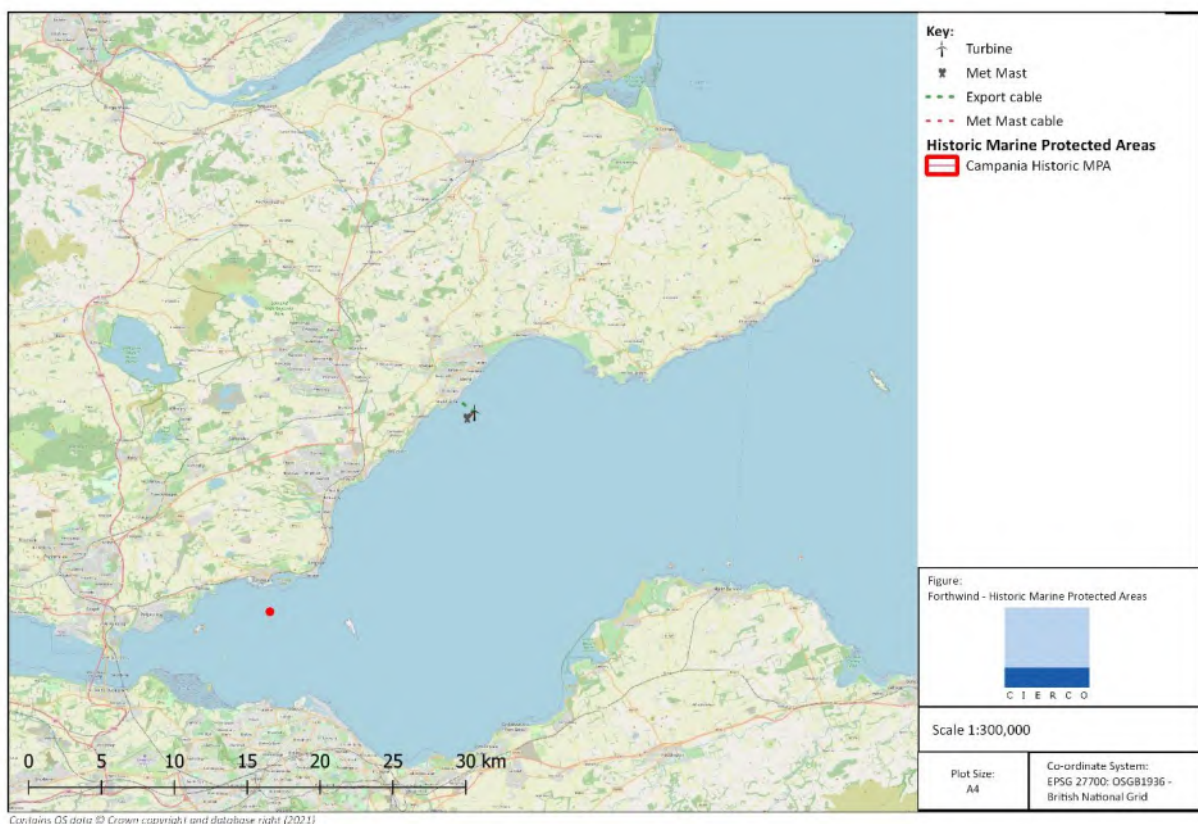


Figure 13 - Historic Marine Protected Areas

The proposed Development is now reduced in scale and within the scope of the consented development. As such it is considered that the potential impacts of the proposed Development will be the same that of the consented Development (i.e., negligible).

The offshore surveys across the development area were completed in 2014 and included within the original 2015 Environment Statement (the full geophysical survey results were provided as Appendix A in the original Environmental Impact Assessment). The surveys consisted of multibeam bathymetric, sub-bottom profile, sidescan sonar and magnetometer surveys and covered the development area (both the original 2015 application and the current locations). No items of archaeological or buried features were identified within the surveys, as reported in the original 2015 EIA.

A magnetometer survey was carried out across the area in 2017 prior to intrusive geotechnical borehole activities being carried out at the proposed turbine location. Again, no assets of archaeological value were identified.

As the area has already been adequately surveyed, no additional surveys are required. Based on the fact that the area has already been assessed for offshore archaeological and heritage assets in the 2015 EIA, it is proposed that this is scoped out from further assessment. Prior to construction a magnetometer survey will be undertaken of the development area to ensure that sunken ships, lost anchors, buried pipelines, and other underwater objects are identified and recorded. Regardless of any known archaeological sites being found from the desk-based study or geophysical surveys undertaken, a Written Scheme of Investigation (WSI) will be developed, and a Protocol for Archaeological Discoveries (PAD) followed for all intrusive survey work and construction. The WSI and PAD will be provided to the Fife Council Archaeological Unit for review and approval prior to construction works commencing.

The protocol will also include appropriate briefings for all personnel involved in the construction, operation and decommissioning activities associated with the proposed development. The PAD will be in place for the life of the proposed development and will be updated when required should details within the document change, for example contact details for key stakeholders. This should, as far as practical, mitigate for effects upon unexpected archaeological finds. Therefore, it is proposed that this topic is scoped out from the EIA process for this development application.

16.5. Marine Waste Disposal

There are a number of closed disposal sites located in the Firth of Forth, the closest of which is approximately 10 km from the Development, and therefore have not been assessed any further as they are not in use nor in close proximity to the Development.

There are 3 open disposal sites located within the wider vicinity of the Development from Inchkeith to Methil. Two of these are approximately 14.9 km (Blae Rock A and b) and 16 km (Narrow Deep B) southwest of the Development. The closest open disposal site to the proposed Development area is 'Methil' at 0.9 km to the east. However, it is not anticipated that the proposed Development will interfere with the open disposal sites and therefore has been scoped out of any further assessment.

16.6. Terrestrial Ecology

The previous Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, submitted in July 2015, assessed the ecological value of the onshore terrestrial ecology at the Fife Energy Park and assessed the potential impact of the installation of onshore cables, an onshore construction and operational office/compound and associated infrastructure.

The impact assessment concluded that the nature and ongoing operations within the Fife Energy Park result in it having very limited ecological value and no receptors were identified that were likely to be significantly affected by any phase of the development. It considered that the Development had no potential to result in likely significant effect on the ecological receptors considered.

As this Forthwind Demonstration Project application will not seek to extend the project envelope considered within the July 2015 ES, it is proposed that this aspect is scoped out as it has previously been assessed as not significant.

16.7. Terrestrial Hydrology, Hydrogeology and Soils

In a similar way to terrestrial ecology, the Offshore Wind Demonstration Project Environment Statement, Methil Fife, submitted in July 2015, assessed the potential impact of the installation of onshore cables, an onshore construction and operational office/compound and associated infrastructure on the terrestrial hydrology, hydrogeology and soil of the onshore location (Chapter 20).

The impact assessment concluded that all potential effects were all assessed as being of minor or negligible significance and therefore not significant in terms of the EIA regulations. This Forthwind Demonstration Project application proposed a much-reduced onshore footprint, well within the project envelope originally considered to be acceptable, and therefore will not seek to extend the project envelope considered within the July 2015 ES. As a result, it is proposed that this aspect is scoped out as it has previously been assessed as not significant.

Forthwind commits to ensuring that good construction practice is implemented, with appropriate Pollution Prevention Plans (PPP), Waste Management Plans (WMP) and Construction Environmental Management Plan (CEMP) being agreed with the appropriate authorities prior to construction taking place.

16.8. Waste Management

The onshore footprint of the Development is relatively small and significant waste arising are not anticipated. There is no peat present on site and waste will not be imported onto site. However, prior to construction commencing, the principal contractor will be required to prepare a construction phase Health and Safety Plan, which will require compliance with all relevant environmental legislation (including the provision and use of a site waste management plan). In addition, all site contractors will be required to maintain a clean and tidy site and manage the site area in accordance with legislation and best practice. As a result, waste management considerations are scoped out for further consideration.

16.9. Oil and Gas Infrastructure

Within the Firth of Forth harbour limits are two marine terminals for oil and gas export (Forth Ports Limited, 2015). The port of Grangemouth is home to the Grangemouth refinery oil storage and tanker terminals and Hound Point marine tanker loading terminal¹⁶.

No fixed oil and gas infrastructure have been identified near the Development area. Therefore, this is scoped out of further assessment. The potential effects on vessel activity to and from the ports will be considered within the Shipping and Navigation assessment.

¹⁶ Department of Trade and Industry (DTI), 2004. Existing Users and Management Initiatives Relevant to SEA 5. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/197390/SEA5_TR_Users_UO_A.pdf

There are 3 anchorages near Methil harbour utilised by Forth Ports for the temporary mooring of oil rigs. The cumulative impact of these moorings upon the local commercial fisheries will be considered as part of the Commercial Fisheries assessment. However, all other aspects associated with oil and gas infrastructure are proposed to be scoped out from further assessment.

16.10. Recreation and Tourism

Chapter 18 of the Forthwind Offshore Wind Demonstration Project Environment Statement, Methil Fife, July 2015 considered the potential effects of a 2-turbine offshore wind development across the Methil coastline (section 18.5.7). The potential effects identified during the construction, operational and decommissioning phases included deposition of sediment plumes and suspended sediments, vessel displacement/loss of area/resource, indirect effects and scour / damage to fixed infrastructure. Each of these was assessed in terms of their likely effect on other marine users.

Chapter 16 of the July 2015 ES also considered the wider impact of an offshore wind development in Methil on the Fife region's important recreation and tourism sector. The potential effects identified during the construction, operational and decommissioning phases included opportunities for formal and informal recreation and the effect on general tourism within the area.

The potential effects of visual impact on the region's tourism resource will be assessed and addressed within the Seascape, Landscape and Visual Resources section and is therefore scoped out from further consideration within this section.

All effects and cumulative effects assessed were considered to be of negligible or minor significance and no specific mitigation measures were suggested. It concluded that any changes to other marine users as a result of the Development will be highly localised and will not result in a significant effect on the other marine users within the Firth of Forth. It also concluded that the development would not result in any fundamental or material changes in tourism, recreation or land use. It is considered that the turbines, with a relatively short duration of construction and decommissioning timescales, should not result in any change to the conclusion of no significant effect on other recreational and Tourism marine users within the area and so is therefore scoped out for further consideration.

16.11. Cables and Pipelines

A review of charted subsea cables in the Firth of Forth (Kingfisher Information Service - KIS-ORCA¹⁷) indicates that there are no subsea telecommunication or power cables in the vicinity of the Development. With the absence of offshore oil and gas production in the region, there are no pipelines serving this industry. Therefore, no pathway exists for an effect to arise, and this is scoped out of further assessment.

Aspects related to the burial of the electricity export cables from the turbines will be assessed within the Shipping and Navigation and Commercial Fisheries section of the EIA Report.

16.12. Climate and Carbon Balance

The demonstration wind turbine will generate electricity during operation, anticipated to commence in 2024. During its operational lifespan, the Development has the potential to displace electricity generated from fossil fuels and consequently prevent CO₂ from being released. The actual amount of CO₂ released through electricity generation in the UK relates directly to the generating plant in use at any given time. This mix changes on a daily basis and will change in the future as UK generating plant

¹⁷ <http://kis-orca.eu/map#.XJzjifZ2s2w> – accessed 28/03/2019

is replaced and fuel costs change and as a consequence it is not possible to predict exactly the amount CO² release the Development will prevent over its lifetime.

The Development will result in the generation of a renewable source of energy thus reducing the need for power generation from thermal technologies. This will result in the electricity produced creating a saving in emissions of CO², with associated environmental benefit.

Furthermore, due to the nature of the demonstration facility, and the unknown performance data for the new turbine designs, it is not possible to predict the energy that will be produced by the Development over its lifespan and therefore a calculation of the displacement of CO² cannot be made. It can however be stated that any energy generated from the site will result in the displacement of CO² generated from non-renewable sources and that the aim of the project, to further the development of the UK offshore wind industry, will contribute to the reduction of CO² emissions from UK power generation in the long term.

The operation of the Development has the potential, based on the same assumptions, to also displace other gases related to coal-fired electricity generation including those associated with acid rain such as sulphur dioxide (SO²) and oxides of nitrogen (NO_x).

Although the Climate and Carbon Balance aspect of the Development leads to a positive effect, it is anticipated that scale of the effect to be relatively minor on a regional/national scale, so is scoped out for any further consideration.

16.13. Summary of potential effects scoped out from the EIA process

Table 33 provides a summary of potential effects suggested to be scoped out from the EIA process for the Forthwind Development Project.

Table 33 - Suggested Topics to be Scoped out of the EIA Process

Potential Effects	Construction	Operation	Decommissioning	Rationale
Access and Transport	x	x	x	There will be very limited traffic generated by the Development. A traffic management plan will be agreed prior to construction.
Air Quality	x	x	x	The potential effects of exhaust emissions during construction are likely to be very low.
Marine Aggregate Extraction	x	x	x	There is one licensed marine aggregate extraction site located within the inner Firth of Forth Southwest of Methil; however, this is not in active operation.

Potential Effects	Construction	Operation	Decommissioning	Rationale
Marine Archaeology	x	x	x	Desk studies and geophysical surveys indicate there are no recorded wrecks within the area. A Written Scheme of Investigation (WSI) will be developed, and a Protocol for Archaeological Discoveries (PAD) followed for all intrusive survey work and construction in any case.
Marine Waste Disposal	x	x	x	The closest open disposal site to the proposed Development area is 'Methil' at 0.9 km to the east. However, it is not anticipated that the proposed Development will interfere with its operation.
Terrestrial Ecology	x	x	x	The potential effect of the installation of onshore infrastructure was assessed as not significant in the 2015 ES. This application will not seek to extend the project envelope already considered as acceptable.
Terrestrial Hydrology, Hydrogeology and Soils	x	x	x	The potential effect of the installation of onshore infrastructure was assessed as not significant in the 2015 ES. This application will not seek to extend the project envelope already considered as acceptable.
Waste Management	x	x	x	The onshore footprint of the Development is relatively small and significant waste arising are not anticipated
Oil and Gas Infrastructure	x	x	x	No fixed oil and gas infrastructure have been identified near the Development area

Potential Effects	Construction	Operation	Decommissioning	Rationale
Recreation and Tourism	x	x	x	The scale and nature of the development is not significantly different to the previous assessment submitted for the 2015 ES, which concluded that no significant effect.
Cables and Pipelines	x	x	x	There are no subsea telecommunication or power cables in the vicinity of the Development
Climate and Carbon Balance	x	x	x	The scale of the effect of the development is relatively minor on a regional/national scale

17. STAKEHOLDER CONSULTATION

17.1. Introduction

Forthwind recognise that stakeholder engagement is an intrinsic part of the EIA process. The company has engaged with several organisations throughout the development process of the Forthwind Project. Forthwind believes early and ongoing consultation allows the views, potential concerns and perceptions of stakeholders and local communities to feed into the project development process.

This is particularly useful in such a novel project as the Forthwind Project. Engaging early has and will continue to enable us to determine the scope of the EIA Report and need for specific environmental studies based on helpful feedback from consultations.

The project team are undertaking a proactive approach to consultation, with key stakeholders and the community involved in both a formal and informal manner on a non-statutory basis (with respect to the consenting process) from the project outset.

Forthwind will continue to seek to engage on a regular basis with regulators and statutory consultees. Wider consultation with community groups and special interest organisations will also be sought as the project progress. Where possible, representatives from Forthwind will attend community meetings, present at a number of forums and meet face to face with organisations who have expressed an interest in the development plans

In addition, Forthwind will seek to engage with the wider community in positively promoting the project. This will include providing public exhibitions and presenting to local community councils where they are established

In addition, we will seek to update the local community on progress of the development through various media sources, including the dedicated Forthwind pages on the Cierco website.

17.2. Stakeholder Organisations

There are a number of stakeholder groups that Forthwind have engaged with to date and a number of other where we would like to develop a consultation relationship. We intend to engage with the following organisations during the pre-planning application process:

Anstruther Harbour Marina	Sport Scotland
Association of Salmon Fishery Boards	Surfers Against Sewage
British Telecom (Radio Network Protection)	The Civil Aviation Authority (CAA)
Buckhaven Community Council	The Defence Infrastructure Organisation (DIO)
Chamber of Shipping	The Fife Coast and Countryside Trust
Cockenzie & Port Seton Fishermen's Association	The Forth Estuary Forum
Crown Estate Scotland	The Inshore Fisherman's Alliance
Dysart Sailing Club	The Joint Radio Company (JRC)
East Lothian Council	The Marine Safety Forum
East Lothian Yacht Club	The Maritime and Coastguard Agency (MCA)
Edinburgh Airport Ltd	North and East Coast Inshore Fishing Group
Elie & Earlsferry Sailing Club	The Northern Lighthouse Board (NLB)
Fife Council	Royal Society for the Protection of Birds (RSPB)
Fife Creel Fishermen's Association	The Royal Yachting Association (RYA)
Forth Ports	The Scottish Canoe Association
Historic Environment Scotland	The Scottish Creel Fishermen's Federation

Largo Bay Sailing Club	Scottish Environment Protection Agency (SEPA)
Largo Community Council	The Scottish Fisherman's Organisation
Marine Scotland Licencing and Operations Team	The Scottish Fishermen's Federation
Marine Scotland Compliance	The Scottish Surfing Federation
Methil Boat Club	The Scottish White Fish Producers Association
Methil Creel Fishermen	The Scottish Wildlife Trust
NATS	The Whale and Dolphin Conservation Society
Pittenweem Fishermen's Mutual Association	Transport Scotland
Scottish Natural Heritage (SNH)	UK Chamber of Shipping
Visit Scotland	Whale & Dolphin Conservation (WDC)

17.3. Communication Methods

Forthwind will seek to communicate through a variety of methods, including:

- Establishing a dedicated Forthwind Project webpage.
- Establishing a bi-annual stakeholder newsletter.
- Face to face meeting with stakeholder organisation.
- Offer briefing events to the Elected Members of Fife Council and East Lothian Council.

17.4. Public Events

Forthwind will hold pre-application public consultation event in Methil. The venue has step free access and will be held as a "drop-in" style event, allowing the public to attend, view the presentation material and ask questions to the Forthwind Project team. In addition to putting the event information on the Forthwind web pages, Public Notices advertising the event will be placed in the Fife Edition of The Courier Newspaper.

Following the previous Scoping Report, Forthwind presented our proposals to Largo Community Council and we intend to follow this up with an update presentation should the Community Council accept this offer.

17.5. EIA Report

Forthwind will include a specific chapter on stakeholder engagement within the EIA report which will provide information on the stakeholder engagement activities carried out prior to the application, information / feedback received from these activities and details of how concerns or issues raised have been taken into account in the EIA process.

17.6. Post Consent Communication

Should Forthwind be successful in securing consent for the proposal, we intend to continue engagement activities with stakeholders on aspects such as licence condition implementation, development of the environmental monitoring protocols, decommissioning plans, etc.

We will also continue to engage with our local stakeholders who live, work, or have an interest in the Firth of Forth and its coastal communities to keep them informed of the project process and key milestones.

Appendix A

Seascape, Landscape and Visual Resources

List of Figures

Figure 9.1 – Study Area with Blade Tip ZTV & Viewpoints

Figure 9.2a – Study Area with Blade Tip ZTV & Landscape Character

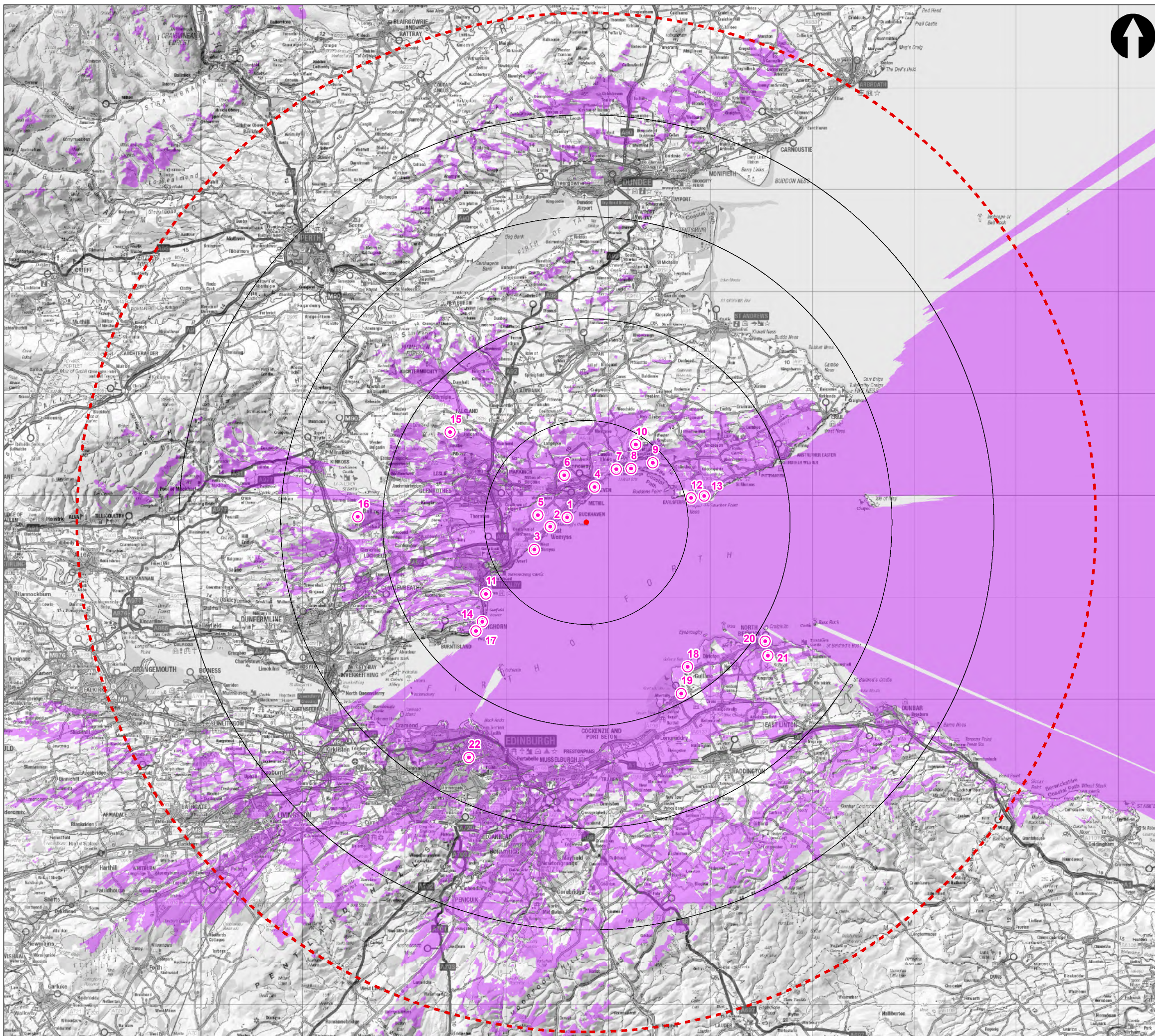
Figure 9.2b – Study Area with Blade Tip ZTV & Landscape Character Key

Figure 9.3a – Study Area with Blade Tip ZTV & Landscape Designations

Figure 9.3b - Study Area with Blade Tip ZTV & Landscape Designations Key

Figure 9.4 – Coastal Character - Overview

Figure 9.5 - Cumulative Wind Farms



Key:

- Proposed Turbine
- 10km Radii
- 50km Radius
- Turbine Theoretically Visible (1x280m Blade Tip)
- Viewpoints

1. Buckhaven, Shore Street
2. East Wemyss, Fife Coastal Path
3. West Wemyss, Fife Coastal Path
4. Leven, Fife Coastal Path
5. A915, Wemyss Coast
6. Kennoway
7. Fife Coastal Path, Lundin Links
8. Lower Largo
9. A917 near Drumeldrie
10. Largo Law Summit
11. Kirkcaldy, Esplanade
12. Earlsferry, Links Road
13. Elie, The Toft
14. Kinghorn, Fife Coastal Path
15. East Lomond Summit
16. Benarty Hill
17. Pettycur Road, Kinghorn
18. Gullane Beach
19. Aberlady Bay Footbridge
20. North Berwick (north of Harbour)
21. North Berwick Law
22. Calton Hill, Edinburgh

Blade Tip:	280m	Observer height:	2m
DTM:	OS T5 / T50	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

**FORTHWIND
OFFSHORE WIND FARM**

SCOPING REPORT

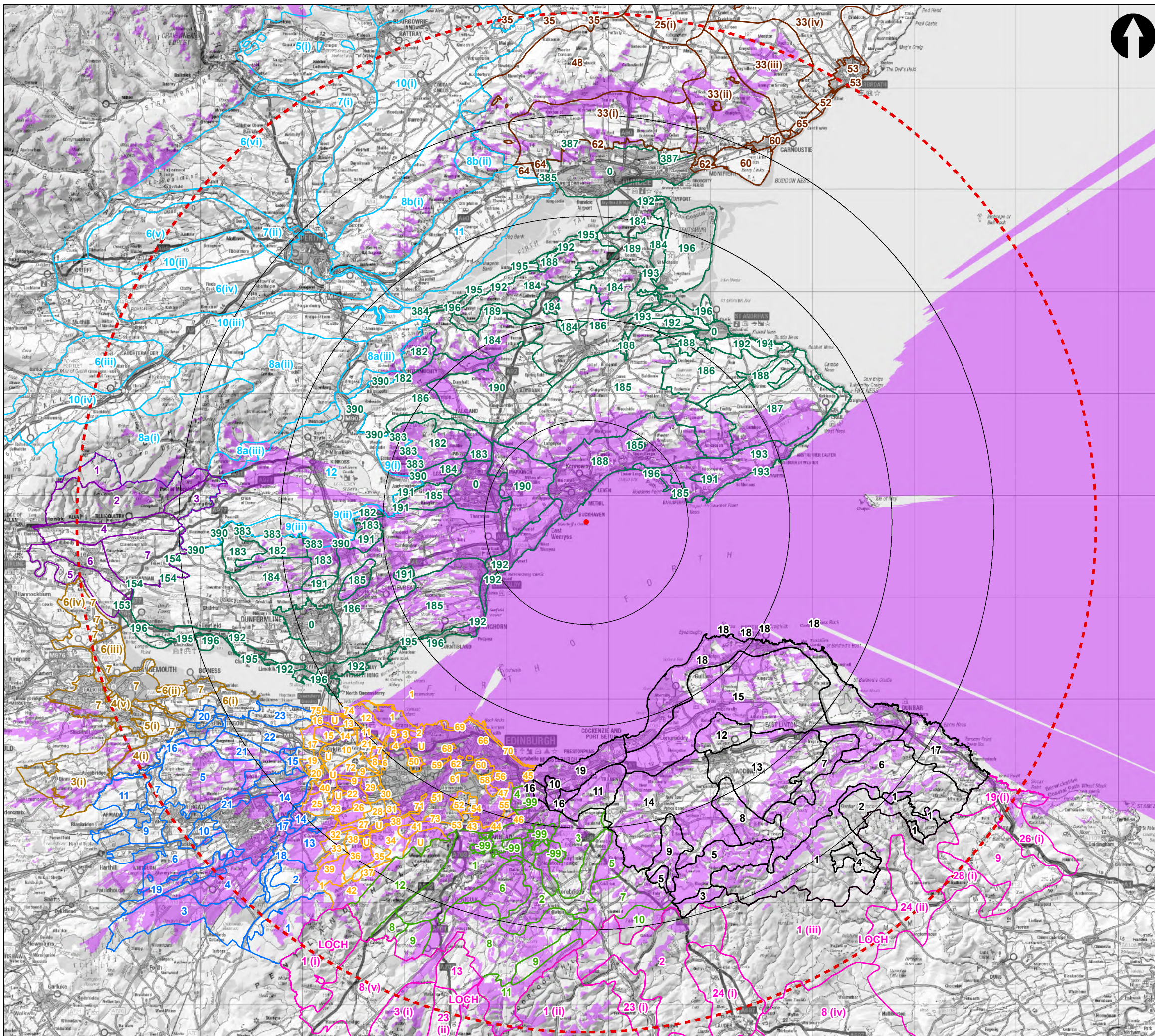
Figure:
Study Area with Blade Tip ZTV & Viewpoints



Scale: 1:370,000 0 2.5 5 10 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.1	Rev. 1
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- Key:**
- Proposed Turbine
 - 10km Radii
 - 50km Radius
 - Turbine Theoretically Visible (1x280m Blade Tip)
 - Angus Landscape Character
 - City of Edinburgh Landscape Character
 - Clackmannanshire Landscape Character
 - Dundee City and Fife Landscape Chracter
 - East Lothian Landscape Character
 - Falkirk Landscape Character
 - Midlothian Landscape Character
 - Perth and Kinross Landscape Character
 - Scottish Borders Landscape Character
 - West Lothian Landscape Character

For Landscape Character Details see Figure 9.2b

Data Source:
 Strategic Landscape Capacity Assessment for Wind Energy in Angus 2014
 Edinburgh Landscape Character Assessment 2010
 Clackmannanshire Local Development Plan - SG2 - Onshore Wind Energy Modified May 2015
 East Lothian Landscape Character Assessment 2014
 FalkirkSPG Note: Spatial Framework and Guidance for Wind Energy Developemtn 2013
 Midlothian Landscape Wind Energy Capacity Study 2014
 Perth & Kinross Landscape Study to Inform Planning for Wind Energy 2010
 Scottish Borders Update of Wind Energy Landscape Capacity and Cumulative Impact Study 2016
 West Lothian Landscape Character Classification 2014

Blade Tip:	280m	Observer height:	2m
DTM:	OS T5 / T50	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

FORTHWIND OFFSHORE WIND FARM

SCOPING REPORT

Figure:
 Study Area with Blade Tip ZTV & Landscape Character



Scale: 1:370,000

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.2a	Rev. 1
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Legend

- Angus Landscape Character
 - 25(i). Low Moorland Hills. Forfar Hills
 - 33(i). Dipslope Farmland. Tealing Farmland
 - 33(ii). Dipslope Farmland. Crombie/Monikie Farmland
 - 33(iii). Dipslope Farmland. Redford Farmland
 - 33(iv). Dipslope Farmland. Letham, Lunan Water & Arbroath Valleys
 - 35 . Broad Valley Lowlands.
 - 35 . Urban.
 - 48 . Igneous Hills.
 - 52 . Coast with Sand.
 - 53 . Urban.
 - 60 . Coast with Sand.
 - 60 . Urban.
 - 62 . Urban.
 - 64 . Firth Lowlands.
 - 65 . Coast with Cliffs.
- City of Edinburgh Landscape Character
 - 1. Coastal Sands. Cramond Coast
 - 2. Recreational Open Space. Silverknowes Golf Course
 - 3. Policy Landscape. Laurieston Policies
 - 4. Recreational Open Space. Barnton Golf Course
 - 5. Incised River Valley. Lower Almond Valley
 - 6. Lowland Farmland. Cammo Fringe Farmland
 - 7. Policy Landscape. Cammo Policies
 - 8. Lowland Farmland. Lennie Golf Course
 - 9. Lowland Farmland. West Craigs Farmland
 - 10. Lowland Farmland. Almond Farmland
 - 11. Rural Outcrop Hills. Craigie Hill
 - 12. Policy Landscape. Dalmeny Policies
 - 13. Lowland Farmland. Dalmeny Fringes
 - 14. Settled Farmland. Queensferry Fragmented Farmland
 - 15. Policy Landscape. Dundas Policies
 - 16. Settled Farmland. Queenferry Settled Farmland
 - 17. Lowland Farmland. Newton Farmland
 - 18. Lowland Farmland. Niddry Farmland
 - 19. Policy Landscape. Newliston Policies
 - 20. Lowland Farmland. Newbridge/Broxburn Farmland
 - 21. Policy Landscape. Craigiehall Policies
 - 22. Rolling Farmland. Ratho Farmland
 - 23. Rural Outcrop Hills. Ratho Hills
 - 25. Rolling Farmland. Bonnington Farmland
 - 26. Policy Landscape. Dalmahoy Policies
 - 27. Rolling Farmland. Gowanhill Farmland
 - 28. Settled Farmland. Riccarton Institutional Landscape
 - 29. Settled Farmland. Gogar Farmland and Institutions
 - 30. Settled Farmland. East Hermiston Farmland
 - 31. Rolling Farmland. Baberton Farmland
 - 32. Rural Outcrop Hills. Kaimes Hill
 - 33. Pentland Flanks. Leith Plateau Farmland
 - 34. Pentland Flanks. Curie Sloping Wooded Farmland
 - 35. Pentland Flanks. Redford Basin
 - 36. Pentland Flanks. Cockburn Geometric Wooded Farmland
 - 37. Pentland Hills - Upper Slopes and Summits. Bavelaw Geometric Wooded Farmland
 - 38. Incised River Valley. Water of Leith Colinton to Balerno
 - 39. Pentland Flanks. West Pentland Fringe
 - 40. Settled Farmland. Craigpark Fragmented Farmland
 - 41. Pentland Flanks. North Pentland Slopes
 - 42. Pentland Hills - Upper Slopes and Summits. Pentland Heights
 - 43. Settled Farmland. Broomhill Farmland
 - 44. Rolling Farmland. Burdiehouse Farmland
 - 45. Settled Farmland. Brunstane Farmland
 - 46. Lowland Farmland. Danderhall Settled Farmland
 - 47. Settled Farmland. Craigmillar Farmland
 - 48. Policy Landscape. Craigmillar Policies
 - 49. Policy Landscape. Drum Policies
 - 50. Prominent Urban Hills. Corstorphine Hill
 - 51. Prominent Urban Hills. Craiglochchart Hills
 - 52. Prominent Urban Hills. Braid Hills
 - 53. Policy Landscape. Mortonhall Policies
 - 54. Settled Farmland. Liberton Fringes
 - 55. Policy Landscape. Edmonstone Policies
 - 56. Policy Landscape. Duddingston Policies
 - 57. Informal Open Space. Duddingston Loch
 - 58. Recreational Open Space. Prestonfield Golf Course
 - 59. Incised River Valley. Water of Leith New Town
 - 60. Prominent Urban Hill. Holyrood Park

- 61. Formal Urban Greenspace. The Meadows
- 62. Prominent Urban Hill. Castle Rock
- 63. Formal Urban Greenspace. Princes Street Gardens
- 64. Prominent Urban Hill. Calton Hill
- 65. Formal Urban Greenspace. Queen Street Gardens
- 66. Formal Urban Greenspace. Leith Links
- 67. Formal Urban Greenspace. Royal Botanic Gardens
- 68. Formal Urban Greenspace. Inverlieth Park
- 69. Urban Waterfront. Granton and Leith Waterfront
- 70. Coastal Sands. Portobello Coast
- 71. Incised River Valley. Water of Leith Slateford to Colinton Dell
- 72. Settled Farmland. Airport
- 73. Policy Landscape. Dregghorn Woodland and Barracks Policies
- 74. Urban Waterfront. Queensferry Waterfront
- 75. Coastal Sands. Hopetoun Coast
- U. Urban. Urban
- Clackmannanshire Landscape Character
 - 1. Ochil Hills: Western Peaks
 - 2. Ochil Hills: Southern Scarp
 - 3. Middle Devon Valley
 - 4. Lower Devon Carselands
 - 5. Carse of Forth
 - 6. Settled Carse Fringe
 - 7. Black Devon Farmlands
- Dundee City and Fife Landscape Chracter
 - 0. Urban
 - 153. Carselands
 - 154. Lowland Valley Fringes
 - 182. Upland Hills
 - 183. Hill Slopes
 - 184. Foothills - Fife
 - 185. Pronounced Hills and Craggs
 - 186. Lowland Hills and Valleys
 - 187. Lowland Open Sloping Farmland
 - 188. Lowland Dens
 - 189. Lowland Valley - Fife
 - 190. Lowland River Basins
 - 191. Lowland Loch Basins - Fife
 - 192. Coastal Hills - Fife
 - 193. Coastal Terraces - Fife
 - 194. Coastal Cliffs
 - 195. Coastal Braes
 - 196. Coastal Flats - Fife
 - 383. Rugged Lowland Hills
 - 384. Broad Valley Lowlands - Tayside
 - 385. Firth Lowlands
 - 387. Dipslope Farmland
 - 390. Lowland Basins
- East Lothian Landscape Character
 - 1. Lammermuir Plateau
 - 2. Lammermuir Plateau with Wind Farm
 - 3. Whiteadder Upland Valley
 - 4. Plateau Grassland
 - 5. Western Lammermuir Fringe
 - 6. Eastern Lammermuir Fringe
 - 7. Whittingehame Water
 - 8. Gifford Water
 - 9. Humble Water
 - 10. Esk River Valley
 - 11. Tranent Ridge
 - 12. Garleton Hills
 - 13. Lower Tyne Valley Plain
 - 14. Mid Tyne Valley Plain
 - 15. Coastal Plain
 - 16. Settled Farmland
 - 17. Innerwick Coast
 - 18. Northern Coast
 - 19. Musselburgh/Prestonpans Coast
- Falkirk Landscape Character
 - 3(i). Lowland Plateau. Slamannan Plateau
 - 4(i). Lowland River Valley. Avon Valley
 - 4(v). Lowland River Valley. Falkirk/Grangemouth Urban Fringe
 - 5(i). Rolling Farmlands. Manuel Farmlands
 - 6(i). Coastal Margins. Bo'ness Coastal Hills
 - 6(ii). Coastal Margins. Grangemouth/Kinneil Flats
 - 6(iii). Coastal Margins. Skinflats
 - 6(iv). Coastal Margins. Carse of Forth

- 7. Urban/Village Limit. Urban
- Midlothian Landscape Character
 - 1. North Esk/Lower South Esk Valleys
 - 2. Upper South Esk/Tyne Water Valleys
 - 3. Mayfield/Tranent Ridge
 - 4. Musselburgh/Prestonpans Fringe
 - 5. Agricultural Plain
 - 6. Rosewell/Carrington Spur
 - 7. North Lammermuir Platform
 - 8. Moorland Fringes
 - 9. Lowland Moorland
 - 10. Plateau Grassland
 - 11. Moorfoot Hills
 - 12. Pentland Hills
 - 99. Urban
- Perth and Kinross Landscape Character
 - 5(i). Highland Foothills. Clunie Foothills
 - 6(iii). Lowland Hills. Strathallan Plateau
 - 6(iv). Lowland Hills. Gask/Dupplin Ridge and Moncreiffe Hill
 - 6(v). Lowland Hills. Keillour Ridge / Methven Hills
 - 6(vi). Lowland Hills. Logie Almond / Bankfoot Plateau
 - 7(i). Lowland River Corridors. Strath Tay
 - 7(ii). Lowland River Corridors. Glen Almond
 - 8a(i). Igneous Hills, Ochil Hills. Ochil Western, Central Hills and Glens
 - 8a(ii). Igneous Hills, Ochil Hills. Ochil Northern, Central Hills and Glens
 - 8a(iii). Igneous Hills, Ochil Hills. Ochil Southern, Eastern Hills and Slopes
 - 8b(i). Igneous Hills, Sidlaw Hills. Sidlaw Southern, Central Hills and Slopes
 - 8b(ii). Igneous Hills, Sidlaw Hills. Sidlaw Southern, Central Hills and Slopes
 - 9(i). Dolerite Hills. Lomond Hills
 - 9(ii). Dolerite Hills. Benarty Hills
 - 9(iii). Dolerite Hills. Cleish Hills
 - 10(i). Broad Valley Lowland. Strathmore
 - 10(ii). Broad Valley Lowland. Pow Water Valley
 - 10(iii). Broad Valley Lowland. Strathearn
 - 10(iv). Broad Valley Lowland. Strathallan
 - 11. Firth Lowlands. Braes of Gowrie
 - 12. Lowland Basins. Loch Leven Basin
- Scottish Borders Landscape Character
 - 1 (i), Dissected Plateau Moorland, Western Pentlands
 - 1 (ii), Dissected Plateau Moorland, Moorfoot Plateau
 - 1 (iii), Dissected Plateau Moorland, Lammermuir Hills
 - 13, Poor Rough Grassland, Leadburn
 - 19 (i), Coastal Farmland, Cockburnspath
 - 2, Plateau Grassland, Lauder Common
 - 3 (i), Plateau Outliers, Eddlestone / Lyne Interfluve
 - 8 (iv), Rolling Farmland, Westruther Platform
 - 8 (v), Rolling Farmland, West Linton Synclinal Belt
 - 9, Platform Farmland, Eye Water Platform
 - 23 (i), Pastoral Upland Valley, Gala Water
 - 23 (ii), Pastoral Upland Valley, Eddlestone Water
 - 24 (i), Upland Valley with Farmland, Upper Leader
 - 24 (ii), Upland Valley with Farmland, Upper Whiteadder
 - 26 (i), Pastoral Upland Fringe Valley, Eye Water
 - 28 (i), Wooded Upland Fringe Valley, Middle Whiteadder
- West Lothian Landscape Character
 - 1. Upland Hills. Western Pentland Hills
 - 2. Upland Hill Fringes. North-West Pentland Fringe
 - 3. Upland Hill Fringes. Gladsmuir / Woodmuir / Camilty Fringe
 - 4. Upland Hill Fringes. Harburn / Hartwood Fringe
 - 5. Lowland Hills and Valleys. Bathgate Hills
 - 6. Broad Valley Lowlands. Upper Almond Valley
 - 7. Broad Valley Lowlands. Couston Valley
 - 9. Lowland Plateaux. Armadale / Bathgate Plateau
 - 10. Lowland Plateaux. Livingston / Blackburn Plateau
 - 11. Lowland Plateaux. Avonbrigde to Armadale Plateau Edge
 - 13. Lowland Plains. Kirknewton Plain
 - 14. Lowland Plains. East Calder / Livingston / Broxburn Plain
 - 15. Lowland Plains. Winchburgh / Niddrie Plain
 - 16. Lowland River Corridors. Avon Valley
 - 17. Lowland River Corridors. Almond Valley
 - 18. Lowland River Corridors. Murieston / Linhouse / Camilty Waters
 - 19. Lowland River Corridors. West Calder Burn and Breich Water
 - 20. Lowland Hill Fringes. Linlithgow Fringe
 - 21. Lowland Hill Fringes. Bathgate Hills Fringe
 - 22. Coastal Margins. West Lothian Coastal Farmlands
 - 23. Coastal Margins. West Lothian Coastal Hills

Data Source:
 Strategic Landscape Capacity Assessment for Wind Energy in Angus 2014
 Edinburgh Landscape Character Assessment 2010
 Clackmannanshire Local Development Plan - SG2 - Onshore Wind Energy Modified May 2015
 East Lothian Landscape Character Assessment 2014
 FalkirkSPG Note: Spatial Framework and Guidance for Wind Energy Developemtn 2013
 Midlothian Landscape Wind Energy Capacity Study 2014
 Perth & Kinross Landscape Study to Inform Planning for Wind Energy 2010
 Scottish Borders Update of Wind Energy Landscape Capacity and Cumulative Impact Study 2016
 West Lothian Landscape Character Classification 2014

Blade Tip:	280m	Observer height:	2m
DTM:	OS T5 / T50	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

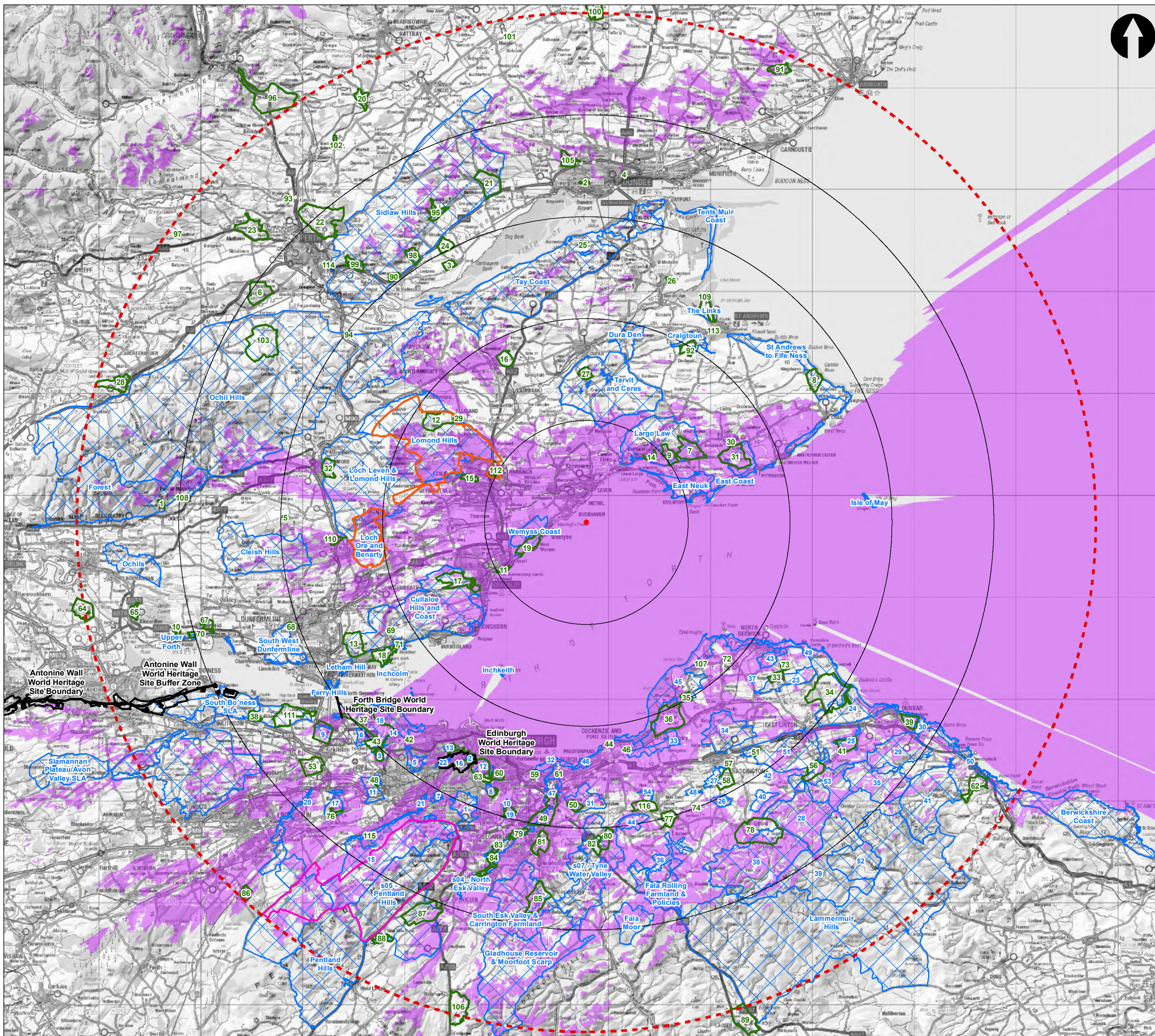
FORTHWIND OFFSHORE WIND FARM

SCOPING REPORT

Figure:
**Study Area with Blade Tip ZTV
 & Landscape Character Key**

Scale: 1:370,000

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.2b	Rev. 1
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- Key:**
- Proposed Turbine
 - 10km Radii
 - 50km Radius
 - Turbine Theoretically Visible (1x280m Blade Tip)
 - Pentland Hills Regional Park
 - Lomond Hills Regional Park
 - World Heritage Sites
 - Gardens and Designed Landscapes
 - Special Landscape Areas/Candidate Special Landscape Areas

For Garden and Designed Landscape Names and City of Edinburgh and East Lothian SLA names, see Figure 9.3b

Data Source:
 City of Edinburgh Council Local Development Plan 2016
 Clackmannanshire Local Development Plan 2015
 East Lothian Local Development Plan 2018
 Falkirk Local Development Plan 2015
 Fife Local Development Plan 2017
 Midlothian Local Development Plan 2017
 Perth and Kinross Local Development Plan 2014
 Scottish Borders Local Development Plan 2016
 West Lothian Local Development Plan 2018

Blade Tip:	280m	Observer height:	2m
DTM:	OS T5 / T50	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

FORTHWIND OFFSHORE WIND FARM

SCOPING REPORT

Figure:
 Study Area with Blade Tip ZTV & Landscape Designations




Scale: 1:370,000 0 2.5 5 10 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.3a	Rev. 1
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Key

 Gardens and Designed Landscapes

1. Castle Campbell
2. Balgay Park
3. Errol Park
4. Baxter Park
5. Cleish Castle
6. Dupplin Castle
7. Balcarres
8. Cambo
9. Charleton House
10. Dunimarle Castle
11. Dysart House And Ravenscraig Park
12. House of Falkland
13. Fordell Castle
14. Lahill
15. Leslie House
16. Melville House
17. Raith Park And Beveridge Park
18. St Colme
19. Wemyss Castle
20. Meikleour
21. Rossie Priory
22. Scone Palace
23. Methven Castle
24. Megginch Castle
25. Naughton
26. Earshall
27. Hill of Tarvit (Wemyss Hall)
28. Gleneagles Hotel And Golf Courses
29. Falkland Palace
30. Kellie Castle
31. Balcaskie
32. Kinross House
33. Balgone House
34. Tynninghame
35. Luffness
36. Gosford House
37. Dalmeny
38. House of The Binns
39. Broxmouth Park
40. Dundas Castle
41. Biel
42. Lauriston Castle
43. Craigiehall
44. Cockenzie House
45. Royal Botanic Garden, Edinburgh
46. Seton House (Palace)
47. The New Town Gardens
48. Millburn Tower
49. Dalkeith House (Palace)
50. Carberry Tower
51. Stevenson House
52. Cammo
53. Newliston
54. Palace of Holyroodhouse
55. Dean Cemetery
56. Whittingehame
57. St Mary's Pleasance (Haddington Garden)

58. Lennoxlove (Lethington)
59. Newhailes
60. Duddingston House
61. Pinkie House
62. Dunglass
63. Prestonfield House (Priestfield)
64. Dunmore Park
65. Tulliallan
66. The Pineapple
67. Valleyfield
68. Pittencrieff Park
69. The Murrel
70. Culross Abbey House
71. Aberdour Castle
72. Dirleton Castle
73. Leuchie
74. Pilmuir
75. The Drum
76. Hatton House
77. Saltoun Hall
78. Yester House
79. Melville Castle
80. Prestonhall
81. Newbattle Abbey
82. Oxenfoord Castle
83. Mavisbank
84. Roslin Glen And Hawthornden Castle
85. Arniston
86. Harburn House
87. Penicuik
88. Newhall
89. Thirlestane Castle
90. Inchyra
91. The Guynd
92. Craigtoun
93. Battleby
94. Balmano
95. Fingask Castle
96. Murthly Castle
97. Keillour Castle
98. Glendoick
99. Kinfauns Castle
100. Glamis Castle
101. Drumkilbo
102. Stobhall
103. Invermay
104. Craigmillar Castle
105. Camperdown House
106. Portmore
107. Grey Walls (High Walls)
108. Cowden Japanese-Style Garden
109. St Andrews Links
110. Blair Adam
111. Hopetoun House
112. Balbirnie
113. St Andrews Botanic Garden
114. Branklyn
115. Mallyen

116. Winton Castle
-  Special Landscape Areas/Candidate Special Landscape Areas
- City of Edinburgh Candidate Special Landscape Areas
1. Braids, Liberton, Mortonhall
 2. Calton Hill
 3. Cammo
 4. Castle Rock
 5. Corstorphine Hill
 6. Craigie Hill
 7. Craiglockhart
 8. Craigmillar Castle
 9. Dundas
 10. Edmonstone House
 11. Gogar
 12. Holyrood, Duddingston and Prestonfield
 13. Inverleith
 14. Lower Almond
 15. Pentlands
 16. Princes Street Gardens
 17. Ratho Hills
 18. Southern Forth Coast
 19. The Drum
 20. Upper Almond
 21. Water of Leith - West
 22. Water of Leith, New Town
- East Lothian Special Landscape Areas
23. Balgone & Whitekirk Outcrops
 24. Belhaven Bay
 25. Biel & Bielton
 26. Bolton
 27. Clerkington & Tyne
 28. Danskine to Whitcastle
 29. Doonhill to Chesters
 30. Dunbar to Barns Ness Coast
 31. Elphinston Ridge
 32. Fisherrow Sands
 33. Garden County Farmland
 34. Garleton Hills
 35. Halls to Bransley Hill
 36. Humbie Head & Waters
 37. Kingston
 38. Lammer Law, Hopes to Yester
 39. Lammermuir Moorland
 40. Linplum
 41. Monynut to Blackcastle
 42. Morham
 43. North Berwick Law
 44. Ormiston View & Fountainhall
 45. Port Seton to North Berwick Coast
 46. Prestonpans Coast
 47. River Esk
 48. Samuelson
 49. Tantallion Coast
 50. Thorntonloch to Dunglass Coast
 51. Traprain
 52. Whiteadder
 53. Whittingeham to Woodhall
 54. Winton Walks

Data Source:
 City of Edinburgh Council Local Development Plan 2016
 Clackmannanshire Local Development Plan 2015
 East Lothian Local Development Plan 2018
 Falkirk Local Development Plan 2015
 Fife Local Development Plan 2017
 Midlothian Local Development Plan 2017
 Perth and Kinross Local Development Plan 2014
 Scottish Borders Local Development Plan 2016
 West Lothian Local Development Plan 2018

Blade Tip:	280m	Observer height:	2m
DTM:	OS T5 / T50	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

FORTHWIND OFFSHORE WIND FARM

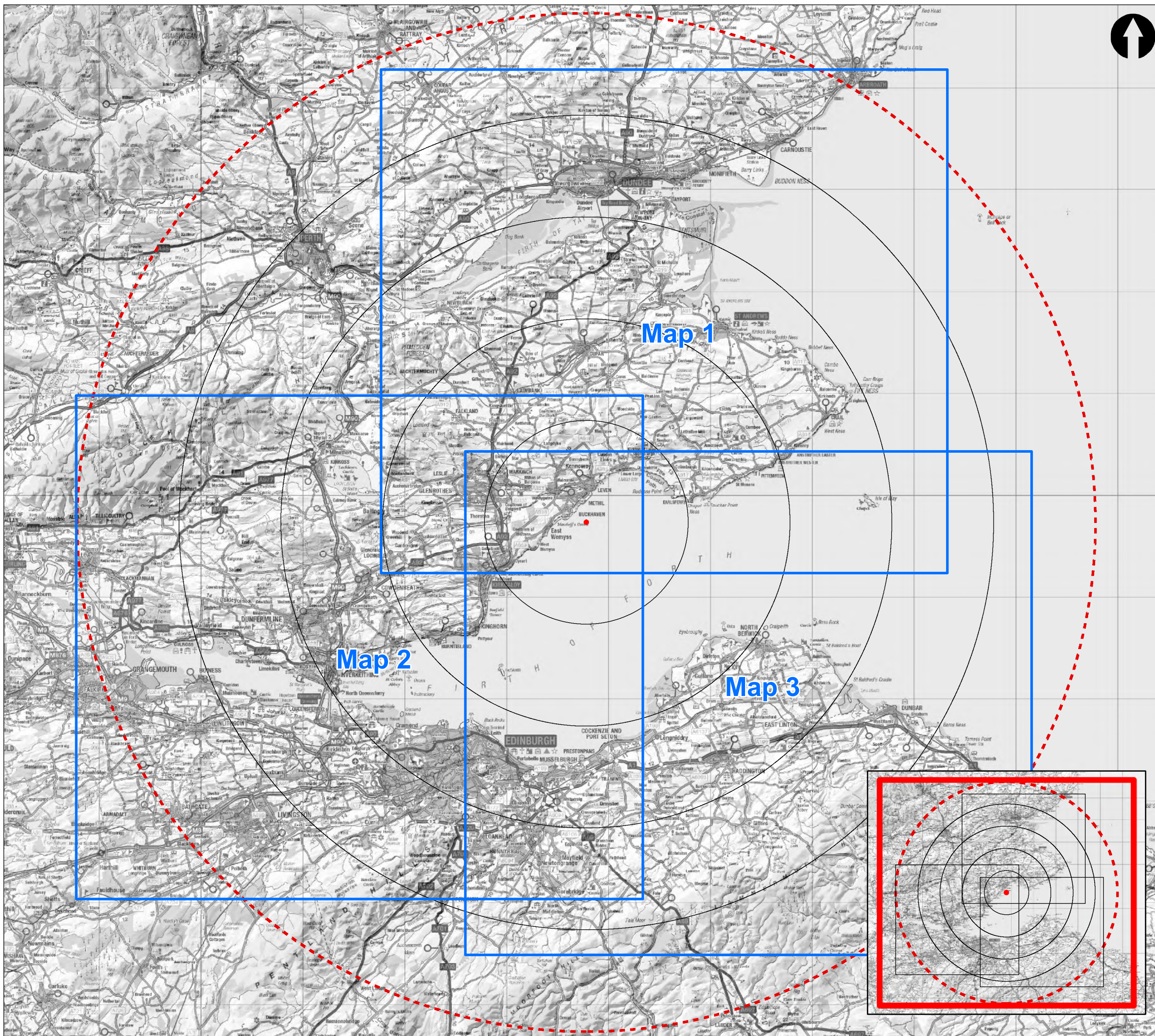
SCOPING REPORT

Figure:
**Study Area with Blade Tip ZTV
 & Landscape Designations Key**



Scale: 1:370,000 0 2.5 5 10 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.3b	Rev. 1
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- Key:**
- Proposed Turbine
 - 10km Radii
 - ⋯ 50km Radius

Data Source:
 Local: Forthwind Demonstrator Application
 Regional: Forth + Tay Onshore Windfarm Developer Group
 National: SNH Seascape Character Assessment, 2012

FORTHWIND OFFSHORE WIND FARM

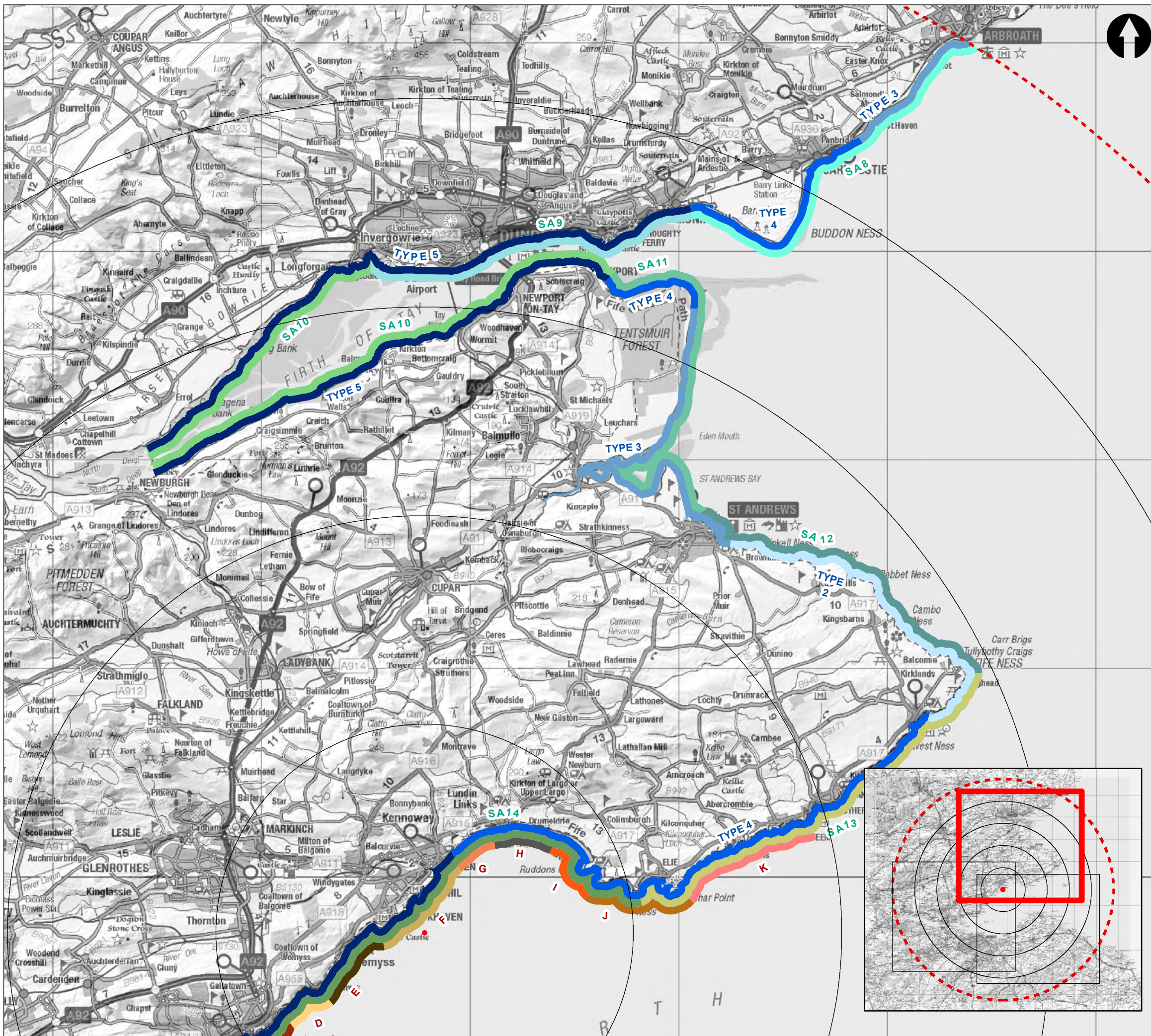
SCOPING REPORT

Figure:
 Coastal Character - Overview



Scale: 1:370,230 0 2.25 4.5 9 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.4a	Rev. 1
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- Key:**
- Proposed Turbine
 - 10km Radii
 - 50km Radius
- National Coastal Character**
- Type 2. Rocky Coastline / Open Sea Views
 - Type 3. Deposition Coastline, Open Views
 - Type 4. Outer Firths
 - Type 5. Developed Inner Firths
- Regional Coastal Character**
- SA8. Arbroath to ...
 - SA9. Dundee
 - SA10. Inner Firth of Tay
 - SA11. St. Andrews
 - SA12. St. Andrew to Fife
 - SA13. East Neuk of Fife
 - SA14. Kirkcaldy & Largo Bay
- Local Coastal Character**
- C. Dysart
 - D. Dysart to West Wemyss
 - E. West Wemyss to Buckhaven
 - F. Buckhaven/Methill/Leven
 - G. Leven Links
 - H. Lower Largo Rocky Shore
 - I. West Largo Bay & Links
 - J. Rocky Headland
 - K. East Neuk Coast

Data Source:
 Local: Forthwind Demonstrator Application
 Regional: Forth + Tay Onshore Windfarm Developer Group
 National: SNH Seascape Character Assessment, 2012

FORTHWIND OFFSHORE WIND FARM

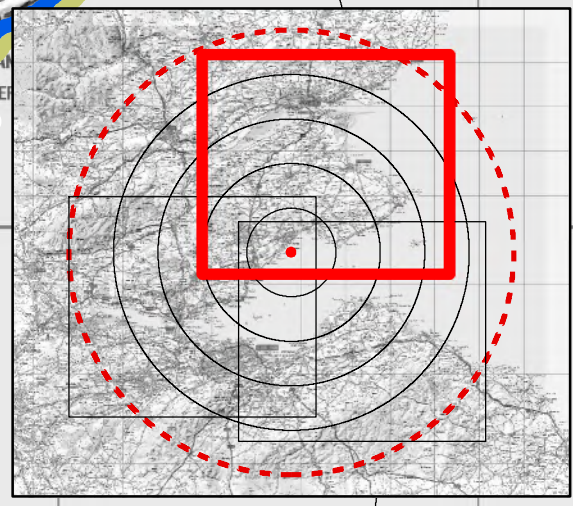
SCOPING REPORT

Figure:
Coastal Character - Map 1

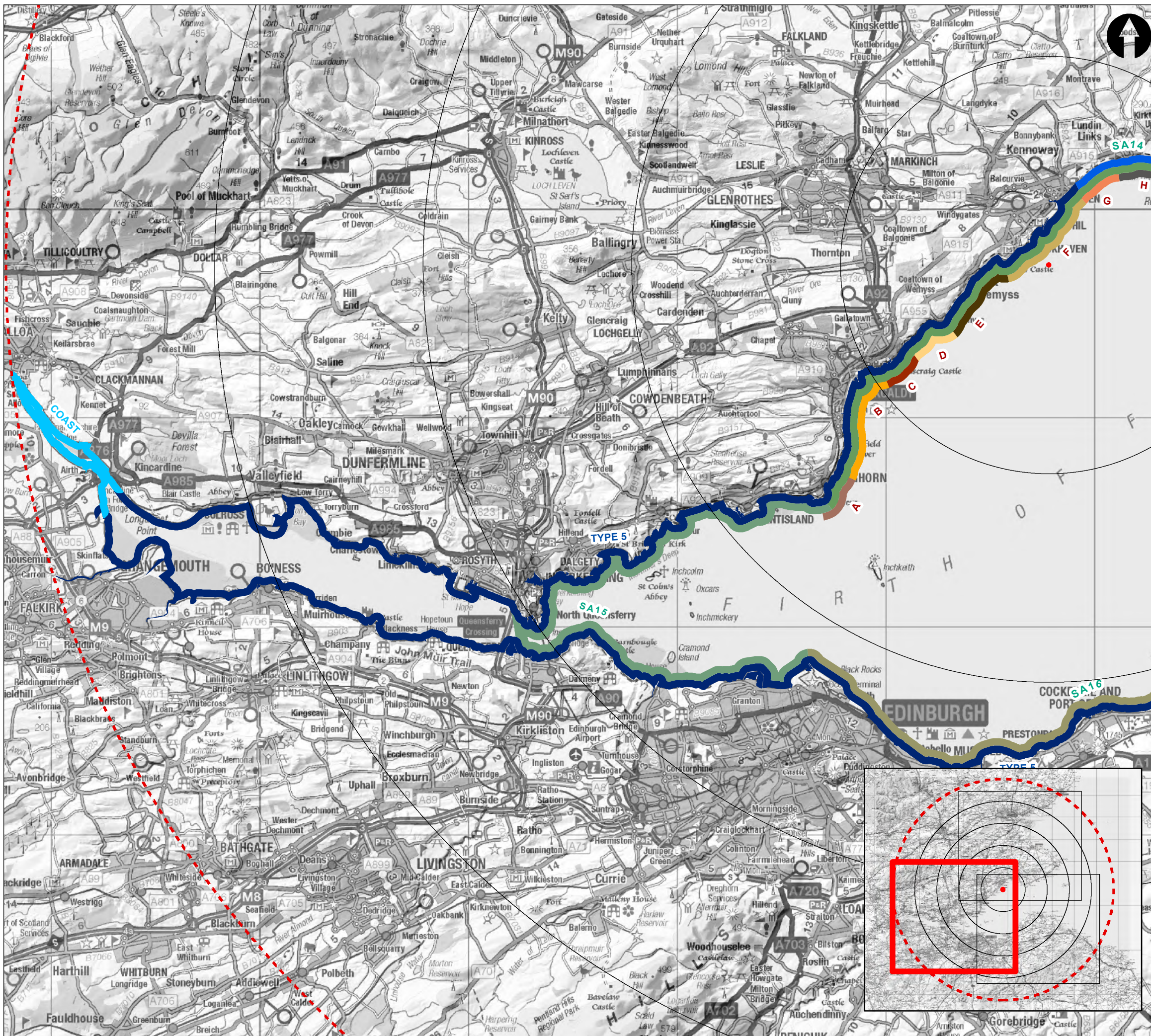


Scale: 1:180,110 0 1 2 4 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.4b	Rev. 1
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Key:

- Proposed Turbine
- 10km Radii
- 50km Radius
- National Coastal Character
 - Coast
 - Type 4. Outer Firths
 - Type 5. Developed Inner Firths
- Regional Coastal Character
 - SA14. Kirkcaldy & Largo Bay
 - SA15. Inner Firth of Forth
 - SA16. Edinburgh to Gullane
- Local Coastal Character
 - A. Kinghorn Rocky Cliffs
 - B. Kirkcaldy Urban Shore
 - C. Dysart
 - D. Dysart to West Wemyss
 - E. West Wemyss to Buckhaven
 - F. Buckhaven/Methill/Leven
 - G. Leven Links
 - H. Lower Largo Rocky Shore

Data Source:
 Local: Forthwind Demonstrator Application
 Regional: Forth + Tay Onshore Windfarm Developer Group
 National: SNH Seascape Character Assessment, 2012

**FORTHWIND
OFFSHORE WIND FARM**

SCOPING REPORT

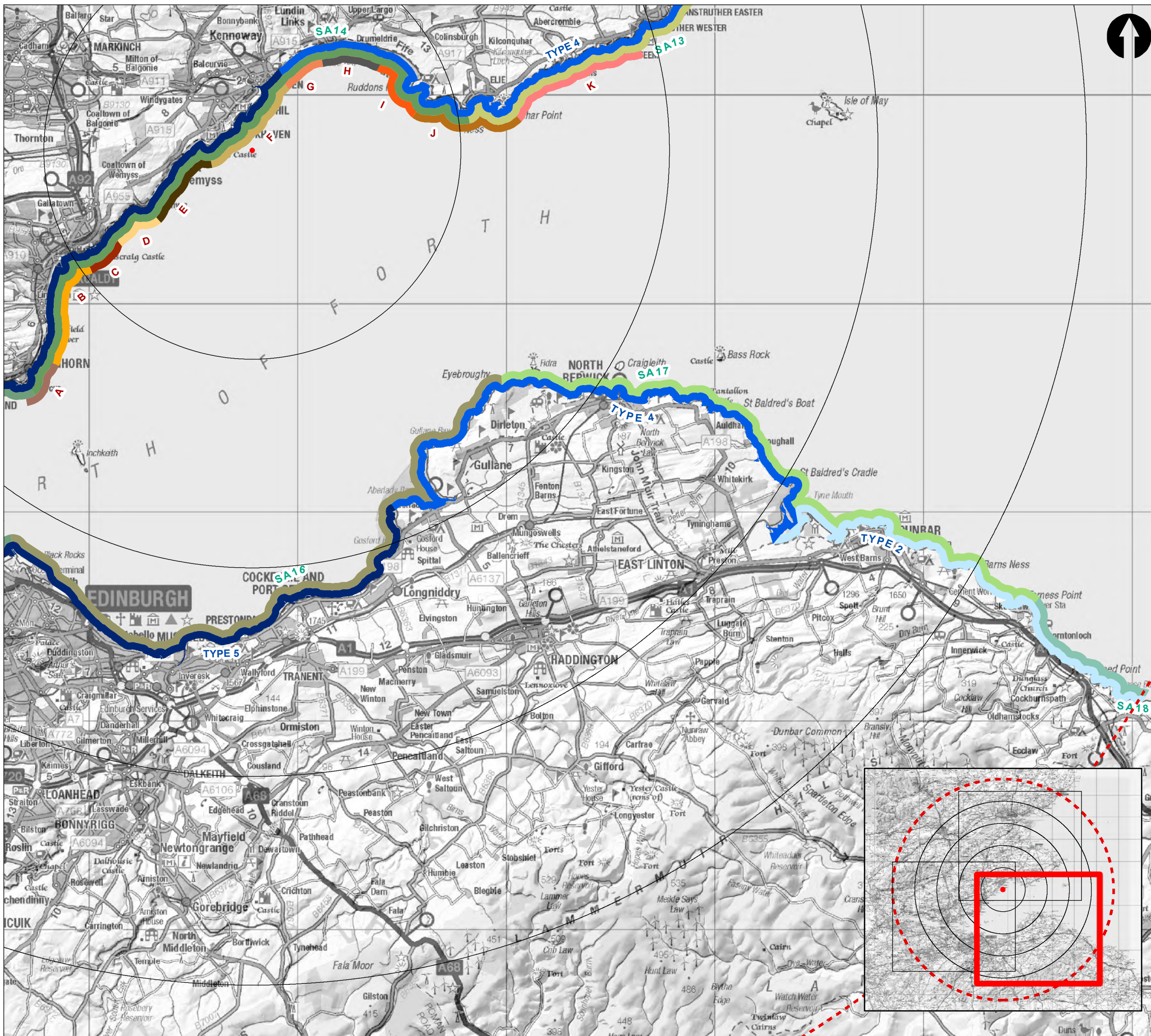
Figure:
Coastal Character - Map 2



Scale: 1:180,110

0 1 2 4 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.4c	Rev. 1
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Key:

- Proposed Turbine
- 10km Radii
- ⊞ 50km Radius

National Coastal Character

- Type 2. Rocky Coastline / Open Sea
- Type 4. Outer Firths
- Type 5. Developed Inner Firths

Regional Coastal Character

- SA13. East Neuk of Fife
- SA14. Kirkcaldy & Largo Bay
- SA15. Inner Firth of Forth
- SA16. Edinburgh to Gullane
- SA17. Eyebroughy to Torness Point
- SA18. Torness Point to St. Abbs

Local Coastal Character

- A. Kinghorn Rocky Cliffs
- B. Kirkcaldy Urban Shore
- C. Dysart
- D. Dysart to West Wemyss
- E. West Wemyss to Buckhaven
- F. Buckhaven/Methill/Leven
- G. Leven Links
- H. Lower Largo Rocky Shore
- I. West Largo Bay & Links
- J. Rocky Headland
- K. East Neuk Coast

Data Source:
 Local: Forthwind Demonstrator Application
 Regional: Forth + Tay Onshore Windfarm Developer Group
 National: SNH Seascape Character Assessment, 2012

FORTHWIND OFFSHORE WIND FARM

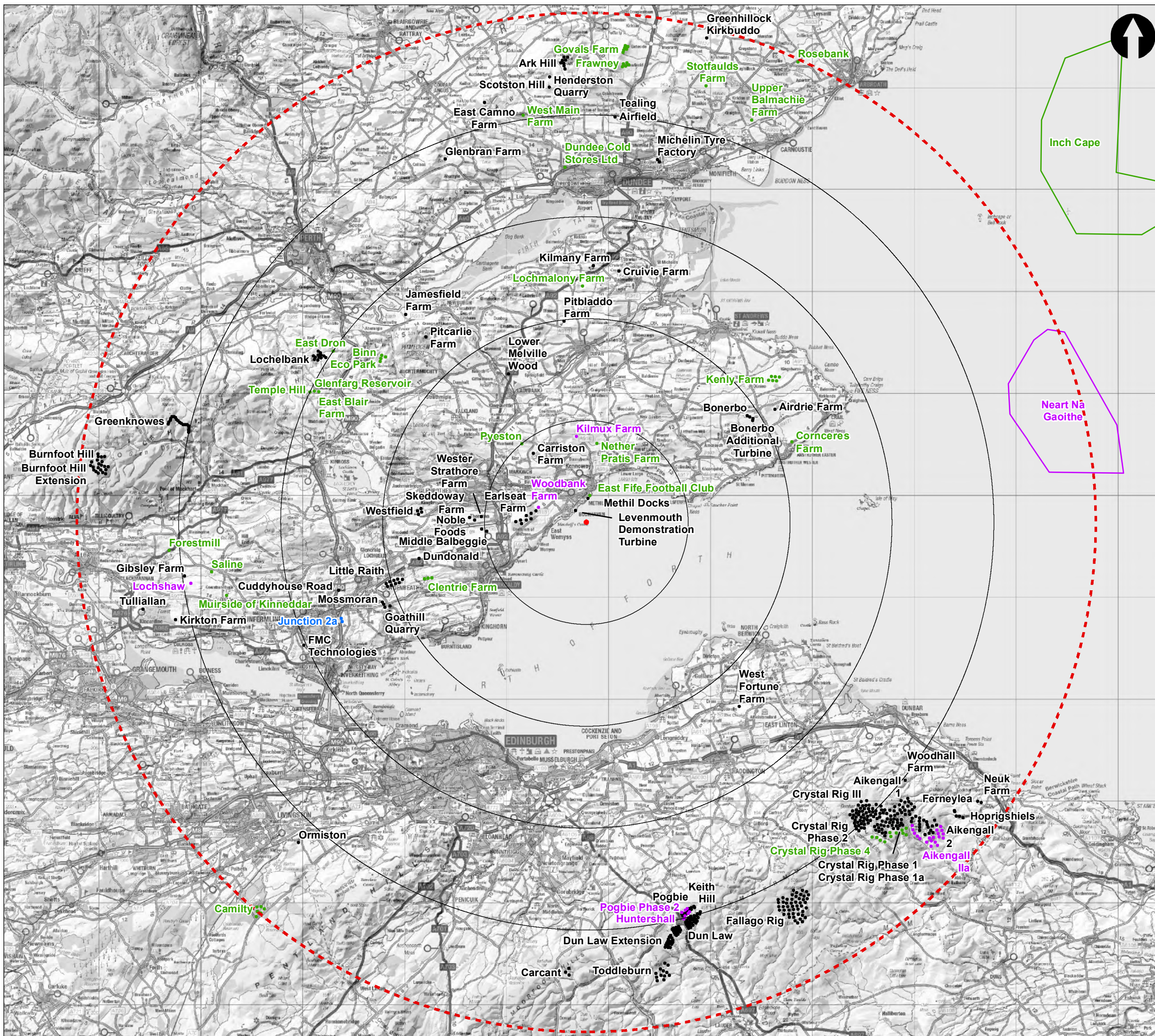
SCOPING REPORT

Figure:
Coastal Character - Map 3



Scale: 1:180,110 0 1 2 4 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.4d	Rev. 1
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Key:

- Proposed Turbine
 - ◻ 10km Radii
 - ◻ 50km Radius
- Cumulative Wind Farm
- Operational
 - Under Construction
 - Consented
 - Appeal/Application

**FORTHWIND
OFFSHORE WIND FARM**

SCOPING REPORT

Figure:
Cumulative Wind Farms



Scale: 1:370,000 0 2.5 5 10 km

Plot Size: A3	Co-ordinate System: British National Grid	Figure No: 9.5	Rev. 1
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Appendix B

Offshore Ecology (Ornithology, Marine Mammals and Fish/Shellfish)

Survey Spreadsheets

Appendix 11.1 – Densities and Population (Excel Spreadsheet)

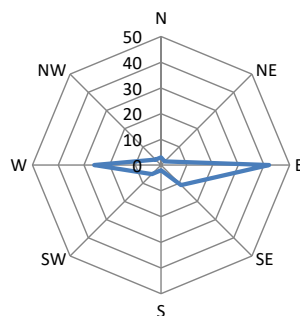
Appendix 11.2 – Flight Directions

Appendix 11.3 – Flight Heights

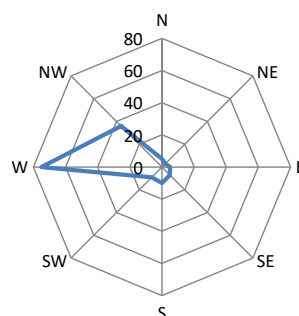
Appendix 11.4 – Marine Mammal Observation data (Excel Spreadsheets attached)

Species	Year 1									N	NE	E
	N	NE	E	SE	S	SW	W	NW				
Arctic Skua		1										
Black-headed Gull		13	15	58	14	13	25	32	21	40	11	21
Black-necked Grebe										3		
Black-throated Diver			2									
Brent Goose												
Common Gull		30	9	22	7	13	10	34	13	26	6	25
Common Scoter				1			3	54	29	2	4	26
Common Tern		4	1	4	1	3	1	4		5		10
Cormorant		1		2	3	2	2	4	2	2	1	5
Curlew				2		1						
Dunlin							1					
Eider		1		10	2		2	16	3	2		3
Fulmar		5	2	13	4	3	1	17	5	4	2	12
Gannet		54	34	250	95	69	89	240	81	44	26	220
Goldeneye						1						
Great Black-backed Gull		18	11	10	10	13	7	17	13	9	7	13
Great Northern Diver				1			1					
Great Skua				1			2					
Greenshank				1								
Grey Heron		2										
Guillemot		24	8	58	23	19	16	102	44	7		37
Guillemot / Razorbill						1			2			
Herring Gull		59	17	42	50	49	25	53	65	43	20	55
House Martin		1										
Kestrel											1	
Kittiwake		40	16	58	23	32	23	82	52	10	13	42
Lesser Black-backed Gull		10	3	3	4	6	7	9	5	9	4	8
Little Auk		18	12	2	3		8	45	41			
Long Tailed Duck				1				1	1	3	2	7
Manx Shearwater				15		12						3
Meadow Pipit		2						39	60	1		
Mediterranean Gull		2	3						3	1		
Oystercatcher												1
Pied Wagtail									1			
Pink-footed Goose		27		11		130		98	29			
Puffin		2	2	34	3	1	3	23	3	1		8
Razorbill		4	1	4	4	6	1	45	32	1	2	1
Red-breasted Merganser										3		
Redshank									2			
Red-throated Diver		2		5				7		3	1	10
Ringed Plover									1			
Sand Martin										3		
Sandwich Tern		1	2	2				6			2	14
Shag		3	4	20	8	7	3	15	9	6	3	20
Shelduck												
Siskin									1			
Skylark							1		3			16
Storm Petrel									1			
Swallow		16						1	3	8	1	
Teal								7				
Tufted Duck		1										
Velvet Scoter		4		1				4	2	1	1	16
Whooper Swan									10			
Wigeon												

Puffin

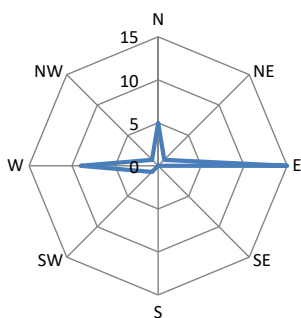


Razorbill

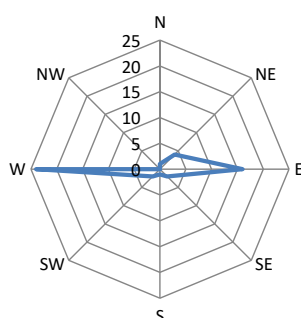


Year 2					Combined									
SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW		
						1	0	0	0	0	0	0	1	
7	15	10	27	10	53	26	79	21	28	35	59	31	332	
					3	0	0	0	0	0	0	0	3	
					0	2	0	0	0	0	0	0	2	
			1		0	0	0	0	0	0	1	0	1	
12	10	17	25	4	56	15	47	19	23	27	59	17	263	
5	5	36	10	17	2	4	27	5	5	39	64	46	192	
10	8	1	6		9	1	14	11	11	2	10	0	58	
3	3	1	12	5	3	1	7	6	5	3	16	7	48	
			2		0	0	2	0	1	0	2	0	5	
						0	0	0	0	1	0	0	1	
	2	3	12	13	3	0	13	2	2	5	28	16	69	
2			5		9	4	25	6	3	1	22	5	75	
56	51	34	139	33	98	60	470	151	120	123	379	114	1515	
					0	0	0	0	1	0	0	0	1	
10	12	7	15	6	27	18	23	20	25	14	32	19	178	
					0	0	1	0	0	1	0	0	2	
					0	0	1	0	0	2	0	0	3	
		1			0	0	1	0	0	1	0	0	2	
					2	0	0	0	0	0	0	0	2	
15	14	22	54	21	31	8	95	38	33	38	156	65	464	
					0	0	0	0	1	0	0	2	3	
19	35	24	77	22	102	37	97	69	84	49	130	87	655	
					1	0	0	0	0	0	0	0	1	
					0	1	0	0	0	0	0	0	1	
11	12	17	51	6	50	29	100	34	44	40	133	58	488	
6		3	3	4	19	7	11	10	6	10	12	9	84	
					18	12	2	3	0	8	45	41	129	
2	1		1	1	3	2	8	2	1	0	2	2	20	
7					0	0	18	7	12	0	0	0	37	
			199	12	3	0	0	0	0	0	238	72	313	
	1				3	3	0	0	1	0	0	3	10	
					0	0	1	0	0	0	0	0	1	
					0	0	0	0	0	0	0	0	1	
		23		80	27	0	11	0	130	23	98	109	398	
8	1	2	3		3	2	42	11	2	5	26	3	94	
3	4	8	30	4	5	3	5	7	10	9	75	36	150	
			3		3	0	0	0	0	0	3	0	6	
					0	0	0	0	0	0	0	2	2	
		1	2	1	5	1	15	0	0	1	9	1	32	
					0	0	0	0	0	0	0	1	1	
					3	0	0	0	0	0	0	0	3	
2	1	2	18		1	4	16	2	1	2	24	0	50	
3	3	7	19	4	9	7	40	11	10	10	34	13	134	
1					0	0	0	1	0	0	0	0	1	
					0	0	0	0	0	0	0	1	1	
		7			0	0	16	0	0	8	0	3	27	
					0	0	0	0	0	0	0	1	1	
			4	7	24	1	0	0	0	0	5	10	40	
					0	0	0	0	0	0	7	0	7	
					1	0	0	0	0	0	0	0	1	
1	5	1	4	1	5	1	17	1	5	1	8	3	41	
	6				0	0	0	0	6	0	0	10	16	
			18		0	0	0	0	0	0	18	0	18	

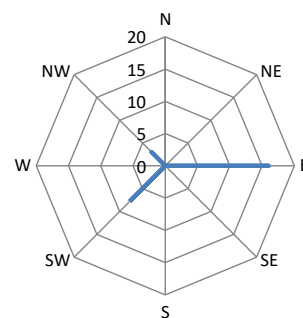
Red-throated Diver

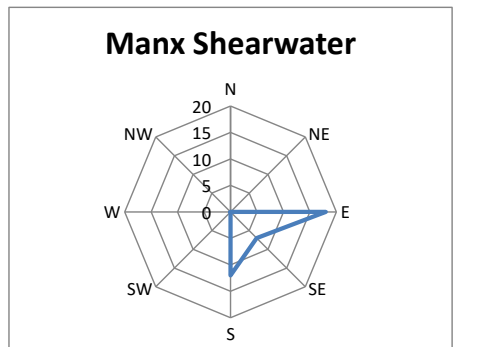
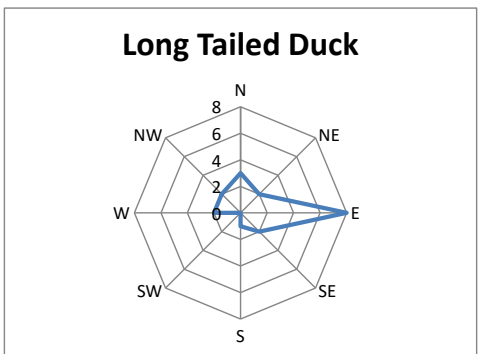
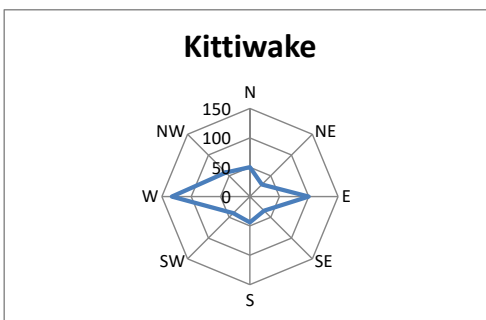
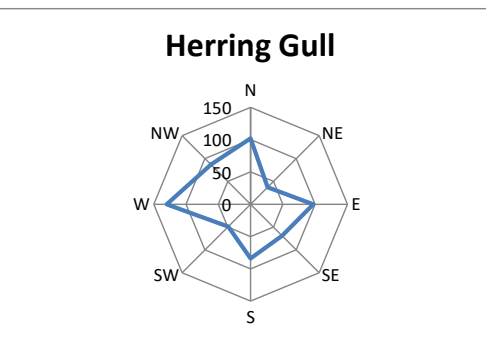
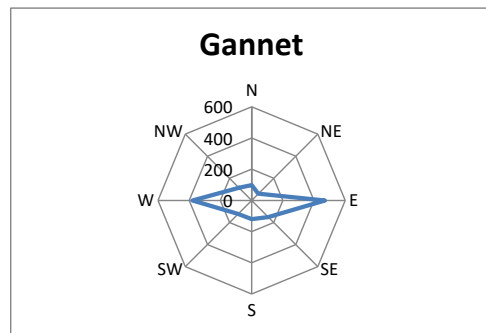
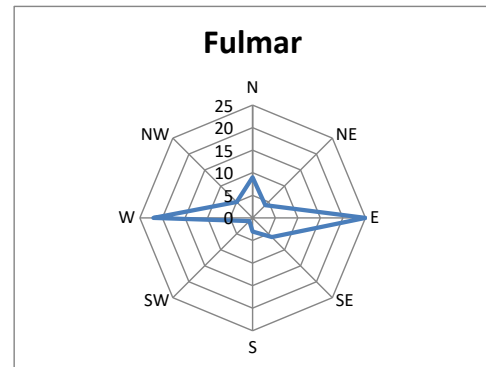
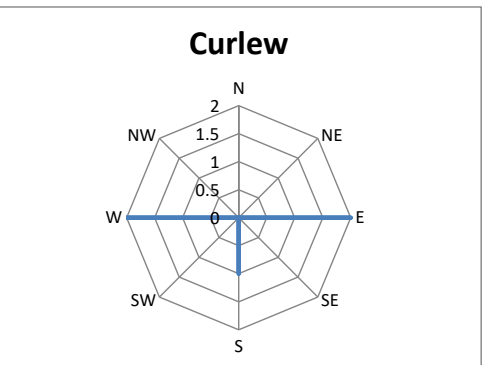
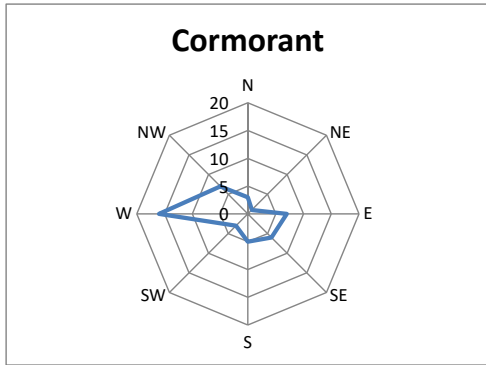
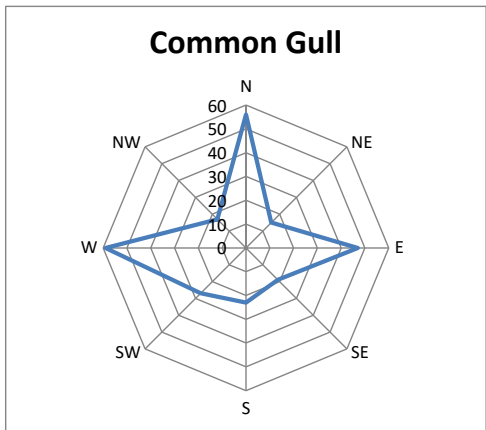
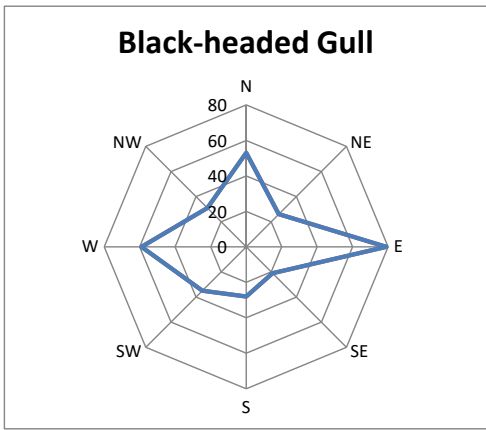


Sandwich Tern

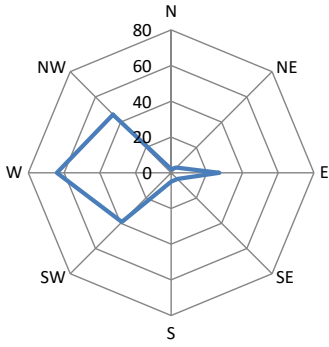


Shag

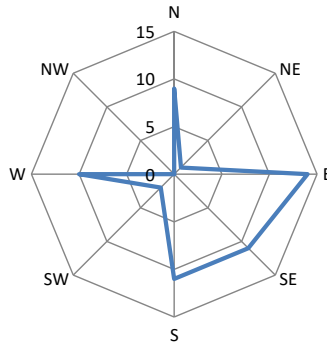




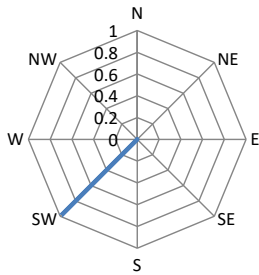
Common Scoter



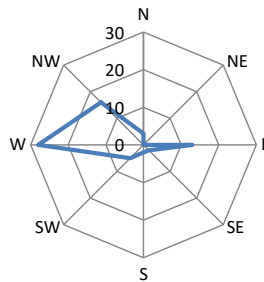
Common Tern



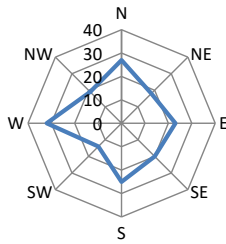
Dunlin



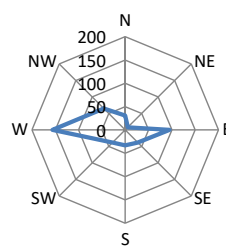
Eider



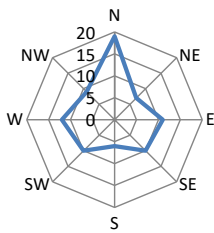
Great Black-backed Gull



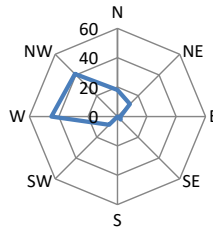
Guillemot



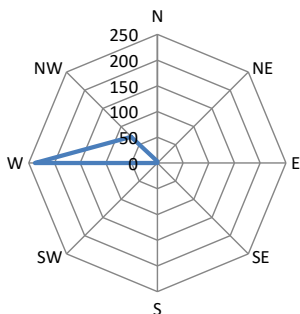
Lesser Black-backed Gull



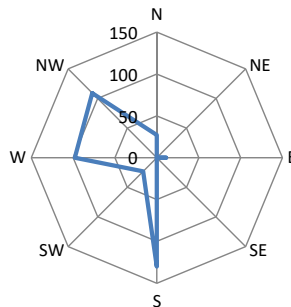
Little Auk



Meadow Pipit



Pink-footed Goose



Species	Year 1					Year 2				
	Flight height 1	Flight height 2	Flight height 3	Flight height 4	Flight height 5	Flight height 1	Flight height 2	Flight height 3	Flight height 4	Flight height 5
Arctic Skua	0	1	0	0	0	0	0	0	0	0
Black-headed Gull	90	74	31	5	0	39	80	42	8	0
Black-necked Grebe	0	0	0	0	0	0	3	0	0	0
Black-throated Diver	1	0	1	0	0	0	0	0	0	0
Brent Goose	0	0	0	0	0	0	0	1	0	0
Common Gull	30	56	54	12	0	12	80	47	10	0
Common Scoter	84	0	3	0	0	84	2	8	1	0
Common Tern	0	12	7	0	0	10	21	12	0	0
Cormorant	14	2	0	0	0	28	2	1	1	0
Curlew	1	2	0	0	0	3	0	0	0	0
Dunlin	4	0	0	0	0	0	0	0	0	0
Eider	27	2	5	0	0	35	1	0	0	0
Fulmar	49	0	1	0	0	24	1	0	0	0
Gannet	399	248	264	18	0	214	131	242	37	0
Goldeneye	1	0	0	0	0	0	0	0	0	0
Great Black-backed Gull	16	23	49	11	0	17	27	31	10	0
Great Northern Diver	0	1	1	0	0	0	0	0	0	0
Great Skua	2	0	1	0	0	0	0	0	0	0
Greenshank	1	0	0	0	0	0	0	1	0	0
Grey Heron	0	0	0	2	0	0	0	0	0	0
Guillemot	286	8	2	0	0	144	24	7	2	0
Guillemot / Razorbill	3	0	0	0	0	0	0	0	0	0
Herring Gull	61	94	161	58	0	35	85	155	43	0
House Martin	0	0	1	0	0	0	0	0	0	0
Kestrel	0	0	0	0	0	0	0	1	0	0
Kittiwake	73	151	135	11	0	19	84	75	8	0
Lesser Black-backed Gull	3	11	36	1	0	2	13	19	5	0
Little Auk	128	1	0	0	0	0	0	0	0	0
Little Grebe	0	0	0	0	0	0	0	0	0	0
Long Tailed Duck	3	0	0	0	0	14	0	1	0	0
Manx Shearwater	27	0	0	0	0	10	0	0	0	0
Meadow Pipit	63	37	2	0	0	143	48	6	0	0
Mediterranean Gull	2	0	2	0	0	0	0	1	0	0
Oystercatcher	0	0	0	0	0	1	0	0	0	0
Pied Wagtail	1					0	0	0	0	0
Pink-footed Goose	0	3	29	53	210	0	0	0	23	80
Puffin	75	0	0	0	0	21	0	0	0	0
Razorbill	95	1	0	1	0	46	4	0	3	0
Red-breasted Merganser	0	0	0	0	0	3	3	0	0	0
Redshank	2	0	0	0	0	0	0	0	0	0
Red-throated Diver	7	4	3	0	0	12	0	0	1	0
Ruff	0	0	0	0	0	0	0	0	0	0
Ringed Plover	1	0	0	0	0	0	0	0	0	0
Sand Martin	0	0	0	0	0	2	0	1	0	0
Sandwich Tern	0	8	4	0	0	3	18	20	0	0
Scaup	0	0	0	0	0	0	0	0	0	0
Shag	66	0	0	0	0	58	4	0	0	0
Shelduck	0	0	0	0	0	0	1	0	0	0
Siskin	1	0	0	0	0	0	0	0	0	0
Skylark	3	1	0	0	0	7	0	16	0	0
Storm Petrel	1	0	0	0	0	0	0	0	0	0
Swallow	11	9	0	0	0	1	4	13	0	0
Teal	0	7	0	0	0	0	0	0	0	0
Tufted Duck	1	0	0	0	0	0	0	0	0	0
Velvet Scoter	10	1	0	0	0	29	1	0	0	0
Whooper Swan	0	0	0	10	0	0	0	0	1	0
Wigeon	0	0	0	0	0	0	0	18	0	0

2015/16 MARINE MAMMAL SURVEYS

Date	Sighting number	Time at start of encounter (UTC)	Time at end of encounter (UTC)	Were animals detected Visually? Acoustically? Or Both?	How were the animals first detected?	Latitude	Longitude	Species or species group	Description	Bearing to animal	Range of animal (metres)	Total number	Number of adults (visual sightings only)	Number of juveniles (visual sightings only)	Number of calves (visual sightings only)	Behaviour (visual sightings only)	Direction of travel (relative to ship or platform)	Direction of travel (compass points)	Comments
26/03/2015	1	10:47		v	v continuous watch	56 08 065	002 58 998	gs	Adult	80	100	1	1	0	0	0 milling	afs	se	
26/03/2015	2	11:25		v	v continuous watch	56 07 210	002 59 312	gs	Adult	300	25	1	1	0	0	0 travelling / milling	cpaos / m	e	
27/03/2015	3	09:39		v	v continuous watch	56 08 100	003 01 184	gs	Adult	90	100	1	1	0	0	0 travelling north	ptodr / m	n	
27/03/2015	4	09:54		v	v continuous watch	56 07 442	002 59 312	gs	Adult	220	150	1	1	0	0	0 milling	afs / m	s	
27/03/2015	5	09:57		v	v continuous watch	56 07 707	002 59 626	gs	Adult male	90	80	1	1	0	0	0 milling	m	var	
16/04/2015	6	11:30	11:31	v	v continuous watch	56 08 712	003 00 198	HP	Adult	290	500	1	1	0	0	0 travelling	cpaos	w	
16/04/2015	7	11:40	11:40	v	v continuous watch	56 09 320	003 01 306	gs	Adult	5	5	1	1	0	0	0 milling	ts	sw	popped up in front of starboard side of boat
16/04/2015	8	12:59	13:00	v	v continuous watch	56 08 589	002 56 227	HP	Adult	45	700	1	1	0	0	0 travelling	cpaos	e	
28/04/2015	9	10:03		v	v continuous watch	56 09 283	002 56 745	gs	Adult	300	50	1	1	0	0	0 travelling	cpaos	w	
28/04/2015	10	12:57		v	v continuous watch	56 08 234	003 03 550	gs	Adult	45	50	1	1	0	0	0 feeding	v	var	Just popped up, surrounded by feeding birds.
04/06/2015	11	10:50		v	v continuous watch	56 08 772	003 00 774	HP	Adult	0	500	1	1	0	0	0 travelling	cpaos	e	
04/06/2015	12	11:29		v	v continuous watch	56 08 452	002 58 065	HP	Adult	345	400	1	1	0	0	0 Diving / Feeding	cpaos	e	
04/06/2015	13	11:45		v	v continuous watch	56 09 966	002 59 632	gs	Adult	290	30	1	1	0	0	0 Milling	v	var	between T6 and T7
04/06/2015	14	11:50		v	v continuous watch	56 09 860	002 58 690	HP	Adult / Juv	90	600	2	1	1	0	0 Diving / Feeding	ptodts	nw	Feeding behaviour
09/06/2015	15	10:43		v	v continuous watch	56 09 790	002 58 607	GS	Adult	300	450	1	1	0	0	0 Milling / Travelling	ptodts	s	
09/06/2015	16	10:54		v	v continuous watch	56 09 616	002 59 556	GS	Adult	320	600	1	1	0	0	0 milling / sleeping	milling / stationary	stationary	nose pointing and bobbing out of water
09/06/2015	17	11:37		v	v continuous watch	56 09 363	003 01 067	GS	Adult	0	150	1	1	0	0	0 milling / travelling	ptodts	e	
09/06/2015	18	11:47		v	v continuous watch	56 08 418	003 00 341	HP	Adult	5	150	2	2	0	0	0 travelling	cpaos	w	
09/06/2015	19	12:24		v	v continuous watch	56 09 074	003 02 638	GS	Adult	280	100	1	1	0	0	0 travelling	ptodts	e	
19/07/2015	20	10:23		v	v continuous watch	56 08 577	002 57 067	HP	Adult	90	150	1	1	0	0	0 travelling	cpaos	se	
19/07/2015	21	10:25		v	v continuous watch	56 08 588	002 57 082	GS	Adult female	5	200	1	1	0	0	0 milling	unknown	unknown	
19/07/2015	22	12:49		v	v continuous watch	56 07 127	003 02 194	HP	Adult	5	100	1	1	0	0	0 travelling	cpaos	e	
19/07/2015	23	13:00		v	v continuous watch	56 08 072	003 03 362	GS	Adult	320	300	1	1	0	0	0 milling	variable	variable	
22/07/2015	24	09:30		v	v continuous watch	56 08 001	003 03 268	GS	Adult	5	400	1	1	0	0	0 milling	milling	stationary	
22/07/2015	25	10:35		v	v continuous watch	56 07 704	002 59 461	GS	Adult	45	200	1	1	0	0	0 Travelling	ptodts	n	
22/07/2015	26	11:59		v	v continuous watch	56 08 638	002 57 167	GS	Adult	30	200	1	1	0	0	0 Travelling	ptodos	n	
07/08/2015	27	09:58		v	v continuous watch	56 10 082	002 57 673	GS	Adult	0	250	1	1	0	0	0 Milling / nose pointing	milling	unknown	
19/08/2015	28	09:26		v	v continuous watch	56 08 484	003 03 892	GS	Adult	200	200	1	1	0	0	0 milling	milling	unknown	
19/08/2015	29	09:35		v	v continuous watch	56 07 537	003 02 711	GS	Adult	210	100	1	1	0	0	0 milling	milling	unknown	
19/08/2015	30	09:37		v	v continuous watch	56 07 355	003 02 493	GS	Adult	90	50	1	1	0	0	0 travelling	ptodts	n	
19/08/2015	31	11:41		v	v continuous watch	556 09 512	002 59 422	GS	Adult	350	500	1	1	0	0	0 nose pointing / sleeping	stationary	unknown	
19/08/2015	32	11:54		v	v continuous watch	56 09 742	002 58 581	GS	Adult	280	100	1	1	0	0	0 milling	milling	unknown	
19/08/2015	33	12:02		v	v continuous watch	56 08 813	002 57 495	GS	Adult	300	100	1	1	0	0	0 travelling	ptodts	n	
19/08/2015	34	12:04		v	v continuous watch	56 08 760	002 57 302	GS	Adult	300	300	1	1	0	0	0 travelling	ptsisdas	s	
09/09/2015	35	11:11		v	v continuous watch	56 08 904	002 58 651	GS	Adult	90	20	1	1	0	0	0 travelling	ptodts	n	
09/09/2015	36	12:36		v	v continuous watch	56 08 733	003 03 071	GS	Adult	10	50	1	1	0	0	0 feeding / travelling	afs	w	
09/09/2015	37	13:07		v	v continuous watch	56 07 676	003 02 908	HP	Adult	20	1500	1	1	0	0	0 travelling	afs	e	
26/09/2015	38	10:03		v	v continuous watch	56 09 401	003 00 423	GS	Adult	80	50	1	1	0	0	0 travelling	afs	nw	
08/10/2015	39	10:26		v	v continuous watch	56 10 003	002 57 594	HP	Adult	45	50	1	1	0	0	0 travelling	ptodts	n	
08/10/2015	40	12:55		v	v continuous watch	56 07 790	003 01 865	GS	Adult	300	100	1	1	0	0	0 travelling	ptodts		
27/10/2015	41	12:18	12:20	v	v continuous watch	56 07 596	003 00 443	HP	Adult	160	100	1	1	0	0	0 travelling	ptodts	nw	
05/11/2015	42	10:51		v	v continuous watch	56 09 118	002 58 910	GS	Adult	300	300	1	1	0	0	0 milling	milling	unknown	
05/11/2015	43	11:27		v	v continuous watch	56 09 253	003 01 358	BS	Adult	0	5	1	0	1	0	0 At surface	ts	e	2.5 - 3m in length
05/11/2015	44	11:51		v	v continuous watch	56 07 366	002 59 855	HP	Adult	300	400	1	1	0	0	0 Travelling	ptoisdas	w	
22/11/2015	45	10:09		v	v continuous watch	56 07 657	003 01 710	GS	Adult	0	300	1	1	0	0	0 milling/nose pointing		unknown	
03/12/2015	46	10:26	10:29	v	v continuous watch	56 08 977	002 57 590	GS	Adult	320	300	1	1	0	0	0 short period	ts	se	
03/12/2015	47	10:50	10:51	v	v continuous watch	56 08 979	002 58 710	GS	Adult	20	200	1	1	0	0	0 swimming on surface briefly	cpaos	n	Dark grey 1.5-2 m long
03/12/2015	48	11:14	11:16	v	v continuous watch	56 09 011	002 59 944	GS	Adult	40	150	1	1	0	0	0 swimming on surface	variable	var	dark grey 1.5 - 2m long
03/12/2015	49	11:19	11:25	v	v continuous watch	56 09 204	003 01 314	GS	Adult		300	1	1	0	0	0 swimming until submerged	ts	se	
03/12/2015	50	11:28		v	v continuous watch	56 08 879	003 00 916	GS	Adult	10	200	1	1	0	0	0 head surfaced briefly, dived soon after	cpaos	n	dark grey 1.5 - 2m long
03/12/2015	51	11:56	11:57	v	v continuous watch	56 08 210	003 01 247	GS	Adult	150	200	1	1	0	0	0 head surfaced - swimming briefly	ts	se	dark grey 1.5 - 2m long
03/12/2015	52	12:09	12:10	v	v continuous watch	56 08 982	003 02 923	GS	Adult	160	150	1	1	0	0	0 swimming until it dives	afs	s	Dark Grey 1.5m

03/12/2015	53	12:35		v	v continuous watch	56 07 039	003 02 130	GS	Adult	150	80	1	1	0	0 surfaced briefly	stationary	se	dark grey 1.5 - 2m long
03/12/2015	54	12:46	12:47	v	v continuous watch	56 08 060	003 03 367	GS	Adult	140	150	1	1	0	0 swimming until it dives	ptodts	se	
14/12/2015	55	10:13	10:14	v	v continuous watch	56 08 094	003 02 266	GS	Adult	380	150	2	2	0	2 individuals approx 100m apart, both	ts	se	dark grey 1-1.5m long
14/12/2015	56	10:29	10:30	v	v continuous watch	56 08 964	003 02 168	GS	Adult	40	150	1	1	0	0 surfaced briefly	v	ne	dark grey 1-1.5m long
14/12/2015	57	10:34	10:35	v	v continuous watch	56 08 461	003 01 537	GS	Adult	150	15	1	1	0	0 15m from vessel before diving	variable	var	dark grey 1-1.5m
14/12/2015	58	10:37	10:38	v	v continuous watch	56 08 188	003 01 251	GS	Adult	150	30	1	1	0	0 swimming on surface before diving	ptsisdas	se	dark grey 1-1.5m long
14/12/2015	59	11:04	11:05	v	v continuous watch	56 08 700	003 00 687	GS	Adult	270	150	1	1	0	0 vessel	afs	w	dark grey 1-1.5m long
14/12/2015	60	11:48	11:49	v	v continuous watch	56 09 036	002 58 828	GS	Adult	300	100	1	1	0	0 swimming briefly before diving	ptodts	se	dark grey 1-1.5m long
14/12/2015	61	12:06		v	v continuous watch	56 09 057	002 58 570	GS	Adult	150	10	1	1	0	0 surfaced approx 10m from the bow before	ts	nw	dark grey 1-1.5m long
14/12/2015	62	12:13		v	v continuous watch	56 08 919	002 57 478	HP	Adult	170	80	1	1	0	Porpoise fully leaped from water briefly,	ptodts	w	grey colour 1.5-2m long
14/12/2015	63	12:13	12:14	v	v continuous watch	56 08 513	002 56 954	GS	Adult	260	100	1	1	0	0 until diving straight after	v	var	pointed triangle dorsal fin
14/12/2015	64	12:34	12:36	v	v continuous watch	56 09 491	002 56 993	GS	Adult	260	30	1	1	0	swimming in variable directions before	v	var	dark grey 1-1.5m long
14/01/2016	65	11:14		v	v continuous watch	56 09 214	003 00 188	GS	Adult	20	30	1	1	0	0 diving	v	unknown	
27/01/2016	66	10:20		v	v continuous watch	56 08 188	003 02 366	GS	Adult	270	400	1	1	0	0 milling	unknown	unknown	
17/02/2016	67	10:17		v	v continuous watch	56 09 063	002 56 473	HP	Adult	50	50	1	1	0	0 milling	ptodts	nw	
17/02/2016	68	10:58		v	v continuous watch	56 08 833	002 58 560	GS	Adult	280	60	1	1	0	0 Travelling	ptodts	nw	
17/02/2013	69	11:07		v	v continuous watch	56 07 835	02 58 293	GS	Adult	270	70	1	1	0	0 Milling / Travelling	ptodts	nw	
															0 milling	ptodts	nw	

2016/17 MARINE MAMMAL SURVEYS

Date	Sighting number	Time at start of encounter (UTC)	Time at end of encounter (UTC)	Were animals detected Visually? Acoustically? Or Both?	How were the animals first detected?	Latitude	Longitude	Species or species group	Description	Bearing to animal	Range of animal (metres)	Total number	Number of adults (visual sightings only)	Number of juveniles (visual sightings only)	Number of calves (visual sightings only)	Behaviour (visual sightings only)	Direction of travel (relative to ship or platform)	Direction of travel (compass points)	Comments
29/03/2016	1	10:18		v	v continuous watch	56 09 637	002 57 150	GS	Milling	100	500	1	1	0	0	0 Milling	milling	unknown	
29/03/2016	2	11:15		v	v continuous watch	56 09 353	002 59 196	GS	Dived / Feeding	310	300	1	1	0	0	0 Diving /Feeding	ptodts	North	
29/03/2016	3	11:46		v	v continuous watch	56 08 931	002 59 974	GS	Dived	300	150	1	1	0	0	0 Dived	unknown	unknown	
22/04/2016	4	10:35		V	v continuous watch	56 08 396	003 03 778	GS	Milling	30	200	1	1	0	0	0 Milling	ptodts	NW	
22/04/2016	5	12:23		V	v continuous watch	56 09 496	003 00 570	GS	SLEEPING	90	300	1	1	0	0	0 MILLING / SLEEPING	VARIABLE	unknown	
22/04/2016	6	12:37		v	v continuous watch	56 08 346	002 59 266	hp	travelling	300	5	1	1	0	0	0 came alongside boat briefly	afs	s	spotted on transect break to avoid oil rig, seen on sw side of rig
22/04/2016	7	12:47		v	v continuous watch	56 08 068	002 58 328	gs	travelling	10	20	1	1	0	0	0 travelling	ptodts	e	
22/04/2016	8	13:18		v	v continuous watch	56 10 013	002 58 933	hp	travelling	45	40	1	1	0	0	0 travelling	afs	nw	
22/04/2016	9	13:49	13:54	v	v continuous watch	56 09 197	002 56 612	hp	travelling	0	1000	2	2	0	0	0 travelling	cpaos	w/ sw	
22/04/2016	10	13:56		v	v continuous watch	56 10 003	002 57 591	gs	travelling	0	30	1	1	0	0	0 travelling	cpaos	w/ sw	
22/04/2016	11	13:55		v	v continuous watch	56 09 830	002 57 374	gs	travelling	30	200	1	1	0	0	0 travelling	ptodts	s	
14/05/2016	12	12:30		v	v continuous watch	56 10 552	002 59 647	gs	Milling/travelling	270	30	1	1	0	0	0 travelling	milling	nw	
14/05/2016	13	13:14		v	v continuous watch	56 09 07	002 00 012	hp	unknown	270	60	1	0	0	0	0 unknown	ptodts	s	
17/05/2016	14	11:44		v	v continuous watch	56 06 949	003 01 467	hp	travelling	300	15	2	2	0	0	0 travelling	ptodts	nw	
17/05/2016	15	12:20		v	v continuous watch	56 08 735	003 01 960	gs	milling/travelling	320	800	1	0	0	0	0 milling/travelling	ptodts	n	
17/05/2016	16	12:23		v	v continuous watch	56 08 457	003 01 546	gs	milling/travelling	45	400	1	0	0	0	0 milling/travelling	ptodts	nw	
07/06/2016	17	10:33		v	v continuous watch	56 09 876	002 58 363	gs	travelling	290	300	1	0	0	0	0 travelling	afs	s	
07/06/2016	18	10:50		v	v continuous watch	56 09 955	003 00 030	gs	milling	320	300	2	2	0	0	0 milling	milling	unknown	
07/06/2016	19	10:54		v	v continuous watch	T6		gs	milling	45		2	0	0	0	0 milling	milling	unknown	
07/06/2016	20	11:03		v	v continuous watch	56 48 649	002 58 487	gs	milling	40	400	1	0	0	0	0 milling	milling	unknown	
07/06/2016	21	11:45		v	v continuous watch	56 09 579	003 01 902	GS	travelling	40	300	1	0	0	0	0 travelling	travelling	n	
07/06/2016	22	11:47		v	v continuous watch	56 09 382	003 01 615	GS	travelling	5	100	1	0	0	0	0 travelling	travelling	n	
07/06/2016	23	12:18		v	v continuous watch	56 07 892	003 00 844	hp	travelling	320	100	1	0	0	0	0 travelling	travelling	ne	
07/06/2016	24	12:30		v	v continuous watch	56 09 090	003 02 344	gs	SLEEPING/nose pointing	300	300	1	0	0	0	0 sleeping/nose pointing	sleeping/sleep pointing	stationary	
07/06/2016	25	12:39		v	v continuous watch	56 09 264	003 03 116	gs	travelling	0	200	1	0	0	0	0 travelling	travelling	nw	
07/06/2016	26	13:18		v	v continuous watch	56 08 987	003 03 350	hp	travelling	320	300	2	0	0	0	0 travelling	travelling	sw	
08/06/2016	27	10:10		v	v continuous watch	56 09 463	003 02 937	gs	travelling	45	200	1	0	0	0	0 travelling	travelling	nw	
08/06/2016	28	11:54		v	v continuous watch	56 10 151	003 00 083	bd	travelling	0	400	8	0	0	0	0 travelling	travelling	se	
08/06/2016	29	12:01		v	v continuous watch	56 10 525	002 59 647	bd	travelling	0	500	8	0	0	0	0 travelling	travelling	e	
09/06/2016	30	10:09		v	v continuous watch	56 09 871	002 57 445	gs	NPD	75	200	1	0	0	0	0 npd	ptodts	unknown	
09/06/2016	31	10:49		v	v continuous watch	56 10 082	002 59 999	gs	nose pointing	270	150	1	0	0	0	0 nose pointing	ptodts	s	
09/06/2016	32	11:03		v	v continuous watch	56 09 842	002 59 863	gs	nps nose pointing	300	200	1	0	0	0	0 nose pointing	unknown	unknown	
27/07/2016	33	12:25		v	v continuous watch	56 09 943	002 58 743	gs/cs	adult - ID unsure	135	300	1	1	0	0	0 spyhopping/loafing, seen briefly at surface			
29/07/2016	34	09:55		v	v continuous watch	56 10 250	002 57 873	gs/cs	adult - ID unsure	270	500	1	1	0	0	0 spyhopping/loafing, seen briefly at surface then dived	ptodts	milling/stationary	
29/07/2016	35	10:00		v	v continuous watch	56 09 700	002 57 198	gs/cs	travelling slowly west on surface then dived	180	300	1	1	0	0	0 travelling	cpaos	w/ sw	
29/07/2016	36	10:04		v	v continuous watch	56 09 441	0021 56 923	gs/cs	adult - ID unsure	100	300	1	1	0	0	0 spyhopping	stationary	stationary	
29/07/2016	37	10:48		v	v continuous watch	56 09 980	003 00 501	gs (F)	adult with long roman nose	240	70	1	1	0	0	0 spyhopping, then seen rolling on surface	milling/stationary	stationary	
29/07/2016	38	10:51		v	v continuous watch	56 09 785	002 59 743	gs (F)	adult, no dorsal fin, long roman nose	180	100	1	1	0	0	0 spyhopping, then flattened	stationary	stationary	
29/07/2016	39	10:56		v	v continuous watch	56 09 110	002 58 873	hp	medium/small adult, head seen only briefly as it headed west. Black, no obvious beak. Small low triangular dorsal fin.	200	500	1	1	0	0	0 travelling, seen several times moving west	cpaos	w/sw	
29/07/2016	40	10:59		v	v continuous watch	56 08 959	002 58 7220	gs/cs	adult seen briefly before rolling and submerged	260	500	1	1	0	0	0 spyhopping	stationary	stationary	
29/07/2016	41	12:26		v	v continuous watch	56 09 280	003 02 595	gs/cs	adult - ID unsure	340	300	1	1	0	0	0 spyhoppinh, rolled and submerged	stationary	stationary	
15/08/2016	42	10:30	10:30	v	v continuous watch	56 08 402	003 01 882	gs	adult in view for 45 seconds	140	550	1	1	0	0	0 spyhopping, rolled then submerged.	stationary	stationary	
15/08/2016	43	10:55	10:55	v	v continuous watch	56 07 899	002 59 631	gs/cs	adult	25	350	1	1	0	0	0 loafing at surface, rolled and submerged.	stationary	stationary	
15/08/2016	44	10:58	10:58	v	v continuous watch	56 08 001	002 59 701	gs	adult in view for 15 seconds	100	200	1	1	0	0	0 spyhopping, then rolled & submerged	stationary	stationary	
15/08/2016	45	10:59	11:01	v	v continuous watch	56 08 438	003 00 134	hp	one larger than other, both travelling at surface. seen 5 times.	220	200	2	1	1	0	0 Travelling NE	cpaos	NE	
15/08/2016	46	11:33	11:33	v	v continuous watch	56 08 697	003 00 153	hp	very brief view as one hp broke surface to expose small dorsal fin during diversion around rig.	200	100	1	1	0	0	0 Travelling west	cpaos	W	SEEN DURING DIVERSON AROUND RIG
15/08/2016	47	12:07	12:08	v	v continuous watch	56 09 854	002 59 980	gs	bull seen several times	75	50	1	1	0	0	0 Travelling at surface. Visible for approx 1 min before fully submer	cpaos	NE	
15/08/2016	48	12:20	12:20	v	v continuous watch	56 10 238	002 59 183	gs	bull vertical at surface. Tall head profile.	190	150	1	1	0	0	0 spyhopping then rolled to submerge	stationary	stationary	
15/08/2016	49	12:22	12:22	v	v continuous watch	56 10 008	002 58 942	gs	bull vertical at surface	175	200	1	1	0	0	0 vertical at surface, swam a few metres and then submerged	stationary	SE	
30/08/2016	50	13:08	13:10	v	v continuous watch	56 07 731		gs	bull vertical in water exposing head,neck and shoulders.	220	500	1	1	0	0	0 Spyhopping	stationary	stationary	Still present in same position on final transect
30/08/2016	51	13:18	13:18	v	v spotted incidentally by	56 07 104	003 01 003	hp	brief encounter with two hp breaking surface with dorsal fins at end of transect	115	250	2	2	0	0	0 Travelling SE, breaking surface periodically before loss of sighting	cpaos	SE	
13/09/2016	52	10:00	10:01	v	v continuous watch	56 07 085	003 01 085	gs	female with head only visible out of water, lying on back	280	200	1	1	0	0	0 Loafing then submerged	stationary	stationary	
13/09/2016	53	10:21	10:23	v	v continuous watch	56 09 210	003 02 530	gs	2 GS close to boat.	240	40	2	2	0	0	0 1 spyhopping and one milling with nose out of water	milling	variable/stationary	
13/09/2016	54	11:06	11:07	v	v continuous watch	56 09 559	003 01 818	gs	Head out of water close to shore	350	350	1	1	0	0	0 Loafing in one spot surrounded by creel markers	stationary	stationary	
13/09/2016	55	11:59	12:00	v	v continuous watch	56 09 970	003 00 060	gs	Head/snout vertical above water	90	250	1	1	0	0	0 Bottling on surface	stationary	stationary	
13/09/2016	56	12:46	12:46	v	v continuous watch	56 09 747	002 57 285	gs	Female Swimming SE	290	15	1	1	0	0	0 Swimming	Towards ship	SE	
13/09/2016	57	12:50	12:50	v	v continuous watch	56 10 360	002 58 013	hp	small dorsals breaking surface	70	150	2	1	1	0	0 Travelling E, showed twice then dived deeper	cpaos	E	
10/10/2016	58	09:41	09:42	V	v continuous watch	56 07 639	003 02 825	gs	only head visible above surface	270	300	1	1	0	0	0 snout/head out of water swimming N/NE	ptodts	NNE	
21/10/2016	59	08:50	08:51	V	v continuous watch	56 09 467	002 56 943	GS		90	500	1	1	0	0	0 Travelling N with head and dorsal surface slightly out of water	ptodts	N	
21/10/2016	60	08:54	08:56	V	v continuous watch	56 09 800	002 56 600	HP	2 HP equal size, good sighting og dorsal surface	100	300	2	2	0	0	0 Showed multiple times, heading N	ptodts	N	
21/10/2016	61	10:32	10:33	V	v continuous watch	56 10 494	002 59 578	GS	Rolled/dived heading W, Reappeared heading same direction before diving again	5	50	1	1	0	0	0 Heading W and Milling in general area in high density of creels. V	cpaos	W	Female
21/10/2016	62	10:40	10:41	V	v continuous watch	56 09 944	003 00 003	GS	Stationary, lying subsurface, rolled/dived	180	420	1	1	0	0	0 Loafing around sub/semi sub surface. Rolled and dived out of sigl	stationary	stationary	
21/10/2016	63	10:49	10:51	V	v continuous watch	56 09 248	002 59 113	GS	Bottling, head/nose upright out of water	260	200	1	1	0	0	0 Bottling on surface	stationary	stationary	
21/10/2016	64	10:52	10:52	V	v continuous watch	56 08 730													

21/10/2016	65	11:05	11:07	V	v continuous watch	56 08 025	002 58 688	HP	Frequent surfacing, good view of dorsal	5	100	1	1	0	0 Porpoising', heading E, Dived longer/deeper as boat approached	cpaos	E
21/10/2016	66	11:25	11:25	V	v continuous watch	56 09 750	003 00 946	GS	Large, Dark GS	10	200	1	1	0	0 Milling around creels	milling	variable
21/10/2016	67	11:21	11:22	V	v continuous watch	56 09 322	003 02 754	GS	Milling on surface, Large, dark, long nose/muzzle	350	30	1	1	0	0 Milling around creels, heading generally S, Inquisitive in boat	towards ship/milling	S
21/10/2016	68	11:40	11:40	V	v continuous watch	56 07 906	003 02 046	GS	Large GS moving W	160	125	1	1	0	0 Swimming along surface	cpaos	W
21/10/2016	69	12:05	12:06	V	v continuous watch	56 08 111	003 03 375	CS	V. short muzzle, head only visible, dived then reappeared, small rounded head.	40	20	1	1	0	0 Bottling slightly between milling	milling	variable
10/11/2016	70	10:11	10:11	V	v continuous watch	56 07 493	003 01 486	GS	Female grey seal	60	150	1	1	0	0 Female, bottling on surface before diving	stationary	stationary
10/11/2016	71	10:48	10:48	V	v continuous watch	56 07 951	003 00 917	GS		110	275	1	1	0	0 Bottling then swam N for 5m then submerged	VARIABLE	variable
10/11/2016	72	11:49	11:50	V	v continuous watch	56 08 000	002 58 632	GS	Lighter coloured grey seal	130	65	1	1	0	0 Milling around on surface looking at boat before diving	milling	variable
24/11/2016	73	10:52	10:53	V	v continuous watch	56 09 325	002 59 325	GS		240	50	1	1	0	0 Head up	stationary	S
24/11/2016	74	13:20	13:21	V	v continuous watch	56 08 391	003 04 061	GS		10	500	1	1	0	0 Head up	stationary	
05/12/2016	75	11:23	11:23	V	v continuous watch	56 09 119	003 00 102	GS	Adult	105	25	1	1	0	0 Swimming east	Away from ship	E
05/12/2016	76	11:50	11:51	V	v continuous watch	56 08 559	002 58 392	GS	Adult	90	100	1	1	0	0 Head up, stationary	ptsisdas/stationary	
05/12/2016	77			V	v continuous watch	56 09 167	002 56 403	GS	Adult Female	0	20	1	1	0	0 Head up, stationary	Variable	S
15/12/2016	78	10:26	10:27	V	v continuous watch	56 09 735	002 57 270	GS	Adult	180	70	1	1	0	0 Loafing, foraging	Towards ship	NE
15/12/2016	79	13:14	13:15	V	v continuous watch	56 07 430	003 01 355	GS	Adult	90	50	1	1	0	0 Loafing, bottling	Towards ship	stationary
27/02/2017	80	11:35	11:36	V	v continuous watch	56 09 090	003 00 049	GS	Adult	90	50	1	1	0	0 Bottling on surface	Stationary	Stationary
27/02/2017	81	11:44	11:45	V	v continuous watch	56 09 861	002 58 707	GS	Adult	260	50	2	2	0	0 Heads up	Away from ship	SW
27/02/2017	82	13:00	13:01	V	v continuous watch	56 09 727	002 57 238	HP	Adult	10	30	1	1	0	0 Rolled twice ahead of boat	Away from ship	W

Appendix C

Offshore Ecology (Ornithology, Marine Mammals and Fish/Shellfish)

Figures

List of Figures

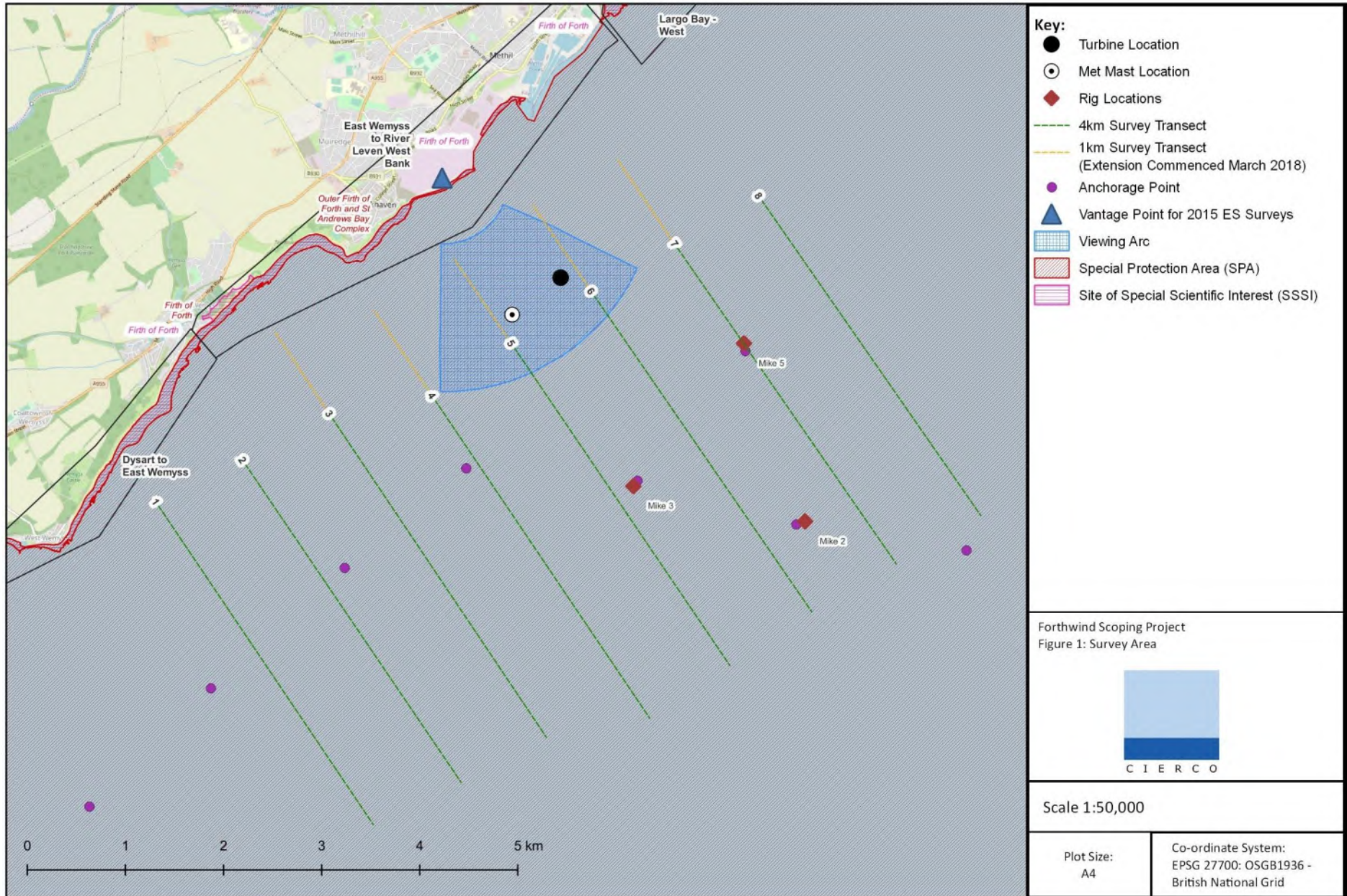
Figure 11.1 – Survey Area

Figure 11.2a – Designated Sites (Firth of Forth)

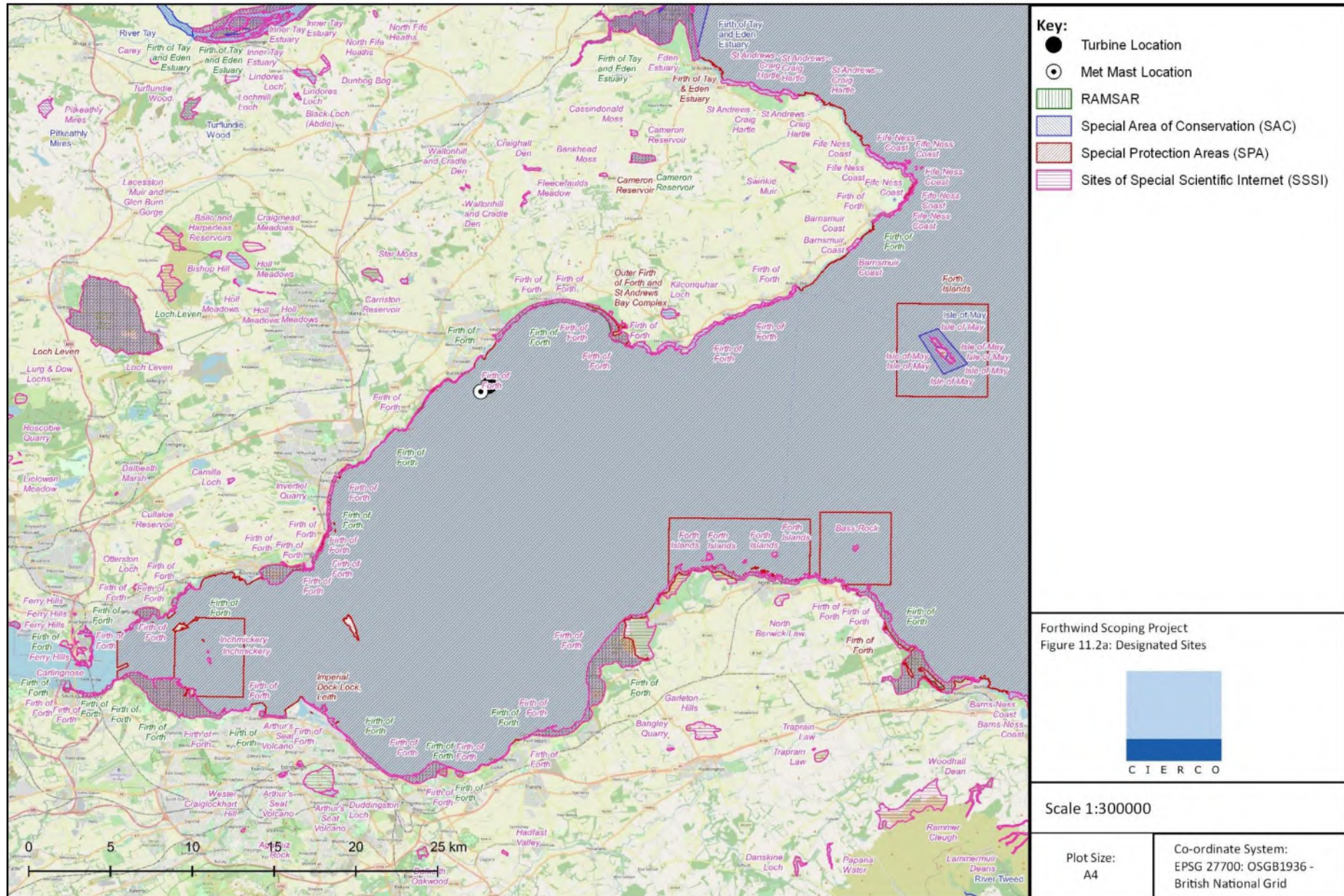
Figure 11.2b – Designated Sites (Moray Firth and North Sea)

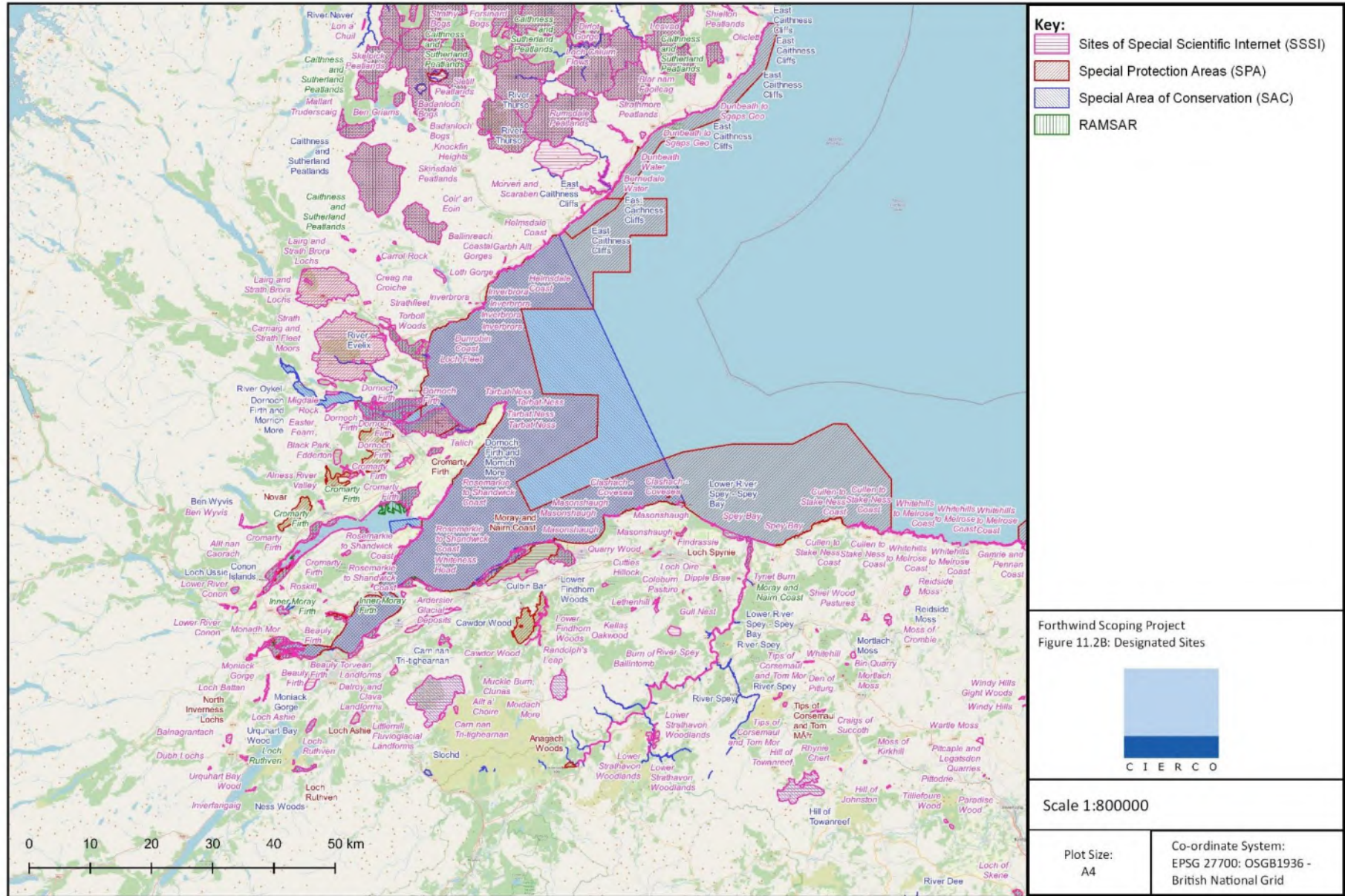
Figure 11.3 – Cumulative Sites

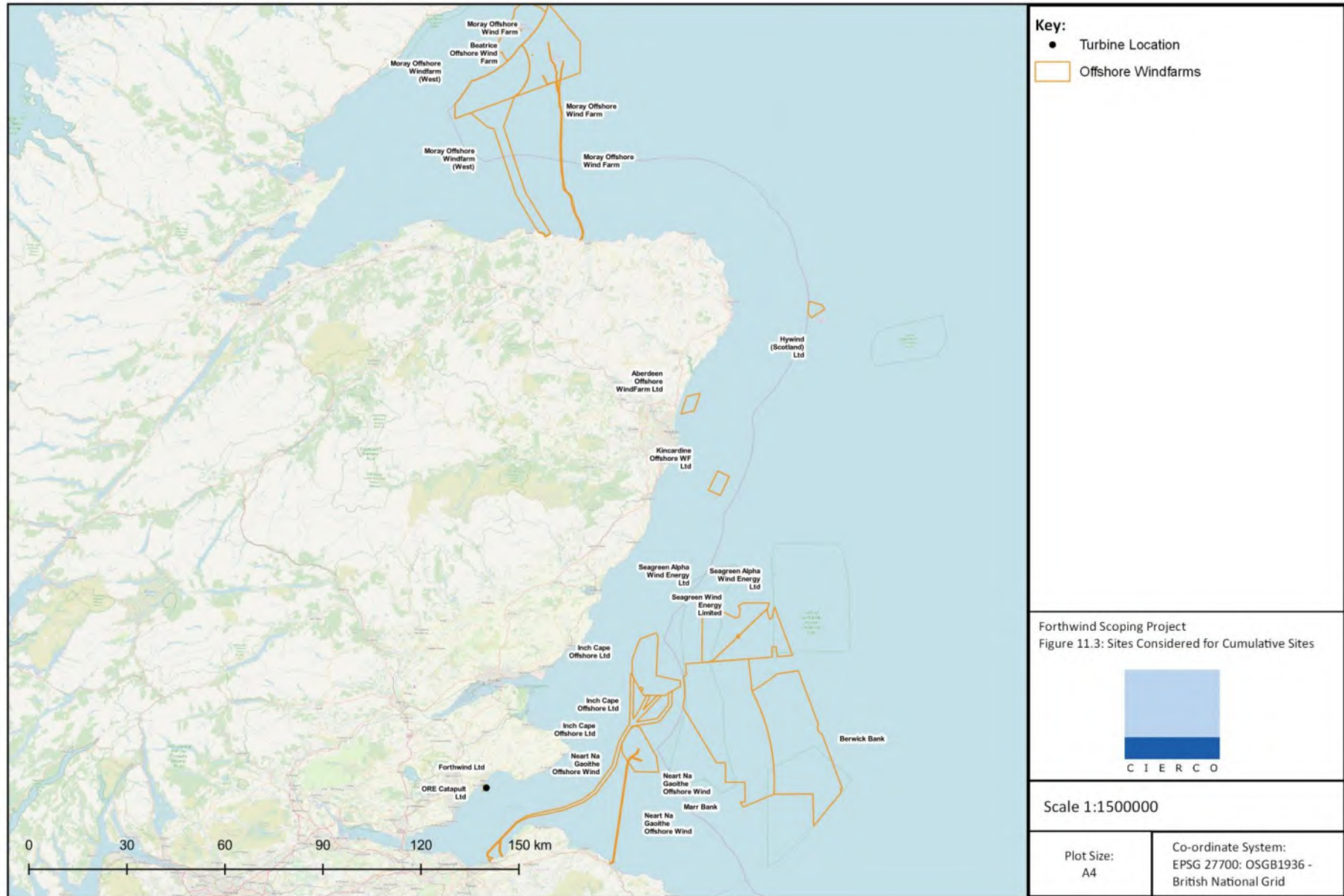
Figure 11.4 – Rig Exclusion Zones



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Key:
 ● Turbine Location
 □ Offshore Windfarms

Forthwind Scoping Project
 Figure 11.3: Sites Considered for Cumulative Sites

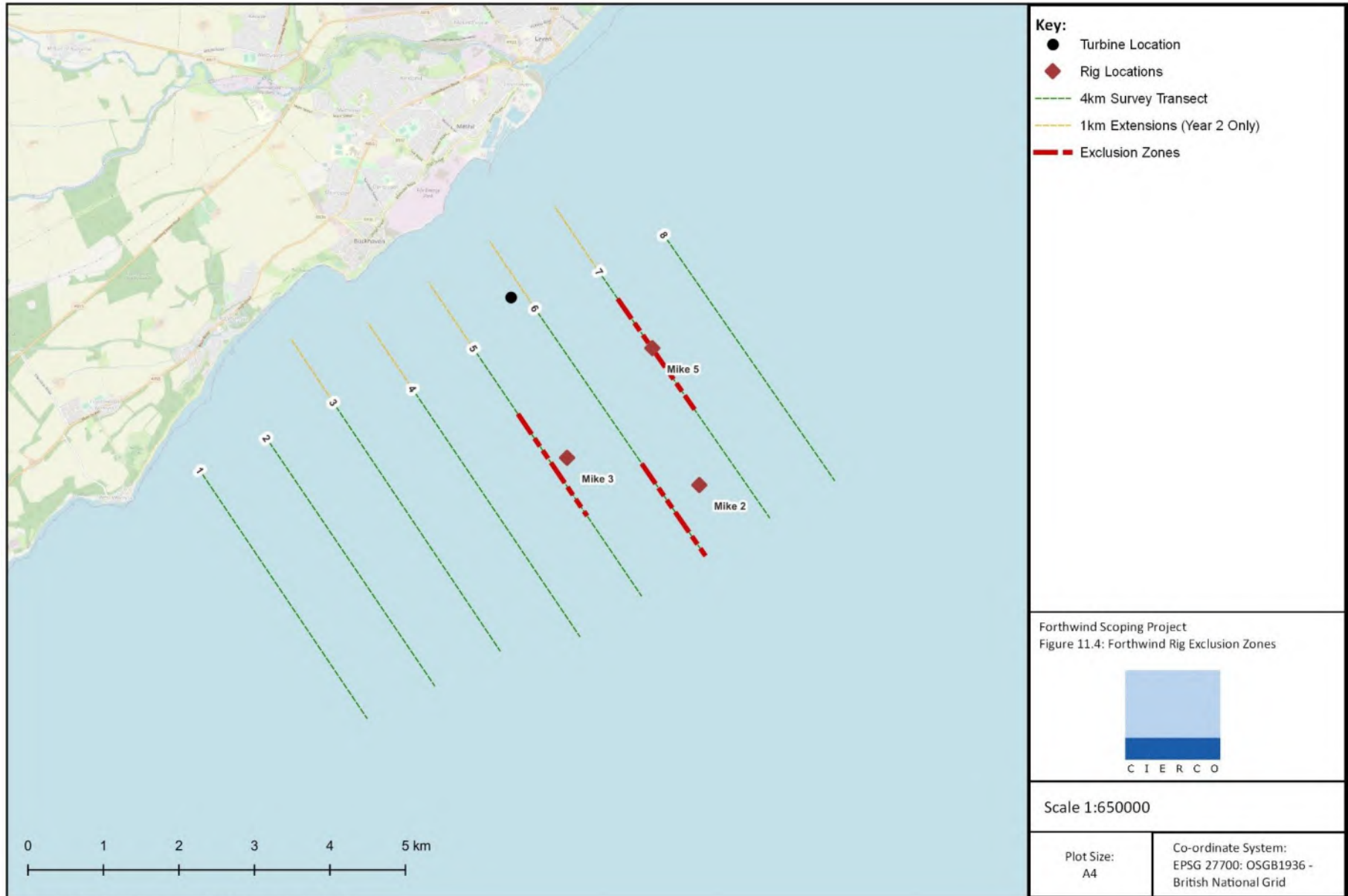


Scale 1:1500000

Plot Size:
 A4

Co-ordinate System:
 EPSG 27700: OSGB1936 -
 British National Grid

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Appendix D

How Responses / Comments in 2019 Scoping Opinion are addressed in this Scoping Report

2019 Consultee Responses	Proposed Development Response
Marine Scotland Science	
<p>ORNITHOLOGY</p> <p>It is standard practice for data collection and survey methodologies to be based on the proposed project parameters. In the current situation the data have been gathered and consideration is being given to if / how they may be applied to new proposed project. This latter approach can result in difficulties.</p>	<p>The proposed Development differs from previous design iterations by a reduction in wind turbine numbers (from two to one), and an increase in turbine height. The survey data collected historically was considered appropriate for the location of the proposed Development turbine. The survey data adequately covers the proposed Development. Where required, supplementary vantage point data can be utilised to ensure a comprehensive assessment is carried out.</p>
<p>There is very limited survey effort within the 2 km buffer of the turbine locations with two transects of approximately 6km total length. This limited effort will reduce confidence in the conclusions reached in relation to collision estimates and seabird use of the area in the immediate vicinity of the turbines.</p>	<p>The survey data is considered appropriate and provides adequate data for the ornithological assessment. Where doubts in confidence regarding survey data occur, vantage point data can be used to supplement the data.</p>
<p>The size of the proposed wind turbines is considerably greater than those considered previously, and the anticipated displacement effect footprint may be expected to be greater than the 2km assumed. As highlighted in correspondence in relation to a previous iteration of the project, for some of the species present in the area (divers and scoter) displacement effects may be anticipated at considerably greater distances than 2km. There are therefore questions over the appropriateness of the 2km buffer.</p>	<p>The proposed Development differs from previous design iterations by a reduction in wind turbine numbers (from two to one), reducing the overall footprint of the Development. Displacement effects are anticipated to be less than that of the consented development comprising of two turbines.</p>
<p>Similarly, survey transect spacing of 1 km may not be sufficient to prevent evasive movement of sensitive species either along the transect being surveyed or adjacent surveys. There are therefore questions over the representativeness of the density and distribution estimates produced.</p>	<p>The survey data is representative of the density and distribution estimates. The issue of flushing during the boat surveys has been raised and adequately addressed on previous occasions. As explained, the qualified and experienced observer consultants contracted to undertake the boat surveys categorically state that they were confident that divers, and other species were not being missed. In addition, they observed that when flushing and evasive action was undertaken by divers during the survey, it had not resulted in</p>

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	significant movement outside of 200 m (in fact circa 70% of flushed birds staying within 200m). It is further supplemented by the surveyors' observations that other species were more tolerant to disturbance than red-throated divers.
Clarification should be provided on whether the flight height data gathered during the boat based surveys are in a format that allows them to be used in collision risk modelling for the revised turbine specifications, which will have different rotor swept height minima and maxima.	<p>The flight height data gathered during the boat-based surveys are in a format that allows them to be used in the collision risk modelling for the proposed Development.</p> <p>A description of the approach to collision risk assessment is included within this Scoping Request.</p>
MSS agree with SNH that the Isle of May SAC (grey seals), Moray Firth SAC (bottlenose dolphins) and the Firth of Tay and Eden Estuary SAC (harbour seal), should be considered in the HRA.	The Isle of May SAC, Moray Firth SAC and the Firth of Tay and Eden Estuary SAC will be considered within the HRA.
MSS agree with SNH that bottlenose dolphin, harbour porpoise, harbour seal and grey seal should be scoped in to the assessment. MSS acknowledge that other cetacean specials may occasionally occur within the Firth of Forth, but as noted by SNH, any mitigation measures put in place for bottlenose dolphin and harbour porpoise will be effective in reducing potential impacts on other cetacean species.	No further comments.
MSS note that boat based surveys in Beaufort seas states higher than two will under-represent the occurrence of harbour porpoises. To provide a more informative interpretation of the sightings data, MSS recommend that these data are considered alongside environmental data known to influence detectability (e.g., sea states). MSS recommend that the seal usage maps (https://marine.gov.scot/information/seal-usage-maps) are used in the assessment, as line transects are not effective for estimating seal occurrence. MSS are aware that sightings of bottlenose dolphins in the Firth of Forth have been increasing over	The additional sources of information provided by MSS will be taken into consideration during the relevant assessments.

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recent years. Consequently, MSS would recommend that the applicant update their information, which may require using other relevant data sources.	
MSS agree that, given the scale of the development, increased vessel movements and EMF from the export cable can be scoped out of the marine mammal assessment.	No further comments.
Section 11.13 outlines the projects that should be scoped into the cumulative assessment of effects; MSS recommend that the Aberdeen harbour expansion project at Nigg bay is included in this assessment. Other developments may also need to be included; MSS recommend that this is agreed in consultation with the Scottish Ministers.	Construction of the Aberdeen harbour expansion project at Nigg Bay is expected to be completed soon (approximately 2022) and is no longer considered required to be included within the cumulative assessment.
Table 25 in Section 11.14, for increased underwater noise, there should also be a tick in the decommissioning box for marine mammals, as per the information provided in the rationale box.	The effects of underwater noise during the construction and decommissioning phase of the project have been scoped in.
Appendix C of Section 11, there are no marine mammal (or fish/ shellfish) datasheets; there are only data pertinent to birds.	The Marine mammal dataset have been included as an excel spreadsheet to accompany this Scoping Report. Consultation with the relevant stakeholders will be undertaken including a review of the data gathered during the survey.
<p>Commercial fisheries</p> <p>Marine Scotland is broadly content with the content of the Scoping Report with regards commercial fisheries. Previous advice on this interest found that given the small scale, the location and the work involved, MSS considers that the development is unlikely to have significant unmitigated effects on commercial fisheries and this remains the case with the inclusion of turbine 2(b).</p>	No further comments.

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<p>Section 7.4 proposes that local fishing organisations are engaged to establish the extent and nature of fishing activity within the location. This is key to understanding potential local level effects and is welcomed, as is the appointment of a fisheries liaison officer should consent be granted. It would be useful for the stakeholder section outlined in 17.5 to include any potential concerns of the fishing community raised during pre-application consultation and how these have been addressed.</p>	<p>Consultation with the local fishing organisations will be carried out. Any potential concerns of the fishing community raised during this consultation will be addressed within the ES.</p>
<p>Marine Fish</p> <p>MSS is broadly content with the information provided and is in agreement that marine fish/ shellfish species can be scoped out on the basis of the outcomes of the 2015 ES, provided any mitigation in the current consent is carried forward.</p>	<p>No further comments.</p>
<p>Diadromous fish</p> <p>The Firth of Forth, which is the estuary of the River Forth, is important for several diadromous fish species which migrate through the firth or feed in it. The main rivers these are associated with are the River Forth and its tributary, the River Teith at the head of the firth. MSS is content with what the Scoping Report advises in relation to diadromous fish provided that the application is only for two turbines which would be in place of two previously consented turbines which have not been installed, that the larger development which at one time was being proposed is no longer under consideration, that no impact piling will be undertaken, and that as far as possible cables will be buried.</p>	<p>Forthwind confirm that the turbine will be located in the one of the two locations previously consented, impact piling will not be undertaken, and that as far as possible the cables will be buried.</p> <p>No further comments.</p>
<p>Other main comments</p> <p>To date there has been no survey work within the firth targeted at diadromous fish, so there is no information on migration routes within the firth and very limited information on the spatial distribution. In view of the small scale of the proposed Development and the good mitigation arrangements proposed, MSS is not challenging the statement that “Given the reduced size of the site, this is no longer</p>	<p>Forthwind are content to engage with the ScotMER, where appropriate, in future monitoring work. As MSS agrees due to the size and scale of the proposed Development it is no longer considered proportionate to include this aspect in the application.</p>

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<p>considered proportionate, given the reduced footprint / reduced effort on diadromous fish.” Where the “this” is the need to participate in the monitoring requirements laid down in what was the National Research and Monitoring Strategy for Diadromous Fish (NRMSD), which involves carrying out or commissioning projects to address knowledge gaps.</p>	
<p>Nonetheless, the site may provide opportunities for useful studies to be carried out and MSS would point the developer to the Diadromous Fish evidence map https://www2.gov.scot/Topics/marineenergy/mre/research/maps produced under ScotMER, which has now replaced NRMSD, for up to date information on knowledge gaps.</p>	<p>Forthwind are content to engage with the ScotMER, where appropriate, in future monitoring work. As MSS agrees due to the size and scale of the proposed Development it is no longer considered proportionate to include this aspect in the application.</p>
<p>Other comments</p> <p>Chapter 8 Commercial Fisheries</p> <p>8.2 indicates that information will be gathered from the salmon and sea trout catch statistics published by Marine Scotland in 2012 which are for 2011. MSS would note that data for up to 2018 are now online https://www2.gov.scot/Topics/marine/Publications/stats/salmonSeaTroutCatches along with, in the case of salmon, the latest assessments of the state of the salmon populations in each river, which determine whether any salmon can be retained by anglers.</p>	<p>The original fisheries assessment will be included with updated information.</p>
<p>8.2 also indicates that the Association of Salmon Fishery Boards will be contacted. This body no longer exists. There is now Fisheries Management Scotland (FMS) which represents many Salmon Fishery Boards and Fisheries Trusts. The local bodies are the Forth District Salmon Fishery Board and the Forth Rivers Trust.</p>	<p>The Fisheries Management Scotland (FMS), the Salmon Fishery Boards and the Fisheries Trusts will be contacted for stakeholder engagement.</p>
<p>Chapter 11 Offshore Ecology</p>	<p>The populations of sea trout and spurling (smelt) will be considered within the fish and shellfish chapter of the EIAR.</p>

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<p>11.12.1 correctly lists migratory fish species, such as Atlantic salmon, sea lamprey, river lamprey and the European eel as present in the firth. MSS would note that sea trout and sparring (smelt) are also present and there may also be a population of shad (allis shad) associated with the River Forth.</p>	
<p>This section notes that impact piling will not be undertaken and that bases will either be drilled pin piles, or suction bucket. However, this section also states that “Mitigation will include a ‘Soft Start’ to allow diadromous fish to disperse away from a works area.” With no impact piling, this may no longer be relevant, and, in any case, it now appears likely from the work of Harding et al (2016) that soft starts will not be effective in displacing diadromous fish away from impact piling.</p>	<p>Soft start mitigation is no longer being considered as mitigation.</p>
<p>This section also advises that the material to assist in the HRA of the salmon, river lamprey and sea lamprey interests of the River Teith SAC will be included in the marine mammal assessment. If so, the title of this assessment should make clear that it includes assessment material for other than marine mammals.</p>	<p>No further comments.</p>
<p>Benthic Ecology</p> <p>MSS welcomes the opportunity to comment on this scoping request and is in agreement that benthic ecology should be scoped into the new ES according to the following recommendations.</p>	<p>The revised proposed development has a reduced footprint and impact to the 2019 scoping report and the original application already considered and assessed in the 2015 Environment Statement, which concluded that no specific mitigation measures were needed for construction or operational effects as all effects and cumulative effects assessed were considered to be of negligible or minor significance. Forthwind request that Benthic Ecology has already been sufficiently assessed and should be scoped out.</p>
<p>Section 12.4 worst case scenarios: from a benthic perspective, MSS has a preference for avoidance of gravity bases due to the greater loss of habitat and sediment resuspension than other methods.</p>	<p>Following a review of the design, the proposed turbine will not use a gravity base as a foundation. The temporary met mast may require a gravity base (with a diameter of 8m) – this will be decided before the application is submitted. Considering the small scale of the gravity base considered (compared to that considered in the 2015</p>

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	<p>Environment Statement) and relative low value of the habitat it is proposed that any further consideration of benthic impact is scoped out.</p>
<p>Section 12.4.3.1 Loss of original habitat: MSS would recommend all priority marine features and habitats listed under OSPAR to be scoped into the assessment. Therefore, seapens and burrowing megafauna should be scoped in. If the worst case scenario is realised it will result in considerable habitat loss. The significance of this from a population perspective should be discussed in the ES.</p>	<p>The priority marine features have already been assessed within the 2015 Forthwind environment Statement. The identified biotope SS.SMu.CFiMu.SpnMeg (that confirmed the presence of the PMF habitat ‘burrowed mud’ and the OSPAR habitat ‘seapens and burrowing megafauna communities’) is located over 2km from the turbine. The Environment statement considered the potential effects for construction, operational and decommissioning phases. These included: habitat disturbance, increased suspended sediment, sediment deposition and smothering, underwater noise and vibration, release of environmentally harmful substances, introduction of new habitats, EMF and heat effects and a change to the local hydrodynamic regime. Each of these effects was assessed in terms of their likely effects on benthic ecological receptors. As a result, a significance level was produced to easily compare the results against a known scale. No specific mitigation measures were suggested for construction or operational effects as all effects and cumulative effects assessed are considered to be of negligible or minor significance.</p> <p>As the revised development proposal is of smaller scale and of a lesser seabed special scale than that originally consented there is no reason to conclude that the outcome would be any different to that already assessed. Therefore, Forthwind propose that Benthic Impact should be scoped out.</p>

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MSS also notes the finding of a stony reef, although it is described as being of low reefiness. MS recommends considering the position of this reef in relation to the new infrastructure and attempting to microsite away from the reef.	The position of the stony reef will be taken into consideration with regards to the location of the proposed Development and its cable. Micrositing away from the reef will be carried out if possible.
Section 12.4.3.2 Introduction of new hard substrate for colonisation by non-native species: MSS is in agreement that this issue has already been considered in the July 2015 ES (10.7.3.2) and that it can be scoped out of the new ES	No further comment.
Section 12.4.3.4 EMF and heat effects: MSS agrees that EMF and heat effects have already been considered and would not be any different in the case of the revised turbine proposal. These issues can therefore be scoped out of the new ES.	No further comment.
Section 12.4.4. Decommissioning: Having reviewed the 2015 ES (10.7.3.2) MSS is content that decommissioning has been adequately covered and can be scoped out of the assessment.	No further comment.
Section 12.4.5. Potential cumulative effects: MSS recommends that cumulative effects are scoped into the new ES. Plans for the other windfarms mentioned in this section have also changed and these changes should be factored into the assessment.	As discussed in the above and within the scoping document, due to revised development proposal is of smaller scale and of a lesser seabed special scale than that originally consented there is no reason to conclude that the outcome would be any different to that already assessed. In addition to the small scale of Forthwind, as the nearest development, NNG is nearing completion and is over 45km away, it is very unlikely that Forthwind could provide any contribution to any cumulative benthic effect.
<p>Aquaculture</p> <p>There are currently no aquaculture sites registered with Marine Scotland Science located in the immediate vicinity of the Forthwind Offshore Wind Demonstration Project proposed by Forthwind Ltd.</p>	No further comment.

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<p>The nearest aquaculture site is situated approximately 20km southeast of wind turbine 2b. It is marine land based tank site which uses pumped seawater and produces and holds European lobsters. It is currently active and operated by The Firth of Forth Lobster Hatchery.</p>	<p>No further comment.</p>
<p>There is also a marine land based tank site which uses pumped seawater situated at Dalgety Bay approximately 24km southeast of the nearest wind turbine in the development, 2b. This site is authorised to hold a variety of marine fish and shellfish species. Is it currently active and operated by Todd Fish Technology.</p>	<p>No further comment.</p>
<p>Marine Analytical Unit</p>	
<p>The socioeconomic chapter scopes in a set of potential effects for further assessment including (a) direct job opportunities; (b) supply chain opportunities; (c) local infrastructure improvements and (d) cost reduction in the offshore wind industry. It is not clear however how these have been identified/prioritised from a wide range of socioeconomic impacts that may arise from marine development. For example, marine developments through employment impacts may affect the demography of local communities, with potential impacts on demand for public services (health, education, etc), incomes, poverty, etc. If these other wider socioeconomic impacts are being scoped out, scoping Report must set out clearly the reasons for doing so. For instance, is it because of the scale of the project that these wider socioeconomic impacts are scoped out? I would recommend that scoping for socioeconomic effects consider a wider range of impacts and provides much clearer rationale for why some potential impacts are scoped in and others scoped out.</p>	<p>Consultation with the relevant stakeholders will be undertaken prior to the submission of the application. A detailed description of the range of potential effects to be assessed will be included in the EIAR. The scale and nature of the proposed development (1 turbine), means it has negligible ability to affect the demographics of the local community nor potentially have an impact on demand for local public services. It is considered disproportionate to the proposal to include these elements within the scope of the assessment.</p>

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<p>As an initial comment, I note that in your consultation you have referenced the Electricity Works (Environmental Impact Assessment (Scotland) Regulations 2000 (As Amended) and question why not the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA 2017), which I would have thought apply. These are the regulations referred to in the Scoping Report.</p>	<p>The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA 2017) has been referenced within the Scoping Report.</p>
<p>The application seeks consent for a revised proposal for two wind turbines in the Firth of Forth off Methil. The proposal is in a similar position to an already consented proposal. The main differences between the proposals are set out in a table in the Scoping Report.</p>	<p>This comment is no longer relevant to the current application. The current application seeks consent for a revised proposal for one wind turbine in the Firth of Forth offshore Methil. The proposed turbine is located in the same location as the already consented proposal.</p>
<p>It seems clear that the intention is to build either the consented or revised scheme, but not both. One of the turbines is physically in the same position, so it would not be possible to build both, however the other isn't. The Environmental Statement should make it clear that only one scheme will be built.</p>	<p>This comment is no longer relevant to the current application. The current application seeks consent for a revised proposal for one wind turbine, larger than the two already consented.</p>
<p>Description of the Project: Decommissioning is considered in the Scoping Report, and the Council supports a description of the process being included in the Environmental Statement. Although this should follow best practice at the time, impacts of this should be examined prior to consent. If there are any consequential alterations to the national grid network required as a result of the proposal (the Scoping Report says not) then this should be included also.</p>	<p>The potential impacts of the offshore decommissioning phase of the proposed Development will be considered in the ES.</p> <p>The project has already secured grid capacity to the national grid, with the necessary upgrades to the local substation already undertaken (internal works rather than external). The onshore grid connection will be a private buried service grid connection to the Leven substation as per the original consent application, which will be subject to the local Fife Council planning requirements.</p>
<p>Noise: Maintenance of the project is proposed to be by boat not air, therefore the Council</p>	

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has no comment on the noise assessment as this is not expected to affect interests in East Lothian.	No further comment.
<p>Commercial fisheries:</p> <p>Commercial fisheries are proposed to be scoped out if the same locations are used for the turbines, based on the information in the Environment Report. As mitigation for fisheries is part of the proposal, for transparency it is my view that it would be preferable if the impacts as shown in the original Environmental Statement are included or referred to, to allow members of the public to take a view on the effectiveness of mitigation. The Scoping Report notes that the increased piling will not have an effect due to the low presence of relevant species in the area. If there are no other different effects from turbine alterations (e.g., different vibration) the Council is content that no further studies be done if the turbines are located in the same position as the consented proposal.</p>	<p>The current application seeks consent for one wind turbine of a revised design on the site of one of the two previously consented turbine locations. For transparency, the original commercial fisheries assessment will be included with updated information.</p>
<p>Landscape</p> <p>The Council supports the undertaking of a Seascape, Landscape and Visual Assessment. Use of a 45 km study area is supported. It is agreed that significant effects are mostly likely to be found within 25 km. The Council has recently undertaken a Landscape Review, which has revised the Landscape Character Areas of the area. This has led to the production of Supplementary Planning Guidance on Special Landscape Areas. These have not been designated through the East Lothian Local Development Plan 2018 and are no longer 'proposed' as noted in the Scoping Report. East Lothian Landscape Character in Figure 9.2b refers to the Landscape Character Areas defined in the Landscape Capacity for Wind Turbine Development in East Lothian, which is now around 15 years old. It would be preferable to refer to the Landscape Character Areas as set out in the Supplementary Planning Guidance on Special Landscape Areas. Information on our Special Landscape Areas is also available in that document.</p>	<p>Within the Landscape review the Landscape Character Areas set out in the Supplementary Planning Guidance on Special Landscape Areas have been considered within the assessment.</p>

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<p>Paragraph 9.2 states that the worst case for SLVIA is turbine locations 1 and 2(b). It is not clear that this is the case, and the Scoping Report does not appear to give a reason for that. One of the main landscape impacts is likely to be that the turbine breaks the skyline from important viewpoints or is seen in relation to other landmarks such as the Lomond Hills. It is not clear which of the locations for the second turbine would have more potential to do this (and it may vary depending on the viewpoint). It is therefore our preference that both locations for the second turbine are included in visual assessment.</p>	<p>This comment is no longer relevant for the proposed Development as there will only be one turbine to consider within the assessment: Turbine 2(a) from the original consent. This turbine will be considered within the visual assessment.</p>
<p>For Special Landscape Areas within East Lothian, in addition to those mentioned in the Report there could also be effects on the Fisherrow Sands SLA and Prestonpans Coast SLA. These are populated areas, and views of the proposal from there may therefore be more frequent. Newhailes house GDL has views across the Forth, and although the effect is not likely to be significant this should be considered.</p>	<p>Fisherrow Sands SLA, Prestonpans Coast SLA and Newhailes House GDL will be considered in the SLVIA (Figure 9.3)..</p>
<p>On the Significance matrix (Table 13) it seems possible that a low magnitude of change could potentially have a significant impact on a high sensitivity receptor on the basis that some receptors are sensitive to any change.</p>	<p>No further comment.</p>
<p>The Scoping Report states that local level coastal characterisation for the East Lothian coastline will not be undertaken as it is very unlikely that effects on coastal character will occur here, and only visual/perceptual effects will occur from here. From areas where the turbines are only seen in the open sea, this is agreed. However, from the North Berwick area the turbines may be perceived as smaller, closer turbines if they are seen over the skyline above the land or behind the islands rather than as elements of the view in the sea, as they would from more open views. This could have the potential to affect coastal character here. East Lothian Council would welcome further discussion on this; it may be that this can be scoped out.</p>	<p>The SVLIA will carry out a local level coastal character assessment. Further discussion with ELC will be undertaken with regard to potential effects on the coastal character of North Berwick</p>
<p>For roads, the overall visual assessment could consider the A6137 which is an elevated route with some views towards the area, and the A198/B1348 coastal</p>	<p>The SLVIA will consider the A6137 and the A198/B1348 coastal route.</p>

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<p>tourist route in East Lothian. Golf courses, including Muirfield and the Renaissance course at Archerfield, may also have visibility and should be considered. Viewpoints are identified in the Scoping Report as:</p> <ul style="list-style-type: none"> • 17 Gullane, Marine Terrace • 18 A198 Aberlady Bay • 19 North Berwick 	<p>The effect on views from Muirfield and Renaissance golf courses will be considered within the SLVIA.</p>
<p>For 17 - Gullane, although this viewpoint is panoramic, it may not represent the worst case scenario, which would probably be from Gullane Beach, where the proposal is more likely to be seen above the skyline. There are benches with views across the bay both to the north (to the west of the car park) and the east. The benches by the car park are probably better used than the suggested viewpoint.</p>	<p>A viewpoint near the benches with views across the bay at Gullane Beach will be included within the SLVIA as shown in Table 14 and Figure 9.1.</p>
<p>At 18 - Aberlady, although the viewpoint chosen is within the settlement, it would be worth considering a point on the footbridge into Aberlady Local Nature Reserve at Luffness, if there is visibility from there. The view north from here is a peaceful scene appreciated for its natural qualities. Another potentially significant view is from the A6137 at West Garleton where there is a panoramic view over Aberlady Bay with the Methil turbine directly in the line of sight.</p>	<p>A viewpoint at Luffness footbridge into Aberlady Local Nature Reserve will be included within the SLVIA as shown in Table 14 and Figure 9.1. The SLVIA will consider the A6137.</p>
<p>At 19 – North Berwick, the viewpoint is on the John Muir Way, and near a popular beach, as well as the settlement of North Berwick. It is important to select a view that shows how the turbines will sit with coastal foreground and the islands of the Forth. Other spots that could be considered for this are the slipway at Victoria Road, North Berwick, or to the north of North Berwick Harbour. These may give a more open view towards the proposal. Yellowcraig Beach is another well visited area with good views – a view from Longskelly point, the Yellow Craig itself, or the beach, which would have Fidra island in the foreground, could also be considered. Views of the turbines from this section of coast interact with views of the islands in the Forth, and these views are important.</p>	<p>A viewpoint to the north of North Berwick Harbour will be included within the SLVIA as shown in Table 14 and Figure 9.1.</p>

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A viewpoint from North Berwick Law could also be considered, which also has cultural heritage value.	A viewpoint at North Berwick Law will be included within the SLVIA as shown in Table 14 and Figure 9.1.
East Lothian Council would appreciate the opportunity to further discuss the choice of viewpoints from East Lothian.	East Lothian Council will be consulted on prior to submission of the application.
On cumulative assessment, the Council disagrees with scoping out Inchcape Offshore windfarm. This windfarm is expected to be clearly visible from East Lothian from many of the locations where the proposal is also visible. Although it will often be seen looking in a different direction (as will Neart Na Gaoithe), it will be visible from the same point. At night, both the proposal and Inchcape will (under current rules) need to have aviation lighting. This means that as it darkens, other elements in the view will recede, while the lit elements become more prominent. Seagreen is a bit further again and will be visible on fewer days of the year. It is very unlikely to have a different cumulative impact that Inchcape and Neart Na Gaoithe and on the basis that assessment of Inchcape and Neart Na Gaoithe represent the 'worst case' the Council agrees that Seagreen does not require to be assessed, although its existence should be noted.	The SLVIA cumulative effects of Inch Cape and, Neart Na Gaoithe and Seagreen will be considered within the SLVIA. The cumulative effects of the proposed development with Seagreen are scoped out of the SLVIA.
The Council also considers that the temporary oil rig berths in the Firth of Forth should be included in the cumulative SLVIA assessment as they have similarities in that they are lit, tall, and located nearby. In Table 15, the Council broadly agrees with the Scoping in and out however considers there could be significant impacts on the seascape character of parts of East Lothian, in particular through impacts on from the North Berwick area as noted above.	The temporary oil rig berths in the Firth of Forth will be considered as part of the baseline within the SLVIA.
The Council considers that night-time views should be included as part of the SLVIA, and mitigation explored, such as reducing the angle of beam of the lighting. The Council would also request that it is consulted along with SNH and Fife Council on the methodology for the SLVIA.	Night time views will be assessed with the SLVIA, as identified in Table 14 and mitigation explored

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<p>Heritage The methodology proposed for the assessment of the indirect impacts upon the Historic Environment is inadequate to assess any potential impacts upon Historic assets in East Lothian.</p>	<p>Consultation with East Lothian Council, Historic Scotland and other relevant stakeholders will be undertaken prior to the submission of the application. The assessment of heritage assets will be in accordance with the responses received from stakeholders.</p>
<p>The 15km boundary will not reflect the limit of the potential indirect impacts with key receptors such as North Berwick Law which falls outside this. One of the key considerations (following the Managing Change: Setting guidelines) when looking at identifying indirect impacts is whether the receptor has a function (either in the past or now) of looking out over the proposed development. Due to the height of the proposals this will mean that a number of receptors, that have this function of looking out over the Forth, will be out with the 15km and will likely be impacted upon. The proposed assessment methodology will not assess the level of this impact on any receptors in East Lothian. Our normal recommended level of assessment is for a 35km radius and key receptors to be included in the initial assessment.</p>	<p>The Study Area for the cultural heritage receptors has been increased to 35 km for the EIA.</p>
<p>Additionally, the assessment should also consider the assets recorded on the respective council Historic Environment Record rather than just those recommended by Historic Environment Scotland. Simply including an asset in the SLVIA is not a substitute for undertaking a heritage assessment.</p>	<p>A cultural heritage assessment will be undertaken and included within the EIAR.</p>
<p>It is difficult at this stage to identify what receptors should be taken forward into more detailed assessment as the baseline for making those decisions will be incomplete by following the methodology proposed in the scoping Report.</p>	<p>Heritage assets will be identified and assessed within the EIAR where necessary. Consultation with the relevant stakeholders will be undertaken prior to the submission of the application to confirm the correct approach to the methodology.</p>
<p>Biodiversity The Council values its birdlife, including that of the Firth of Forth SPA, the Forth Islands SPA and offshore, and Outer Firth of Forth and St Andrews Bay Complex</p>	<p>The designated sites noted within this consultee response are scoped into the EIA.</p>

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<p>proposed marine SPA. It also values the marine mammals which are visitors to the East Lothian coast, including those from the nearby Isle of May SAC and further afield Moray Firth SAC. There is legislative provision for the protection of such sites and some such species. The Council does not have expertise as to whether the proposal would have a significant effect on these interests but would support the views of SNH on this matter.</p>	<p>No further comment.</p>
<p>The contribution of the proposal to the climate and carbon balance is in a global sense tiny, however it would be helpful to Report this. Although the impact is low, the sensitivity of the receptor (the global climate) is high. Also, the reduction of greenhouse gas emissions consequent on production of renewable energy is an important factor in the potential to accept significant impacts the proposal may have on other receptors, which might otherwise be unacceptable.</p>	<p>As the proposed Development is a prototype, aspects of the project i.e., materials, methodologies to be employed, are still to be developed from a mass production perspective. This initial prototype will feed into future assessments but at this stage it is still too early in the process to undertake this assessment.</p>
<p>Fife Council</p>	
<p>I refer to your consultation dated 17th May 2019 regarding the above, and your request for Fife Council to provide a scoping opinion on the proposal. Fife Council has not provided a formal opinion on the basis that we consider that it is likely only to be matters of visual impact which have the potential to have the highest significance, and, in this respect, our only specific comment is that one of the viewpoints should be the public car park off Pettycur Road in Kinghorn, general grid ref. 326960 686657. This is a well-used public viewpoint and used by many people to access the beach, Fife Coastal Path, for whale/dolphin watching, views out of the estuary etc.</p>	<p>The viewpoint at the public car park off Pettycur Road in Kinghorn (grid ref. 326960 686657) will be included in the SLVIA as shown in Table 14 and Figure 9.1.</p>

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Scottish Nature Heritage	
<p>Habitats Regulations Appraisal</p> <p>We strongly advise that HRA scoping should be undertaken for this new application. This Report should be submitted for comment at the earliest opportunity in advance of the application and EIAR in order to fully inform our HRA advice for this project.</p>	<p>A HRA will be undertaken and the findings of which will be included within the EIA.</p>
<p>Cumulative and in-combination effects</p> <p>We advise those other projects and plans to be considered in the cumulative and in-combination assessment should be agreed in consultation with Marine Scotland and other Regulators.</p>	<p>The cumulative and in-combination impacts of the proposed Development have been scoped into the EIA. Consultation with Marine Scotland and the other Regulators will be undertaken prior to the application submission.</p>
<p>Mitigation and monitoring</p> <p>The EIAR should contain a schedule of commitments detailing all proposed mitigation as well as a draft Project Environmental Monitoring Plan (PEMP). The proposed PEMP should provide details on mitigation measures and any monitoring studies to be undertaken and at which stage of the development, if consented, including pre-construction, construction, operation / maintenance and decommissioning.</p>	<p>A draft PEMP will be included within the schedule of commitments within the EIAR.</p>
<p>Seascape, landscape and visual interests are addressed in chapter 9 of the scoping Report. With the change in design, we wish to highlight the following:</p> <ul style="list-style-type: none"> • The proposed turbine design change has merit in reducing the issue around complexity of design particularly in terms for the cumulative impact assessment. • We welcome the intention to consider the worst case scenario, which is option 2, i.e. The change in location with the second turbine (2b) located 	<p>Although this consultation response refers to the previous design iteration of the Forthwind Project, the current application no longer considers a second turbine or change of turbine location. The proposal is restricted to one turbine and a temporary met mast.</p>

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<p>further out into the Firth. We consider the setting of the Firth of Forth to be sensitive. The Firths and estuaries around Scotland are important for their scenic qualities.</p>	
<p>Study Area</p> <p>SNH recommends the use of a 50km study area, rather than a 45km study area as identified in the scoping Report. We also advise that the local authorities may identify whether there are any sensitive visual receptors located on the border or just beyond of this 50km study area, requiring consideration.</p>	<p>The new application will be supported by a Seascape and Landscape Visual Impact Assessment (SLVIA). A 50 km Study Area will be utilised during the SLVIA.</p>
<p>Coastal character – baseline information</p> <p>We note that Forthwind intend to utilise and update the existing baseline coastal character assessment previously undertaken by the Forth & Tay offshore wind developer’s group (FTOWDG) as well as that undertaken for their original application. We would be happy to advise further if this would be helpful on methods and extent of this study area, particularly as we note the statement regarding distance to the southern shores of the Forth. We recommend the views of all consultees are taken into account to determine the extent of local character assessment including the Zone of Theoretical Visibility (ZTV).</p>	<p>The Forth & Tay Offshore wind developer’s group existing baseline coastal character assessment will inform the SLVIA - see Figure 9.2.</p> <p>The extent of the Study Area and local character assessment takes account of consultee comments.</p>
<p>Visibility and zones of theoretical visibility</p> <p>We consider it would be helpful to explore the changes in visibility from use of larger turbines. In this regard, we suggest that the increase in turbine size could be modelled in appropriate increments (determined by the design process) with the outputs presented on a composite ZTV, or perhaps as individual ZTVs. These could then be compared against the ZTV for the consented scheme which may help us understand if there is any ‘step change’ to the amount or range of visibility.</p>	<p>Visibility of the proposed single larger turbine will be presented as an individual ZTV and is modelled in Figure 9.1 of this Scoping Report.</p>

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<p>Viewpoint Selection</p> <p>We are content with the proposed viewpoint selection as identified in Table 14 page 67/68 (referred to as Table 9.1 in the text). Other consultees, including Local Authorities may require additional viewpoints with the larger turbines / differing location.</p>	<p>The viewpoints selected and included within this Scoping Report have been selected following feedback from consultation responses.</p>
<p>Baseline photography</p> <p>It is unclear if the existing baseline photography for the viewpoints will be utilised, we would have no issues with this unless new photography may be necessary where views have changed substantially.</p>	<p>Existing baseline photography is already available from the majority of viewpoint locations in Fife, which was undertaken in June 2016 and September 2017 as part of earlier SLVIA work on the Forthwind Project. It is assumed that the baseline viewpoint photography from these viewpoints can be used for the photomontages in the EIAR. Any material changes in the baseline views will be identified and highlighted during survey work, so that an approach to updating photography can be agreed, if necessary, on a case-by-case basis. New viewpoint photographs will be undertaken in summer 2021 for a number of additional viewpoints and the three proposed night-time viewpoints, where a photograph is not currently available.</p>
<p>Lighting</p> <p>The landscape and visual impacts of wind farm lighting are mentioned in the scoping Report; however, it is unclear how this matter will be included as part of the assessment at application stage. We advise that all applications for wind turbines requiring lighting should be assessed through the normal Landscape and Visual Impact Assessment process. Whilst the effects may be significant, it is also important that the assessment is proportionate in scope.</p>	<p>The visual effect of the proposed development at night will be assessed in the SLVIA. Visualisations showing turbine and met mast lighting from a small selection of viewpoints will be presented with the SLVIA as identified in Table 14.</p>
<p>We have included some initial advice on the likely effects of (aviation) lighting in paragraphs 2.11 – 2.13 of our guidance on Siting and Designing Wind Farms in the</p>	<p>The visual effect of the proposed development at night will be assessed in the SLVIA. Visualisations showing turbine and met mast</p>

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<p>Landscape. Our interim advice on producing visualisations which show lighting can be found in paragraphs 174-177 of our guidance on Visual Representation of Wind Farms. Due to the challenges and costs of taking photography in the low light levels required, we recommend that applicants only provide visualisations showing lighting from a small selection of viewpoints. We suggest in this instance that the developer's consultants identify key viewpoints which could be used to illustrate this aspect of the assessment for consultation and agreement.</p>	<p>lighting from a small selection of viewpoints will be presented with the SLVIA as identified in Table 14.</p>
<p>It is important to make the distinction between the 'illustration' of lighting as advocated in our guidance in typically twilight conditions (low light levels at dusk/dawn), and the 'assessment' of lighting required through the SLVIA which will be wider and include twilight and night-time conditions.</p>	<p>No further comment.</p>
<p>Appendix B – Ornithology impacts to be addressed in the EIAR</p> <p>In our view, the scoping Report does not provide a clear account of how impacts to ornithological interests will be addressed for this new application. We have therefore sought to provide below our initial thinking on how Forthwind can make best use of their existing data to assess impacts to key natural heritage features using the most appropriate methods. However, we strongly advise the need for further pre-application dialogue with Forthwind in order to agree (in writing) a draft method statement for ornithological impact assessment prior to submission of the application.</p>	<p>A detailed methodology of how ornithology impacts will be assessed is included within this Scoping Report. Initial consultation with stakeholders (Marine Scot Science, Nature Scot, RSPB Scot) will be undertaken prior to the submission of the application.</p>
<p>SURVEY DATA</p> <p>We advise that the previously collected land based Vantage Point (VP) data should not be used in this new assessment; data should instead come from the previously undertaken boat-based surveys. This is because the height of the proposed turbines is much greater than the height bands used in the VP surveys. We note the proposal to use the boat-based survey data for use in estimating potential impacts for the 2b</p>	<p>Concerns regarding the validity of surveys and survey data will be discussed in detail within the EIAR. The proposal has been reduced to one turbine at the previously identified 2a location which had been previously consented (the 2b location is no longer being considered)</p>

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<p>turbine option; we advise using the same survey data to estimate impacts for both the 2a and 2b design scenarios. This will enable comparisons of estimated impacts between the two design scenarios. Use of boat based data also enables use of the offshore Band model which is current practice for offshore wind proposals rather than the onshore Band model which was used previously. As part of the previous 9 turbine array scoping consultation and follow up meetings, we are aware that boat-based surveys were undertaken but are not sure if these were ever completed?</p> <p>Appendix D of the scoping Report summarises our scoping advice for the 9 turbine proposal, where we raised some concerns about the use of boat-based surveys to collect bird data in an area where species sensitive to disturbance from boats are present. We also expressed concern regarding the nearshore boat transects extensions, which overlap with locations of turbines 1 and 2a, for which data was collected for one year rather than the recommended two. We advise that our concerns outlined in Appendix D, and those highlighted in meetings with Forthwind relating to the 9 turbine proposal, should be considered and addressed in the forthcoming application.</p>	<p>Two years of boat based surveys were completed.</p>
<p>ENVIRONMENTAL IMPACT ASSESSMENT (EIA)</p> <p>HABITATS REGULATIONS APPRAISAL (HRA)</p> <p>As with our previous advice, we advise that the following SPAs (see Table 1 below) will need to be considered due to the potential for connectivity between the development and the site. This is because of the potential for impacts from collision, displacement / barrier effects and impacts on supporting habitats. Further information on SPAs, including their conservation objectives, is available from https://sitelink.nature.scot/home.</p> <p>SPAs to be considered:</p> <ul style="list-style-type: none"> • Firth of Forth SPA 	<p>Consideration of the inclusion SPA's within the EIAR has been given with this Scoping Report.</p> <p>The Outer Firth and Forth and St Andrews Bay Complex (OFFSAB) SPA, Firth of Forth SPA and Forth Islands SPA have been scoped into the EIAR.</p> <p>The Loch Leven SPA and Cameron Reservoir SPA have been scoped out of the EIAR due to the nature of their designated features.</p>

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<ul style="list-style-type: none"> • Forth Islands SPA • Loch Leven SPA • Cameron Reservoir SPA • Outer Firth of Forth and St Andrews Bay Complex (OFFSAB) pSPA <p>We suggest that the (non-breeding) wader species from the Firth of Forth SPA can be screened out. These species are unlikely to utilise the development area to any large extent as they use the intertidal zone to forage. There is therefore unlikely to be any impact from collision or displacement effects.</p>			
<p>Collision risk</p> <p>Having reviewed the boat-based survey flight heights provided in Appendix C of the scoping Report, we have identified those species outlined in Table 2 below with flight heights overlapping with the currently proposed rotor swept zone and as such require consideration for potential collision risk assessment. This long-list is based on the data provided. Other species may need to be considered. Both whooper swan and pink-footed goose have been included at this stage as we are unclear whether the flights recorded represent regular or migratory movements. In our view migratory movements can be scoped out however we would expect further clarification from Forthwind on this going forward.</p>			No further comments.
Species / Sites for which collision risk assessment should be considered			Consideration of the identified species will be given during the collision risk modelling aspect of the EIAR.
Species	Designated Site	Season	
Common tern	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB Pspa 	<ul style="list-style-type: none"> • Breeding • Breeding 	
Northern gannet	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB Pspa 	<ul style="list-style-type: none"> • Breeding • Breeding 	
Herring gull	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB pSPA 	<ul style="list-style-type: none"> • Breeding • Breeding and non-breeding 	

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Black-legged kittiwake	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB pSPA 	<ul style="list-style-type: none"> • Breeding • Breeding and non-breeding 	
Lesser black-backed full	<ul style="list-style-type: none"> • Forth Islands SPA 	<ul style="list-style-type: none"> • Breeding 	
Sandwich tern	<ul style="list-style-type: none"> • Firth of Forth SPA • Forth Islands SP 	<ul style="list-style-type: none"> • Passage • Breeding 	
Black-headed gull	<ul style="list-style-type: none"> • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding 	
Common gull	<ul style="list-style-type: none"> • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding 	
Whooper Swan	<ul style="list-style-type: none"> • Loch Leven SPA 	<ul style="list-style-type: none"> • Non-breeding 	
Pink-footed goose	<ul style="list-style-type: none"> • Loch Leven SPA • Cameron Reservoir SPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
<p>We are mindful that bird survey data collected for the 9 turbine proposal covers a larger area than the current proposal being scoped and as such some recalculation of the survey data based on the 2 turbine development area and buffer may be necessary. We recommend that the survey data is revisited and split according to the GPS tracks from the survey vessel. We would be happy to discuss this further if this would be helpful.</p>			<p>The survey data gathered over the course of the project will be reviewed and recalculated where necessary. Consultation with the relevant stakeholders will be carried out to confirm the approach.</p>
<p>We advise the offshore Band model should be used to estimate collision risk and refer Forthwind to the joint SNCB guidance on the use of avoidance rates in collision risk modelling. We would like to make Forthwind aware of the recent ORJIP Thanet project that collected bird flight behaviour data in an existing wind farm, which was then used to calculate updated and empirical avoidance rates. This work was recently reviewed in a project commissioned by the JNCC. A position on recommended avoidance rates in light of these two pieces of work is currently</p>			<p>No further comment.</p>

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ongoing, which could result in changes to SNHs avoidance rate guidance - we will advise MS further on the timescales for this as soon as we are able.			
We are aware of differences observed in Forthwind’s site-specific flight heights, compared to the generic flight height distributions recommended for use in the offshore Band model (Johnston et al. 2014). Given the proximity to the coastline, which may result in different bird flight behaviour than in the offshore environment, we advise of the need for a comparison of collision risk estimates between outputs using site-specific flight height data and the Johnston et al. 2014 generic flight height distributions to be provided in the application.			A review of collision risk estimates will be undertaken prior to carrying out the revised collision risk assessment.
<p>Displacement / barrier effects</p> <p>We refer Forthwind to the joint SNCB displacement advice note for details and Table 3 below for those species / sites to be assessed for displacement / barrier effects. A displacement rate of 60% should be used for auk species, with a mortality rate of 2% for puffin and 1% for guillemot and razorbill. The same rates should be used for immatures as for adult birds. As per the SNCB advice note, displacement rates should be presented in a matrix ranging from 0-100% in 10% increments.</p> <p>To date in Scottish casework, there has been no need to establish displacement rates for seaducks, divers and shags. We are discussing this with the other SNCBS and will provide further advice as soon as possible.</p>			Consideration over this consultation response will be taken into consideration when assessing the displacement / barrier effects of the proposed Development.
SNH are content that a 1km buffer should be suitable given the scale of the development.			No further comment.
Species	Designated Site	Season	Consideration of the identified species and the potential impacts of the proposed Development will be given within the EIAR.
Common scoter	<ul style="list-style-type: none"> Firth of Forth OFFSAB pSPA 	<ul style="list-style-type: none"> Non-breeding Non-breeding 	

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Long-tailed duck	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
Red-breasted merganser	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
Velvet scoter	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
Common eider	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
Razorbill	<ul style="list-style-type: none"> • Forth Islands SPA 	<ul style="list-style-type: none"> • Breeding 	
Common guillemot	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB pSPA 	<ul style="list-style-type: none"> • Breeding • Breeding & non-breeding 	
Atlantic puffin	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB pSPA 	<ul style="list-style-type: none"> • Breeding • Breeding 	
Slavonian grebe	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
Goldeneye	<ul style="list-style-type: none"> • Firth of Forth • OFFSAB pSPA 	<ul style="list-style-type: none"> • Non-breeding • Non-breeding 	
European Shag	<ul style="list-style-type: none"> • Forth Islands SPA • OFFSAB pSPA 	<ul style="list-style-type: none"> • Breeding • Breeding & non-breeding 	
Apportioning	<p>We refer Forthwind to the SNH guidance on apportioning impacts to SPAs but highlight that further discussion and agreement is required for non-breeding season qualifiers.</p>		<p>Apportioning will follow the recommended NatureScot guidance. The opportunity for further discussion and agreement with NatureScot is welcomed by Forthwind and request that discussion begin as soon as possible.</p>
Population modelling			<p>Population modelling will utilise the stochastic Leslie matrix models.</p>

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<p>We advise use of stochastic, density independent PVA models that include all age classes and sabbaticals. Recommended rates are for large gulls 35%, kittiwake 10%, guillemot/razorbill/puffin 7%, and gannet 10%.</p>	
<p>As indicated Scottish casework to date has not had to consider seaducks, shags or divers, we are currently collating evidence and will provide further guidance on this if PVA is required for these species.</p>	<p>Consultation with the relevant stakeholders will be carried out prior to undertaking the ornithological assessment to ensure all identified species are considered appropriately.</p>
<p>Baseline demographic rates should be based on site specific information where available or Horswill and Robinson 2015 (Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough). The impacts should be assessed over 25 years with no recovery period.</p>	<p>A description of the approach towards Population Viability Assessments has been included within the Scoping Report. The Natural England population modelling tool will be used, and the impacts will be assessed over 25 years with no recovery period. If practical we will use site specific information on demographic rates for the Forth Islands (Isle of May and Bass Rock).</p>
<p>Impacts on supporting habitats assessment of potential impacts on supporting habitats should focus particularly on those species of the Outer Firth of Forth and St Andrews Bay pSPA occurring in the nearshore environment that were observed within the site in notable numbers. This will be a new aspect to be considered in the assessment in light of the status of this site which has since changed to receive full policy protection. Assessment methods will require further discussion and agreement. We have recently commissioned a project aiming to map supporting seabed habitats within all of the current pSPAs. The project is not yet completed but outputs may be relevant to support assessment of potential impacts, and we will share findings from this work as it becomes available.</p>	<p>Consultation with relevant stakeholders will be undertaken prior to assessments being carried out. Further information provided by stakeholders will be incorporated into the assessment where possible.</p>
<p>In combination assessment</p> <p>We advise that MS-LOT should in discussion with other regulators which other projects will require to be considered as part of an in-combination assessment.</p>	<p>Consultation with MS-LOT and the other relevant stakeholders will be carried out and feedback from these discussions will be fed into the in-combination assessment methodology.</p>

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<p>Appendix C – Marine mammal impacts to be addressed in the EIAR</p> <p>We advise that underwater noise is the key impact pathway that may raise significant effects including cumulative effects for cetaceans and seals during wind farm construction and cable installation. Consideration of this impact is achieved through noise modelling. We anticipate that this modelling would inform the assessment process for both the Habitats Regulations Appraisal 9 and future European Protected Species (EPS) licensing requirements 10,11 (if consented).</p>		<p>The potential impact of underwater noise during the construction phase and decommissioning phase of the proposed Development has been scoped into the EIAR for further assessment. As the application is for a single turbine, it is intended that the desk based assessment provided in post consent compliance Forthwind Construction Plan (FW1.PLN.004, Section 3.2) is updated to take account of the larger pile size and is provided within the Environmental Impact Assessment Report. As the number, duration and extent of piled foundations in this application is smaller than the development already consented, this should be sufficient for the application and the requirement to provide underwater noise modelling is disproportionate to the proposed development.</p>
<p>HABITATS REGULATIONS APPRAISAL (HRA)</p> <p>We anticipate, having reviewed our previous advice that those SACs outline below in Table 4 will need to be considered under HRA due to potential for connectivity between the development and the site with respect to impacts from underwater noise including cumulative effects.</p>		<p>The designated sites listed will be scoped into the EIAR and addressed within the HRA.</p>
<p>SACs to be considered</p>		
SAC name	Qualifying Feature	
Firth of Tay and Eden Estuary SAC	Harbour Seal	
Isle of May SAC	Grey seal	
Moray Firth SAC	Bottlenose dolphin	

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<p>We do not consider that other qualifying features from these SACs or other SACs in close proximity to the development site require further consideration and as such can be scoped out</p>	<p>No further comment.</p>
<p>EUROPEAN PROTECTED SPECIES</p> <p>We have reviewed section 11 with respect to cetacean species and are content that the main species to be scoped in are bottlenose dolphin and harbour porpoise noting that the likelihood of other cetacean species being in the vicinity of the development is low. However, the occasional visit from rarer species cannot be ruled out.</p> <p>Any mitigation that is put in place to protect bottlenose dolphin and harbour porpoise will also reduce any impacts on other cetacean species that may be in the area.</p> <p>We do not agree with the conservation value set out in Table 22 on page 90 with respect to EPS. In our view, this should be classed in the 'Very High' category, as with SAC features.</p>	<p>With regards to Nature Conservation Values, consultation with the relevant stakeholders will be undertaken prior to the assessment being carried out to confirm the appropriate methodology for the assessment.</p>
<p>As requested in section 11.7.1 on page 84, the appropriate reference populations for cetaceans are the IAMMWG management units¹³.</p>	<p>No further comment.</p>
<p>SEALS AT HAUL OUTS DESIGNATED UNDER THE MARINE (SCOTLAND) ACT 2010 We do not agree with the conservation values set out in Table 22 on page 90 with respect to seals at haul outs. In our view seal species protected under the Marine (Scotland) Act 2010 should be 'High' rather than 'Medium' as those seal species at a haul-out site are given legal protection under the Marine (Scotland) Act 2010. Notwithstanding this, disturbance of grey and harbour seals at these specific sites is unlikely given the distance to the nearest haulouts. Impacts to seals at haul outs designated under the Marine (Scotland) Act 2010 can therefore be scoped out.</p>	<p>As above</p>

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<p>Appendix D – Consideration of other natural heritage interests</p> <p>We anticipate that all other natural heritage interests will not require detailed assessment within the EIAR as any residual impacts can be dealt with through consideration in post consent plans (if consented) particularly the Construction Method Statement and Cable Plan for aspects such as the export cable installation. We also highlight a few aspects for which further clarification is needed.</p>	<p>No further comments.</p>
<p>MARINE NON-NATIVE SPECIES</p> <p>Invasive non-native species in our seas can have significant impacts on both biodiversity and the economy. Construction and operating renewable devices provide clean surfaces for settlement of native and non-native species¹⁴, potentially providing 'stepping-stones' around our coast. The movement of vessels, barges, equipment and renewable devices themselves, both around the UK coast and internationally, could also allow the accidental transfer of invasive non-native organisms. Marine biosecurity planning is therefore a critical step in creating a framework to reduce the risk of introduction.</p> <p>Since the previous assessment (July 2015 ES), a non-native seaweed, <i>Undaria pinnatifida</i> has been found in the Firth of Forth. This is a large, invasive species which could establish on the turbine bases. Consideration of this and other species should therefore be given through:</p> <p>A biosecurity plan detailing best-practice steps to be taken to manage these risks and to minimise the transfer and spread of marine invasive non-native species. This should form part of the project PEMP and should include the Check Clean Dry principles.</p>	<p>A marine biosecurity plan requiring Marine Scotland approval prior to the commencement of offshore works will be produced as part of the post consent arrangement. An opportunity will be provided to NatureScot to review and approve prior to submission to Marine Scotland. The biosecurity plan will address both the management of installation and maintenance vessels, but also the arrangements for managing the turbine foundation to prevent the establishment of non-native invasive species.</p>

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<p>Biofouling management practices should be implemented, including the use of antifouling and/or foul-release systems and other operational management practices to reduce the development of biofouling.</p> <p>Although guidance specific to the renewables industry is yet to be produced, guidance for other related industries will be useful in identifying ways to minimise risks. For example:</p> <p>The Code of Practice published by the Scottish Government on non-native species to provide guidance on the recently amended legislation in Scotland. This CoP came into effect on 2 July 2012 and applies in Scotland only¹⁶.</p> <p>Guidelines produced by The International Maritime Organisation (IMO) provide useful recommendations on general measures to minimise the risks associated with biofouling for all types of ships.</p> <p>Guidance produced for the prevention and management of invasive species in the oil and gas industry.</p>	
<p>HYDRODYNAMIC PROCESSES & COASTAL GEOMORPHOLOGY</p> <p>We note from the scoping Report that all potential impacts on hydrodynamic processes and coastal geomorphology have been scoped out, based on previous assessment for the 2016 consented project (July 2015 ES). We advise that depending on the location of the landfall, that future proofing for coastal change impacts due to Climate Change are considered as part of the design process and through post consent plans (if consented).</p> <p>East Wemyss to Buckhaven Coast GCR / Firth of Forth SSSI (geological features) Figure 13 on page 40 provides an indicative layout of the onshore works including the cable land fall. However, this figure does not contain sufficient detail to confirm the location of the cable corridor route in relation to East Wemyss to Buckhaven</p>	<p>The landfall location remains the same as the current consented proposal so will not be considered further within the application. A map (figure 12 is provided to give clarity on the proximity to the landfall location and the GCR site). However, the design of the landfall will take into account the potential impact of coastal change due to climate change.</p>

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<p>Coast GCR site. Accurate mapping of the landfall location with scale provided is therefore required to confirm that our advice, as issued on 12 May 2016 in response to the July 2015 application, remains valid. This relates to the location of the landfall corridor which we understood at that time to be some 300m northeast of the eastern end of this GCR site. Providing the landfall is similarly located some distance away from the GCR site, this advice will remain the same.</p>	
<p>Coastal change impacts</p> <p>As part of the design, we advise of the need to consider coastal change impacts due to climate change. We note from section 4.4.5 page 37 that a pull through trench will be used for landfall and that the option of HDD which was considered in the previous July 2015 ES has been removed. Those options taken forward in the application must future-proof against impacts through coastal change brought about by climate change, including consideration of cable protection in the inshore environment and the potential for further disturbance due to remedial works if it becomes exposed. Further information including guidance can be found on our website and via the Dynamic Coast20 project. This provides a mapping tool that uses recent coastal erosion to project landwards to suggest where the shoreline may be in 2050.</p>	<p>As explained in the Scoping Report, a duct will be used to protect the electricity cables in the nearshore and landfall areas. The duct will be made from HDPE material with a design life of 50 years.</p> <p>A review of the Dynamic Coast Coastal Change Assessment Report (Cell 1 - St Abb's Head to Fife Ness) has been undertaken. The proposed landfall is located within Site 12, Buckhaven. The area, although vulnerable and consists of made ground (colliery waste), it does have sea defences in place and the cable landfall will be designed to address potential impacts from localised erosion due to climate change impacts over its 25 year operational life.</p>
<p>FISH OF CONSERVATION CONCERN</p> <p>We have no significant issues to raise in relation to fish (including diadromous fish) and agree that impacts on diadromous fish and marine fish Priority Marine Features (PMFs) can be scoped out. We also advise there will not be any likely significant effect on Atlantic salmon, river lamprey and sea lamprey as features of the River Teith SAC. We refer Forthwind to Marine Scotland Science for advice for commercial marine fish species.</p>	<p>Consultation with Marine Scotland Science will be undertaken with regards to marine fish species prior to the submission of the application.</p>

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<p>We note with respect to cable burial and electromagnetic field impacts that a maximum of two cables will be installed in a single trench to a target burial depth of 1m. UK Government recommends that cables are buried to at least 1.5 m, depending on the suitability of the substrates (Department of Energy and Climate Change (DECC), 201121. We therefore advise that the target burial depth should be 1.5 m deep, where possible, especially in shallow waters (defined as below 20m by Gill and Bartlett 2010). Whilst cable burial would not be expected to reduce the extent of the emission field, it would increase the distance between the cable and the water column.</p>	<p>Due to the proximity to shore the target burial depth is up to 1.5m. Where this is not possible the cable will be protected by a suitable method. Cable burial risk assessment will be provided by the cable installation provider and submitted to Marine Scotland and consultees as part of the construction plan once available.</p>
<p>Maritime and Coastguard Agency</p>	
<p>A Navigational Risk Assessment (NRA) will need to be submitted in accordance with MGN 543 (and MGN 372) and the MCA Methodology for Assessing the Marine Navigation Safety & Emergency Response Risks of Offshore Renewable Energy Installations (OREI). This NRA should be accompanied by a detailed MGN 543 Checklist which can be downloaded from the MCA website at https://www.gov.uk/guidance/offshore-renewable-energy-installations-impact-on-shipping</p>	<p>An update to the original Navigational Risk Assessment (NRA) with up to date traffic assessment and risk modelling carried out will be submitted as part of the EIAR. The NRA will be carried out in accordance with the most up to date methodology.</p>
<p>It is recognised that a Navigation Risk Assessment (NRA) was assessed in 2015 and whilst the applicant wishes to scope out certain aspects from further assessment, it is not clear to which aspects this refers. The MCA would be content to discuss this further with the applicant. The shipping and navigation study should usually include both radar and manual observations in addition to AIS data to ensure vessels of less than 300gt are captured.</p>	<p>Consultation with the MCA prior to the NRA being carried out will be undertaken to ensure correct methodology.</p>
<p>The shipping and navigation study should provide updated data on the 2015 NRA, and it is noted in Section 7.2 that a desk-top assessment will be carried out to</p>	<p>A request has been submitted to Forth Ports for up to date data to use within the current proposals NRA. Consultation with Forth Ports and MCA will be undertaken prior to undertaking the NRA.</p>

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identify updated information and guidance. It is also noted that the marine traffic data will be updated in consultation with Forth Ports Ltd.	
The turbine layout, marking and numbering design will require MCA approval prior to construction to minimise the risks to surface vessels, including rescue boats, and Search and Rescue aircraft operating within the site. This should be carried out in accordance with MGN 543 and its annexes (in particular Annex 5).	A Lighting and Marking Plan will be submitted to the relevant stakeholders prior to construction for approval.
The possible cumulative and in combination effects on shipping routes should also be considered, taking into proximity to other potential windfarm developments and the impact on navigable sea room.	The cumulative and in-combination effects on shipping routes will be considered within the EIAR.
Particular attention should be paid to cabling routes and where appropriate burial depth for which a Burial Protection Index study should be completed and subject to the traffic volumes, an anchor penetration study may be necessary. If cable protection measures are required e.g., rock bags, concrete mattresses, the MCA would be willing to accept a 5% reduction in surrounding depths referenced to Chart Datum. This will be particularly relevant where depths are decreasing towards shore and potential impacts on navigable water increase.	No further comment.
Consideration will need to be given to the implications of the site size and location on SAR resources and Emergency Response Co-operation Plans (ERCoP). Attention should be paid to the level of radar surveillance, AIS and shore-based VHF radio coverage and give due consideration for appropriate mitigation such as radar, AIS receivers and in-field, Marine Band VHF radio communications aerial(s) (VHF voice with Digital Selective Calling (DSC)) that can cover the entire wind farm sites and their surrounding areas.	An Emergency Response Co-Operation Plan (ERCoP) will be provided and consulted with the MCA as part of the post consent compliance arrangements.
Any application for Safety Zones will need to be carefully assessed and additionally supported by experience from the development and construction stages.	In accordance with the Electricity (Offshore Generating Stations) (Safety Zones) (Application Procedures and Control of Access) Regulations 2007, it is expected that a 500m safety zone around the

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	<p>area of installation will be applied for under Section 95 of the Energy Act 2004 during the period of turbine installation works. The implementation of a safety zones will be communicated through an issued Notice to Mariners and a guard vessel will be on site throughout the structure and turbine installation process.</p> <p>Consultation with the relevant stakeholders, including the MCA and Forth Ports, will be undertaken when determining the appropriate size of safety zones during the construction phase.</p>
<p>MGN 543 Annex 2 requires that hydrographic surveys should fulfil the requirements of the International Hydrographic Organisation (IHO) Order 1a standard, with the final data supplied as a digital full density data set, and survey Report to the MCA Hydrography Manager. Failure to Report the survey or conduct it to Order 1a might invalidate the Navigational Risk Assessment if it was deemed not fit for purpose.</p> <p>It should be noted that if floating wind turbines are being considered then information on potential mooring arrangements should be included in the Environmental Statement. This includes possible anchor and line spread, monitoring during construction and operation, recovery of turbines and Third Party Verification. Reference should be made to recent guidance on regulatory expectations developed by MCA and HSE.</p>	<p>Floating wind turbines are not being considered in this application.</p> <p>No further comment on the other issues raised.</p>
<p>On the understanding that the Shipping and Navigation aspects are undertaken in accordance with MGN 543 and its annexes, along with a completed MGN checklist, MCA are likely to be content with the approach. As this project progress, we would welcome engagement with the developers, and early discussion on the points raised above.</p>	<p>No further comments.</p>

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BT Network Radio Protection			
<p>OUR REF; WID10990 T1/T2 & WID10895 & WID10734</p> <p>Dear Sir/Madam</p> <p>Thank you for your email dated 17/05/2019.</p> <p>We have studied this variation to the original Windfarm proposal with respect to EMC and related problems to BT point-to-point microwave radio links. The conclusion is that the Project indicated should not cause interference to BT's current and presently planned radio network.</p>			<p>The original BT Network Radio Protection request has been updated with a resubmission of the revised turbine proposal to re-evaluate the proposal.</p> <p>The result of this assessment will be included in the Environmental Impact Assessment Report.</p>
UK Chamber of Shipping			
<p>The UK Chamber of Shipping thanks Marine Scotland for the opportunity to respond the Forth wind Consultation. The Chamber does not, at this time, have any comments to make, but looks forward to being involved in the consultation process going forward.</p>			<p>No further comments.</p>
Defence Infrastructure organisation			
<p>Thank you for your pro-forma requesting scoping advice from the Ministry of Defence (MOD) regarding your proposed wind energy development variation. I am writing to tell you that the MOD has no concerns with the proposal. Our assessment has been carried out on the basis that there will be 2 turbines at 250.00 metres to blade tip and located at the grid references below.</p>			<p>The proposed Development turbine is located in the same location as previous turbine 2a.</p> <p>Forthwind will engage with the DIO on the revised proposals and to agree what, if any, further assessments are required for the single larger turbine. The results of the assessment will be included in the Environmental Impact Report.</p>
Turbine	Easting	Northing	
1	336964	696677	
2a	337812	697336	

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2b	337319	694939	
<p>Meteorological Office Radar</p> <p>If the application is altered in any way, we must be consulted again as even the slightest change could unacceptably affect us.</p>			<p>The Meteorological Office Radar will be consulted prior to submitting the application. The results of the consultation will be included in the Environmental Impact Report.</p>
<p>If you apply for planning permission, you must ensure that the relevant planning authority consults this office to ensure that no concerns have arisen since the date of this letter.</p>			<p>Forthwind will request that Fife Council engages with the DIO to ensure that no concerns arise.</p>
<p>If planning permission is granted you must tell us:</p> <ul style="list-style-type: none"> • the date construction starts and ends. • the maximum height of construction equipment. • the latitude and longitude of every turbine. 			<p>Prior to the construction phase the Meteorological Office Radar will be informed of the required information.</p>
<p>This information is vital as it will be plotted on flying charts to make sure that military aircraft avoid this area.</p>			
<p>It should be noted that this response is based on current levels of wind farm development in the area and on current technical and operational parameters. If additional wind farms are consented or built, or if our assessment parameters alter prior to this development being submitted for planning consent, our position may change.</p>			<p>No further comments.</p>
<p>Defence Infrastructure Organisation Safeguarding wishes to be consulted and notified of the progression of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.</p>			<p>Defence Infrastructure Organisation Safeguarding will be consulted on prior to submission of the current application.</p>

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Edinburgh Airport	
<p>This development is out with Edinburgh Airports Safeguarding Zone therefore we would have no objections to this application.</p>	<p>Recent correspondence with the Edinburgh Airport Aerodrome Safeguarding and Compliance Officer confirmed that an IFP (Instrument Flight Procedures) safeguarding assessment may be required. Forthwind will work with Edinburgh Airport to conduct an “Instrument Flight Procedure Safeguarding Assessment” to assess IFP impacts and identify mitigation activity if necessary. The outcome will be provided as part of the Environmental Impact Report.</p>
Forth Ports	
<p>We have considered the papers provided and have the following comments:</p> <p>There is a new proposed site for turbine 2. Location 2.b. poses concerns as it will require the removal of anchorage Kilo 1 from use and may limit the use of Anchorage Mike 3. There were discussions started previously with Forthwind/2bEnergy and these will need to continue and conclude to our satisfaction prior to location site 2.b being considered as acceptable for turbine 2.</p> <p>The scoping document states Forth Ports will provide AIS data for review process - we have not agreed to this, rather we stated we would check if this could be made available and is so what potential cost may be incurred for doing so, which would be for Forthwind account.</p>	<p>This application relates to a single turbine to be located on one of the two locations previously consented. Location 2b is no longer relevant for this application.</p> <p>Forthwind has recently opened dialogue with Forth Ports Authority on the type of marine traffic data is held by them and what data can be made available to the project.</p>
Historic Environment Scotland	
<p>Scope of Assessment</p> <p>It is our view that the development proposals have the potential to affect marine and terrestrial historic environment features within our remit. Any Environmental Impact Assessment (EIA) undertaken for the proposals should therefore include an</p>	<p>A cultural heritage and archaeology impact assessment will be carried out as part of the EIAR.</p>

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<p>assessment of impacts on the historic environment. This should consider the potential for impacts on the setting of terrestrial heritage assets located in the vicinity of the proposals, as well as the potential for impacts on unscheduled marine archaeology. We recommend that this assessment is undertaken by a suitably qualified professional and meets the requirements of Scottish Planning Policy (SPP, 2014), the Historic Environment Policy for Scotland (HEPS, 2019) and associated Managing Change Guidance Notes.</p>	<p>Surveys have previously been undertaken across the Forthwind proposal with no anomalies of archaeological potential found. Previous desk studies for the July 2015 ES (Chapter 11) also found no recorded wrecks within the area. It is proposed that marine archaeology is scoped out from the EIA process.</p>
<p>Terrestrial Heritage Assets</p> <p>Any assessment should pay particular attention to impacts on the setting of the below terrestrial heritage assets located along the Fife coastline.</p> <p>MacDuff's Castle and the Caves at East Wemyss (Scheduled Monument, Index no. 817),</p> <p>Wemyss Castle (Inventory Designed Landscape, GDL384)</p> <p>Wemyss Castle (Category A listed building, LB16709).</p>	<p>The previous assessment for the onshore assets, covered by the 2016 consent, will not require updating as part of the current application.</p>
<p>Further to this, we recommend that ZTV analysis is used to identify additional terrestrial heritage assets which may be affected by the proposals. Consideration should also be given to where turbines may appear in views behind heritage assets not located within the ZTV.</p>	<p>An updated ZTV will be produced as part of the SVLIA and potential impacts on heritage assets identified and assessed within the cultural heritage and archaeology assessment of the EIAR.</p>
<p>We also recommend that this assessment should be supported by appropriate visualisations, including photomontage and wireframe views of the development in relation to the above heritage assets and their settings. A visualisation taken from the Fife Coastal path in the vicinity of Jonathan's Cave toward the proposed turbines would be particularly helpful, alongside visualisations taken from MacDuff's Castle and the Wemyss Castle Inventory Designed Landscape.</p>	<p>Viewpoint 2 and 3 from the SLVIA are representative of these locations, in so far as they are located within a few hundred metres and are on the Fife Coastal Path.</p> <p>Viewpoint 2 at East Wemyss, Fife Coastal path is near Jonathan's Cave and Macduff Castle.</p>

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	Viewpoint 3 at West Wemyss, Fife Coastal path is near Wemyss Castle Designed Landscape.
Cumulative impacts resulting from this development in combination with other existing and proposed wind farm developments within the surrounding area should also be considered. This should be supported by cumulative visualisations where appropriate.	The proposed Development is now reduced in scale and proportionate to the consented development. As such it is considered that the scope of the cumulative assessment should be commensurate with that undertaken for the consented development. The cumulative effects of the proposed development with consented and proposed wind farm developments will be included within the SLVIA (Figure 9.5).
<p>Marine Archaeology</p> <p>We note the Scoping Report (April 2019) proposes excluding marine archaeology from the scope of the assessment. We are uncertain about the potential for impacts on unscheduled marine archaeology in this instance and do not consider that sufficient information has been provided within the Scoping Report for us to reach a view on this.</p> <p>Section 16.4 of the Scoping Report identifies that a substantial proportion of the potential development area has been surveyed and no anomalies of archaeological potential were found. There is, however, no clarification of when these surveys were undertaken, what they comprised, or which areas were and were not surveyed. There is also no consideration of the potential for physical processes to have altered the baseline conditions found during these earlier surveys. We therefore require further information about this survey work to reach a view on the archaeological potential of the site. This should include an explicit consideration of where sandbanks or large mobile bedforms may affect the marine archaeological potential for the site.</p>	<p>The proposed Development is now reduced in scale and within the scope of the consented development. As such it is considered that the potential impacts of the proposed Development will be the same that of the consented Development (i.e., negligible).</p> <p>The offshore surveys across the development area were completed in 2014 and included within the original 2015 Environment Statement (the full geophysical survey results were provided as Appendix A in the original Environmental Impact Assessment).</p>
Section 16.4 also states that a magnetometer survey will be carried out. It does not describe at what stage in the development process this will happen, nor how the	Offshore surveys were completed and included within the original Environment Statement (the full geophysical survey results were

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<p>results will be analysed for their archaeological potential. It does not explain fully why magnetometry survey is proposed rather than any other forms of survey. We would expect any additional survey work to be carried out at an early stage in the EIA process so that if any archaeological features are encountered, they are not only “identified and recorded” as stated in the Report but can be actively avoided by windfarm infrastructure if necessary.</p>	<p>provided as Appendix A in the original Environmental Impact Assessment). The surveys consisted of multibeam bathymetric, sub-bottom profile, sidescan sonar and magnetometer surveys and covered the development area (both the original 2015 application and the current locations). No items of archaeological or buried features were identified within the surveys, as reported in the original 2015 EIA.</p> <p>A magnetometer survey was carried out across the area in 2017 prior to intrusive geotechnical borehole activities being carried out at the proposed turbine location. Again, no assets of archaeological value were identified.</p> <p>As the area has already been adequately surveyed, no additional surveys are required. Based on the fact that the area has already been assessed for offshore archaeological and heritage assets in the 2015 EIA, it is proposed that this is scoped out from further assessment.</p> <p>The project, however, is proposing (as previously agreed with Fife Council) to produce, consult and implement a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) prior to construction activities being undertaken. Both Fife Council and HES will be consultees on the WSI and PAD arrangements.</p> <p>The protocol will also include appropriate briefings for all personnel involved in the construction, operation and decommissioning activities associated with the proposed development. The PAD will be in place for the life of the proposed development and will be updated when required should details within the document change, for example contact details for key stakeholders. This should, as far as practical, mitigate for effects upon unexpected archaeological finds. Therefore,</p>

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	it is proposed that this topic is scoped out from the EIA process for this development application.
The Joint Radio Company Limited	
<p>A Windfarms Team member has replied to your coordination request, reference WF412576 with the following response:</p> <p>In the case of this proposed wind energy development, JRC does not foresee any potential problems based on known interference scenarios and the data you have provided. However, if any details of the wind farm change, particularly the disposition or scale of any turbine(s), it will be necessary to re-evaluate the proposal.</p> <p>It should be noted that this clearance pertains only to the date of its issue. As the use of the spectrum is dynamic, the use of the band is changing on an ongoing basis and consequently, developers are advised to seek re-coordination prior to considering any design changes.</p>	<p>The original JRC coordination request has been updated with a resubmission of the revised turbine proposal to re-evaluate the proposal.</p> <p>The result of this assessment will be included in the Environmental Impact Assessment Report.</p>
National Air Traffic Services	
<p>Thanks for your reply. The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.</p>	No further comments.
<p>However, please be aware that this response applies specifically to the above consultation and only reflects the position of NATS (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any</p>	<p>A review of the NATS Safeguarding zones has been undertaken during this Scoping Request production. The proposed Development will not impact on the safeguarding zones however for clarity consultation with NATS will be sought prior to the submission of the application.</p>

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<p>other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.</p> <p>If any changes are proposed to the information supplied to NATS in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission, or any consent being granted.</p>	
Northern Lighthouse Board	
<p>Northern Lighthouse Board also note that the adjacent 'Near na Gaoithe' Offshore windfarm will be included within a study of the cumulative impacts of the Forthwind development.</p>	<p>The 'Near na Gaoithe' offshore windfarm will be included within the cumulative impact assessments of the EIAR.</p>
<p>We require the developer to establish a Navigational Safety Plan and a Lighting and Marking Plan. The latter should indicate proposed marking and lighting for the three phases of the wind farm life, namely the construction, operational and de-commissioning phases, to give the best possible indication to the mariner of the nature of the works being carried out.</p>	<p>A Marking and Lighting Plan will be produced and consulted with the relevant stakeholders, prior to agreement with Marine Scotland.</p>
<p>Construction Phase</p> <p>During the construction phase we would require that the site boundary shall be marked by a series of lit Cardinal Mark or Special Mark buoys, to be agreed with Northern Lighthouse Board and the Harbour Authority. These buoys shall be a minimum of 3 metres in diameter at the waterline, have a focal plane of at least 3 metres above the waterline and be fitted with a topmark and radar reflector. The light range on these buoys shall be 3 Nautical Miles. If the construction phase of the project is to exceed 6 months, these buoys will require the Statutory Sanction of the Northern Lighthouse Board.</p>	<p>This will be addressed in both the Construction Plan and Lighting and Marking Plan that required to be agreed with Marine Scotland prior to construction activities being undertaken. Consultation with the relevant stakeholder, including the Northern Lighthouse Board, prior to submission to Marine Scotland for approval.</p>

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<p>Operational Phase</p> <p>In general terms, during the Operational Phase the windfarm site shall be marked and lit as per IALA Recommendation O-139. It is noted that a number of these recommendations are already addressed within the Scoping Report.</p> <p>The tower of every wind generator should be painted yellow all round from the level of Highest Astronomical Tide (HAT) to 15 metres or the height of the Aid to Navigation, if fitted, whichever is greater.</p> <p>Both turbines shall be designated as Significant Peripheral Structures (SPS). The SPS structures shall have lights visible from all directions in the horizontal plane. These lights should be synchronised to display a character of one yellow flash every 5 seconds and should have a nominal range of not less than 5 nautical miles. The nominal range of these lights should be 5 nautical miles. However, in the case of a light showing immediately to landward this may be reduced to 2 nautical miles.</p> <p>All lights shall be placed not less than 6 metres and not more than 30 metres above Mean High Water Springs (MHWS).</p> <p>NLB are content that no fog signal is required on either turbine.</p> <p>AIS Aids to Navigation (AtoN) should be fitted to the most Southerly turbine, indicating the name and location of the turbine. A radio licence will be required from OFCOM to establish this AtoN.</p> <p>Each tower shall display identification panels with black letters or numbers one metre high on a yellow background visible in all directions. These panels shall be easily visible in daylight as well as at night, by the use of illumination or retro-reflecting material.</p>	<p>The development proposal has been reduced to one turbine. A Lighting and Marking Plan will be produced and agreed with the relevant stakeholders.</p>

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<p>All navigation lights should have an availability of not less than 99.8% (IALA Category 1) over a rolling three year period. AIS AtoN should have an availability of not less than 97% (IALA Category 3) over a rolling three year period.</p> <p>Where aviation anti-collision lights are installed, these should be synchronised lights flashing Morse character 'W'. A derogation from the requirement for fixed red lights should be obtained from the Civil Aviation Authority.</p> <p>It may also be necessary to mark the landfall site of the export cable routes. We would then require that Cable Marker Boards should be positioned as near as possible to the shoreline so as to mark the points at which the cables come ashore. The Cable Marker Boards shall be diamond shaped, with dimensions 2.5 metres long and 1.5 metres wide, background painted yellow with the inscription 'Cables' painted horizontally in black. The structures shall be mounted at least 4 metres above ground level.</p>	
<p>Decommissioning Phase</p> <p>When the site reaches the end of its designed life and there is a need to enter into dialogue with stakeholders on decommissioning options, we would require that the Northern Lighthouse Board is consulted on the requirement for marking and lighting during this phase.</p>	<p>A Decommissioning Plan for the Forthwind development will be agreed with Marine Scotland prior to construction activities taking place. The decommissioning plan will include a provision for a regular review of the adequacy of the decommissioning plan, and for seeking consultation from the relevant stakeholders, including the Northern Lighthouse Board, prior to decommissioning activities being undertaken.</p>
<p>General</p> <p>All navigational marking and lighting of the site or its associated marine infrastructure will require the Statutory Sanction of the Northern Lighthouse Board prior to deployment.</p>	<p>A Lighting and Marking Plan (LMP) will be produced and agreed with the relevant stakeholders and produced as part of the post-consent compliance procedure.</p>

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<p>We would require that Notice(s) to Mariners, Radio Navigation Warning and publication in appropriate bulletins will be required stating the nature and timescale of any works carried out in the marine environment relating to this project.</p>	<p>During the pre-construction, construction, operational and decommissioning phases of the project the appropriate NtM's and publications in Kingfisher will be given. Forthwind will also engage with Forth Ports to ensure the appropriate notifications are made for marine traffic. Details of arrangements of this will be provided in the Construction Plan.</p>
<p>We would require that the turbine installation locations, cable routes and cable landing points should be communicated to the United Kingdom Hydrographic Office in order that all relevant charts and publications can be correctly updated.</p>	<p>Consultation with the Hydrographic Office will be undertaken prior to the construction of the proposed Development. The turbine installation location, cable route and cable landing points will be provided to the United Kingdom Hydrographic Office prior to construction.</p>
<p>We note that a comprehensive contingency plan will be required, detailing the emergency response to all possible catastrophic failure and collision scenarios.</p> <p>Northern Lighthouse Board are willing to meet with the developer to assist with the development of a Lighting and Marking Plan, if required.</p>	<p>No further comment.</p>
<p>ORE Catapult</p>	
<p>Noise</p> <p>We note that the applicant proposes to use background data collected in 2015. In terms of the novelty and quality of data which would normally be collected in support of an Environmental Impact Assessment, our view is that the 2015 data is very old and would not reflect the current baseline situation.</p> <p>Our view is therefore that new baseline data should be collected. It is crucial in our view that, in doing so, such new data should be adjusted to remove the operational noise resulting from the Levenmouth Demonstration Turbine from the calculation.</p>	<p>An updated noise impact assessment will be undertaken and included within the EIAR. It is intended that the baseline noise measurements gathered by Forthwind and OREC will be used for noise impact assessment and no additional further baseline noise monitoring will be gathered. Forthwind has recently engaged with OREC and we have agreed to work together to ensure that an appropriate noise assessment is undertaken (including the commitment from OREC to provide their noise measurement data).</p>

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<p>The applicant states that it will carry out cumulative noise assessment. We have no issue with that but would raise that this should have no impact on the Levenmouth Demonstration Turbine or its operation. Given the significantly increased impact of the now-consented development, our view is that the current requirement on ORE Catapult should be removed</p>	<p>Forthwind will engage with the Environmental Health Department of Fife Council to ensure that the baseline noise measurements are still representative and appropriate for use within the EIA report.</p>
<p>Shadow Flicker</p> <p>We would simply raise that, in our opinion, a cumulative assessment should be carried out which includes any effects arising from the Levenmouth Demonstration Turbine and other windfarm developments within the potential shadow flicker zone.</p>	<p>A shadow flicker assessment will be carried out and included within the EIAR to assess the shadow flicker impacts associated with the proposed Development.</p>
<p>Ornithology (Cumulative Bird Management)</p> <p>Our view is that, similarly with noise, new data should be collected. Data from 2015 is out of date and the advice we have received suggests that the 2017 data is nearing the end of its useful life as well.</p>	<p>The survey data collected during 2015 and 2017 provides Forthwind with a good understanding of the ornithology using the site and area surrounding the site over a long-term period. Where required, vantage point data can be used to supplement the boat-survey data.</p>
<p>We would suggest that 1 year of data should be collected to update the surveys, although this is something that other consultees will no doubt comment upon.</p> <p>There is, at present, an understanding that ORE Catapult would be expected to undertake further surveys if the previously consented development was implemented. Given that the Forthwind development is now consented up to 29.9MW, our view is that this requirement on ORE Catapult should be removed.</p> <p>We would be grateful if you could consider the above comments as part of the consultation and, in the meantime, acknowledge receipt hereof</p>	<p>The survey data collected to date (boat-based and vantage point) is considered appropriate and suitable for the proposed Development.</p>

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Royal Society for the Protection of Birds Scotland	
<p>We welcome the innovation and demonstration potential offered by projects such as this, particularly given the opportunities it may offer to increase our renewable energy capacity and help meet our climate emissions targets. We limit our comments to ornithology and wish to make the following key points which we hope can be considered and included in the forthcoming environmental assessment:</p> <p>The proposal is located within or adjacent to internationally designated Special Protection Areas and in addition to the EIA, will require a habitats regulations appraisal.</p> <p>Cumulative impacts of this proposal with other offshore development will be required. The large commercial scale offshore wind farm projects in the Firths of Forth and Tay region will be particularly relevant with seabird population scale impacts needing to be a focus in the assessment.</p> <p>The scoping Report suggests that survey data from pre-2015 will be used to inform assessment of Option 1 turbine layout and data from pre-2017 used for Option 2 layout. The older the data supporting the environmental assessment the more uncertainty there is in the conclusions. Full and detailed justification will be required in the assessment to demonstrate that the underlying survey data is adequate and suitably robust for the purposes of defining the potential impacts. Additionally, expression of uncertainty in assessment outputs is necessary.</p> <p>Collision risk modelling will require appropriate survey data. This is important when considering the suitability of using data collected from different survey methods (i.e., on and offshore surveys).</p> <p>In Table 23 – we do not support the percentages presented in the guides to assessing magnitude of effect. Magnitude of effect is dependent on the species and population being assessed, using a generic percentage value of impact will not</p>	<p>Consideration of the designated sites, and potential cumulative effects will be considered within the EIAR in their relevant topics.</p>

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<p>account for the specifics of the species and population being assessed. Therefore, the guide could be very misleading and misrepresent significance.</p>	
<p>Royal Yachting Association</p>	
<p>I have read the scoping Report for the revised Forthwind proposal and agree with the statements made about recreational boating in particular that the information gathered on recreational boating during the Hazard Review Workshop held on 20 October 2017 is still valid. I note that the data on recreational boating movements will be updated using the current version of the RYA UK Atlas of Recreational Boating, which is also on NMPI. The Boundaries of the general sailing areas were re-drawn for the current version of the atlas and the areas have been reduced in size. Neither the RYA nor RYA Scotland hold additional information. There is no RYA affiliated club at Methil although there is a boating club based there. As far as I am aware, there are no races held in the vicinity of the development and although there are races from the Forth to the Tay, the wind turbines will be no more of a hazard than the oil platforms that are moored nearby.</p>	<p>No further comment.</p>
<p>Scottish Fisherman's Federation</p>	
<p>The SFF has concerns that this is no longer an application for a demonstration, but almost a full commercial exercise.</p> <p>Given that in the past this developer has used small applications to presage expanded versions, we would need to be reassured of the ultimate plan. Also, the developer is now aware of the commercial fishing it will impact on so that must be scoped in.</p>	<p>The proposal is restricted to one turbine at a location previously assessed in 2015 and subsequently consented. The July 2015 Environment Statement assessed the potential for adverse effects on commercially exploited fish and shellfish populations and concluded there would be no significant effect on the fish and shellfish population. The July 2015 conclusion is based upon the fact that the ecological sensitivity of the local development area is low, and the development area has a relatively confined footprint.</p> <p>The proposed Development is an application for a singular demonstration of 280 m (HAT), with a proposed project rated capacity</p>

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	<p>of up to 20 MW. The purpose of this project is to demonstrate the feasibility and validity of this new technology. There are no proposals or plans from Forthwind to install any further turbines.</p> <p>The revised proposal location, seabed footprint and duration is smaller than that already consented. Therefore, for the purposes of transparency, the impacts as shown in the original ES will be included in the Environmental Impact Report, to allow members of the public to take a view on the effectiveness of mitigation</p> <p>Over the last number of years, we have been very open and transparent in discussing our development proposals with the fishing community, including the SFF, at a very early stage although these early stage proposals have subsequently not transpired. We will continue to engage with the fishing community to keep them informed.</p>
Sport Scotland	
<p>I see this is an amendment to a consented scheme that we had no issue with when initially consulted.</p> <p>Accordingly, I can advise we have no comment.</p>	No further comments.
Transport Scotland	
<p>It is noted that the transportation of the turbine components is described within Chapter 16.1 of the ESR. In this, it is stated that the majority of the turbine components will either be assembled on site or delivered to site by sea, either directly or via a suitable port. There will, therefore, be no abnormal loads generated during the construction phase. The ESR indicates that overall, the traffic generated during construction will be minimal, essentially limited to the transportation of the</p>	No further comment.

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equipment required for landfall and the delivery of a number of onshore elements to the Fife Energy Park.	
With regard to the offshore element of the proposal, it is considered that this will not have any environmental impact on the trunk road network.	No further comment.
In light of the information provided, we can confirm that we have no objection to the proposal in terms of trunk road environmental impacts and do not require any further information.	No further comment.
Scottish Ministers	
Scottish Ministers advise that the HRA Report (information to inform the AA) must be submitted along with the EIA Report. It is appropriate for the HRA report to form a chapter within the EIA Report.	A HRA Report will be included as a chapter within the EIA Report
The NLB state that a Navigational Safety Plan and a Lighting and Marking Plan are required. The Scottish Ministers agree.	Forthwind propose that the Navigational Safety Plan and Lighting and Marking Plan are provided as part of a post consent compliance arrangements should consent for the development proposal be granted.
The Scottish Ministers require an NRA to be undertaken and Disruption to SAR Operation (including risk management and emergency response) is scoped in. If any aspects are to be scoped out this assessment, this must be agreed with the MCA and evidence provided to the Scottish Ministers	An update to the original Navigational Risk Assessment (NRA) with up to date traffic assessment and risk modelling carried out will be submitted as part of the EIAR. The NRA will be carried out in accordance with the most up to date methodology. Consultation with the MCA prior to the NRA being carried out will be undertaken to ensure correct methodology.
The Scottish Ministers require that the Developer includes the impacts as shown in the original ES to provide evidence on the effectiveness of mitigation	For transparency, the original commercial fisheries assessment will be included with updated information.

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<p>The Scottish Ministers require the assessments undertaken for the Original Development are updated and require that commercial fisheries are scoped in for all sites.</p>	<p>For transparency, the original commercial fisheries assessment will be included with updated information.</p>
<p>The Scottish Ministers do not agree that the seascape, landscape and visual and cumulative effects of the Development on seascape, landscape and visual receptors beyond 45km radius study area can be scoped out. The Scottish Ministers require the study area to be increased to 50km and also that the cumulative effects of the Forth and Tay developments are assessed.</p>	<p>The Study Area has been set at a 50 km radius, increased from 45 km.</p> <p>The cumulative effects of the Forth and Tay developments Inch Cape and Neart na Gaoithe will be included in the SLVIA (Figure 9.5).</p> <p>Effects on the landscape character of East Lothian and Edinburgh and their Firth of Forth coastlines will be considered in the SLVIA. Local coastal character assessment of the East Lothian coastline will not be required, with the exception of the potential for a small area of coastline at North Berwick as agreed with ELC.</p>
<p>The Scottish Ministers do not agree that marine archaeology and cultural heritage can be scoped out, this must be scoped in. In addition, the assessment should consider assets recorded on the respective council Historic Environment Record. The Scottish Ministers require a 35km radius and key receptors are scoped in and require that the study area includes the cumulative effects of the Forth and Tay developments.</p>	<p>The proposed Development is now reduced in scale and within the scope of the consented development. As such it is considered that the potential impacts of the proposed Development will be the same that of the consented Development (i.e., negligible).</p> <p>The offshore surveys across the development area were completed in 2014 and included within the original 2015 Environment Statement (the full geophysical survey results were provided as Appendix A in the original Environmental Impact Assessment). The surveys consisted of multibeam bathymetric, sub-bottom profile, sidescan sonar and magnetometer surveys and covered the development area (both the original 2015 application and the current locations). No items of archaeological or buried features were identified within the surveys, as reported in the original 2015 EIA.</p> <p>A magnetometer survey was carried out across the area in 2017 prior to intrusive geotechnical borehole activities being carried out at the</p>

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	<p>proposed turbine location. Again, no assets of archaeological value were identified.</p> <p>As the area has already been adequately surveyed, no additional surveys are required. Based on the fact that the area has already been assessed for offshore archaeological and heritage assets in the 2015 EIA, it is proposed that this is scoped out from further assessment.</p> <p>Data on heritage assets will be collected from the datasets held by Historic Scotland out to 35 km from the Development, in order to identify those cultural heritage assets which may receive a likely significant effect on their settings.</p>
<p>The Scottish Ministers require that the assessment and assessment methodology for ornithological impacts is agreed with SNH, MSS and RSPB Scotland prior to undertaking any assessments.</p>	<p>Forthwind will consult with SNH, MSS and RSPB Scotland prior to undertaking any assessment. This commitment is based upon the understanding that the consultees can participate and engage within a reasonable timeframe.</p>
<p>The Scottish Ministers agree with the list of development projects to undertake cumulative assessments with which was provided by the Developer. These are:</p> <ul style="list-style-type: none"> • European Offshore Wind Deployment Centre • Hywind Scotland Pilot Park • Inchcape Offshore Ltd • Kincardine Offshore Windfarm • Levenmouth Demonstration Turbine (ornithology only) • Moray East Offshore Windfarm (marine mammals only) • Moray West offshore Windfarm (marine mammals only) • Neart na Gaoithe Offshore Windfarm Ltd • Seagreen Alpha Wind Energy Ltd • Seagreen Bravo Wind Energy Ltd 	<p>Forthwind agree to consider the list of development projects to undertake the cumulative assessment, however construction of the Aberdeen harbour expansion project at Nigg Bay is expected to be completed soon (approximately 2022) and should no longer considered required to be included within the cumulative assessment.</p>

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In addition, the Scottish Ministers require that the following project is also included in the cumulative assessment: Aberdeen Harbour Expansion project	
The Scottish Ministers agree with the consultee comments on the landfall location and require that accurate mapping is provided	An accurate map is provided in figure 12 (Scottish GCR Sites) in the Scoping Report.
The Scottish Ministers also require that the cumulative impacts on physical process and water quality must be scoped in.	<p>Should the construction of one or more of the windfarm projects (identified in Table 28 of the Scoping Report) overlap with the proposed Development, there is potential for cumulative effects to arise as a result of the seabed preparation operations and dredging required for the installation of the turbine foundations and cables.</p> <p>However, the associated plumes are not likely to extend as far as the Development area (which will be against the predominant flow of the estuary). In addition, considering that the application is associated with the installation and operation of one turbine, it is argued to include cumulative impact on physical process and water quality is disproportionate to the application and it is proposed that this remote cumulative effect is scoped out from further consideration.</p>
The Scottish Ministers agree with the MAU and requires that a wider range of impacts socio-economic effects is considered and that local infrastructure improvements and cost reduction in the offshore wind industry are scoped in the EIA Report	<p>Consultation with the relevant stakeholders will be undertaken prior to the submission of the application. A detailed description of the range of potential effects to be assessed will be included in the EIAR.</p> <p>The scale and nature of the proposed development (1 turbine), means it has negligible ability to affect the demographics of the local community nor potentially have an impact on demand for local public services. It is considered disproportionate to the proposal to include these elements within the scope of the assessment.</p>

Appendix E

List of Projects Considered for Cumulative Impact

European Offshore Wind Deployment Centre.

Hywind Scotland Pilot Park.

Inch Cape Offshore Windfarm.

Kincardine Offshore Windfarm.

Levenmouth Demonstration Turbine.

Moray East Offshore Windfarm (Marine Mammals only).

Moray West Offshore Windfarm (Marine Mammals only).

Neart na Gaoithe Offshore Windfarm.

Seagreen Alpha Offshore Windfarm; and

Seagreen Bravo Offshore Windfarm

Appendix F

Abbreviations

AIS	Automatic Identification Systems
ALARP	As Low As Reasonably Practicable
ATC	Air Traffic Control
BDMLR	British Divers Marine Life Rescue
CAA	Civil Aviation Authority
CaP	Cable Plan
CEH	Centre for Ecology and Hydrology
CES	Crown Estate Scotland
CfD	Contract for Difference
CIA	Cumulative Impact Assessment
CIEEM	Chartered Institute for Ecology and Environmental Management
CMS	Construction Method Statement
CoP	Construction Programme
CRM	Collision Risk Modelling
CTV	Crew Transfer Vessel
cSAC	Candidate Special Area of Conservation
CSLVIA	Cumulative Seascape, Landscape and Visual Assessment
DECC	Department of Environment and Climate Change
DIO	Defence Infrastructure Organisation
DSLPL	Development Specification and Layout Plan
EC	European Community
EclA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EMF	Electro-magnetic Fields
EMP	Environmental Management Plan
ES	Environmental Statement
ESAS	European Seabirds At Sea
EU	European Union

FLO	Fisheries Liaison Officer
FSG	Forth Seabird Group
HAT	Highest Astronomic Tide
HRA	Habitats Regulations Appraisal
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LMP	Lighting and Marking Plan
LWIC	Lothian Wildlife Information Centre
MCA	Maritime and Coastguard Agency
MGN	Marine Guidance Notice
MMO	Marine Mammal Observer
MOD	Ministry of Defence
MPAs	Marine Protected Areas
MS-LOT	Scottish Government, Marine Scotland - Licensing and Operations Team
MSS	Marine Scotland Science
MW	Megawatt
NATS	National Air Traffic Services
NERL	NATS En-Route Ltd
NLB	Northern Lighthouse Board
nm	Nautical Mile
NRA	Navigational Risk Assessment
NSP	Navigational Safety Plan
O&M	Operation and Maintenance
OREI	Offshore Renewable Energy Installation
PEMP	Project Environmental Monitoring Programme
PLIB	Post lay inspection and burial
PVA	Population Viability Analysis
RIB	Rigid-hulled inflatable boat
ROCs	Renewable Obligation Certificates
ROV	Remotely Operated Vehicle
RSPB	Royal Society for the Protection of Birds

SAC	Special Area of Conservation
SAR	Search and Rescue
SFF	Scottish Fishermen's Federation
SLVIA	Seascape, Landscape and Visual Impact Assessment
SMRU	Sea Mammal Research Unit
SNCBs	Statutory Nature Conservation Bodies
SNH	Scottish Natural Heritage
SPA	Special Protection Areas
SSSI	Site of Special Scientific Interest
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
VMP	Vessel Management Plan
VP	Vantage Point
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility
