

ForthWind Offshore Wind Demonstration Project, Methil, Fife.

Non-Technical Summary



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1 INTRODUCTION

This Non-Technical Summary (NTS) forms part of the Environmental Statement (ES) to accompany an application under Section 36 of Electricity Act 1989 and an application for a Marine Licence under the Marine (Scotland) Act 2010, for consent to Marine Scotland by Forthwind Ltd ("the Applicant"). The application relates to the installation and operation of the Forthwind Demonstration Project ("the Development"), located on the northern shore of the Firth of Forth at Methil, Scotland.

The Development will be located approximately 1.5 kilometres (km) seaward of the mean high water springs (MHWS) as shown in Figure 1. The Development will consist of two demonstration wind turbines each with an installed capacity of up to 9 MegaWatts (MW), with each turbine having a maximum height to blade tip of 198.5 m.

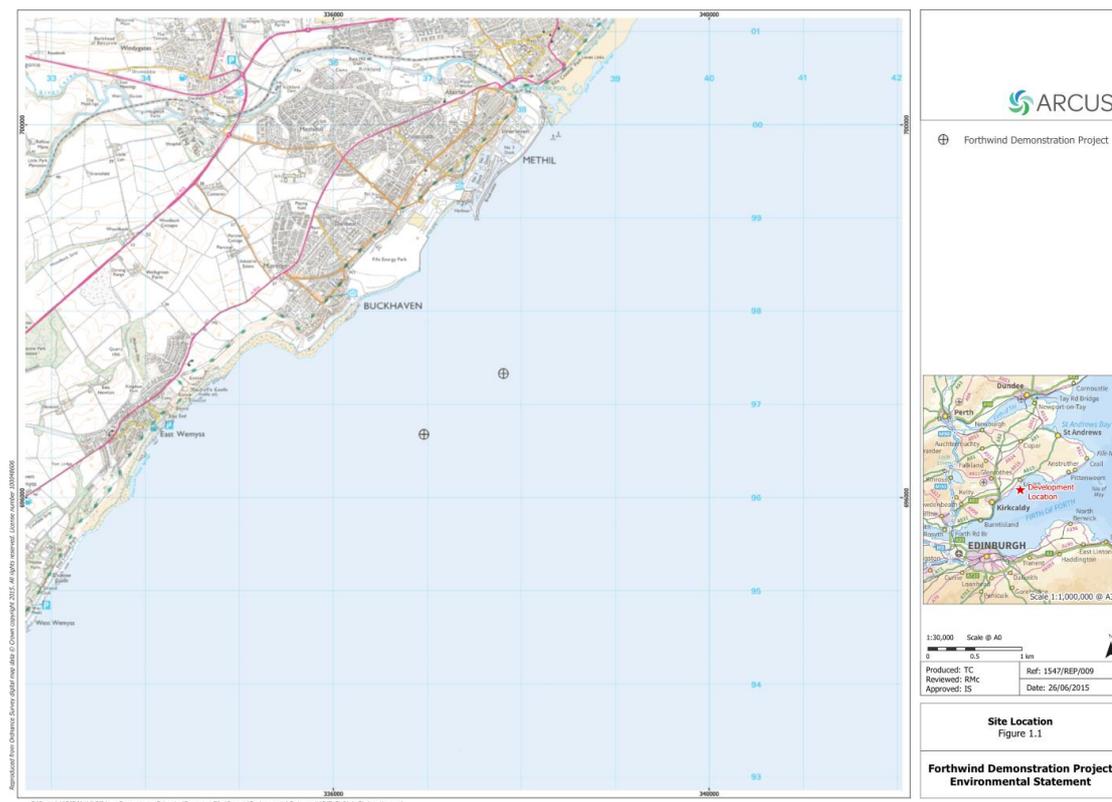


Figure 1 – Site Location

2-B Energy, the parent company of Forthwind Ltd, is developing a wind turbine technology for application to the global offshore wind market. The concept incorporates large, two bladed turbines on steel lattice towers.

The 2B6 turbine, which will be installed on the development site, represents a step change in offshore wind turbine design, with the ambition to significantly reduce the cost of offshore renewable wind energy. The turbine itself is a downwind turbine, meaning that the nacelle faces away from the wind and the blades are downwind from the tower.

The ES provides information on the identification and assessment of the potential significant environmental effects that may occur as a result of the Development. The following types of effects are considered to have the potential to occur as a result of the Development and have therefore been considered as part of the EIA:

- Seascape Landscape and Visual Resource;
- Physical Process;
- Ornithology;
- Marine Mammals;

- Commercial Fisheries;
- Benthic Ecology;
- Marine Archaeology;
- Archaeology and Cultural Heritage;
- Airborne Noise;
- Shipping and Navigation;
- Socio-economics, Recreation and Land-Use;
- Miscellaneous Issues;
- Other Marine Users;
- Terrestrial Ecology; and
- Terrestrial Hydrology, Hydrogeology and Soils Resource.

These effects have been studied systematically through an iterative process, the results of which are presented within the ES and summarised in this NTS. These documents inform readers of the nature of the Development, likely environmental effects and measures proposed to protect the environment during site preparation, construction, operation, and decommissioning.

1.1 The Applicant

Forthwind is a wholly owned subsidiary of 2-B Energy which is an active offshore wind turbine technology company based in Hengelo, Netherlands and in Fife, Scotland. The company was founded in 2007. 2-B Energy, together with a reputable network of key partners in the industry, has developed an innovative, new design for offshore wind turbines. The low-cost, holistic concept includes differentiating designs for the rotor, nacelle, support structure and electrical system.

For more information regarding 2-B Energy, please refer to the website <http://www.2-benergy.com/>.

2 EIA PROCESS AND METHODOLOGY

Environmental Impact Assessment (EIA) is a process aimed to ensure that permissions for developments with potentially significant effects on the environment are granted only after assessment of the likely significant environmental effects has been undertaken. The assessment must be carried out following consultation with statutory consultees, other interested bodies and members of the public. The purpose of identifying significant effects is to ensure that decision makers are able to make an informed judgement on a proposal. Where one or more significant effects are identified, it does not automatically follow that a proposal should be refused.

With regard to the Development the following regulations are applicable:

- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000, as amended by The Electricity Works (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008 (where applicable); and
- The Marine Works (Environmental Impact Assessment) Regulations 2007, as amended by the Marine Works (Environmental Impact Assessment) Regulations 2011 (where applicable).

This ES has been prepared following a systematic approach to EIA and project design. The process of identifying environmental effects is both iterative and cyclical, running in tandem with the iterative design process.

The key elements in EIA are:

- Scoping and ongoing consultation including consideration of responses and how these should be addressed;

- Technical environmental assessments - including baseline studies, input to the design process and identification of potential significant environmental effects;
- Preparation of the ES; and
- Submission of the application and ES including publicity of the EIA application.

A request for a scoping opinion was originally issued to the Scottish Ministers in 2009 for a phased approach to the Development. This was widely circulated among statutory and non-statutory consultees and among local Community Councils. The Marine Scotland Licencing and Operations Team (MS-LOT) confirmed that the previously received scoping responses were still valid in respect of the Development during consultation on the ES. Following the decision to progress with an application for the Development in 2014 however, a further consultation request was submitted to Marine Scotland in July 2014 in order to ensure that key responses were up to date, particularly in relation to statutory nature conservation bodies.

A public exhibition was held at the Hydrogen Office, Ajax Way, Methil Docks on the 26th June 2014 from 10 am until 8 pm. These events provided the opportunity to speak with representatives of the Developer and their specialist consultants, learn about the Development and preliminary findings of the EIA, and provide comment on the proposal.

Environmental effects have been assessed, to identify any effects that may be significant in the context of the EIA Regulations. Mitigation is proposed where possible to avoid, reduce or remedy effects where they are identified as being significant.

In accordance with the EIA Regulations, the assessment has considered 'cumulative effects'. By definition these are effects that result from cumulative changes caused by past, present or reasonably foreseeable actions together with the Development.

3 PROJECT DESCRIPTION

The Development is located on the northern shore of the Firth of Forth at Methil, Scotland and is approximately 1.5 km from the MHWS.

As the final detailed design of the Development has not yet been completed, a 'Project Envelope' has been developed, which sets out a range of parameters such as turbine size and possible foundation types. For each receptor within the ES, the 'worst case' effects which may arise has been identified and assessed, thus ensuring that the worst case effects of the Development have been considered. The final design of the Development will fall within the assessed Project Envelope and will therefore be within the worst case presented in this ES. The Development Footprint Envelope broadly consists of the following:

- Two turbines up to 198.5 m to blade tip and associated foundations, which may be gravity or drilled pile foundations;
- A cable corridor within which cables will be laid in trenches to connect the turbines to the onshore elements of the Development; and
- The onshore elements of the Development, comprising a small site office, underground cabling and turbine transformers, along with associated storage areas. This will be located within the Fife Energy Park.

An overview of the Development layout is provided in Figure 2.

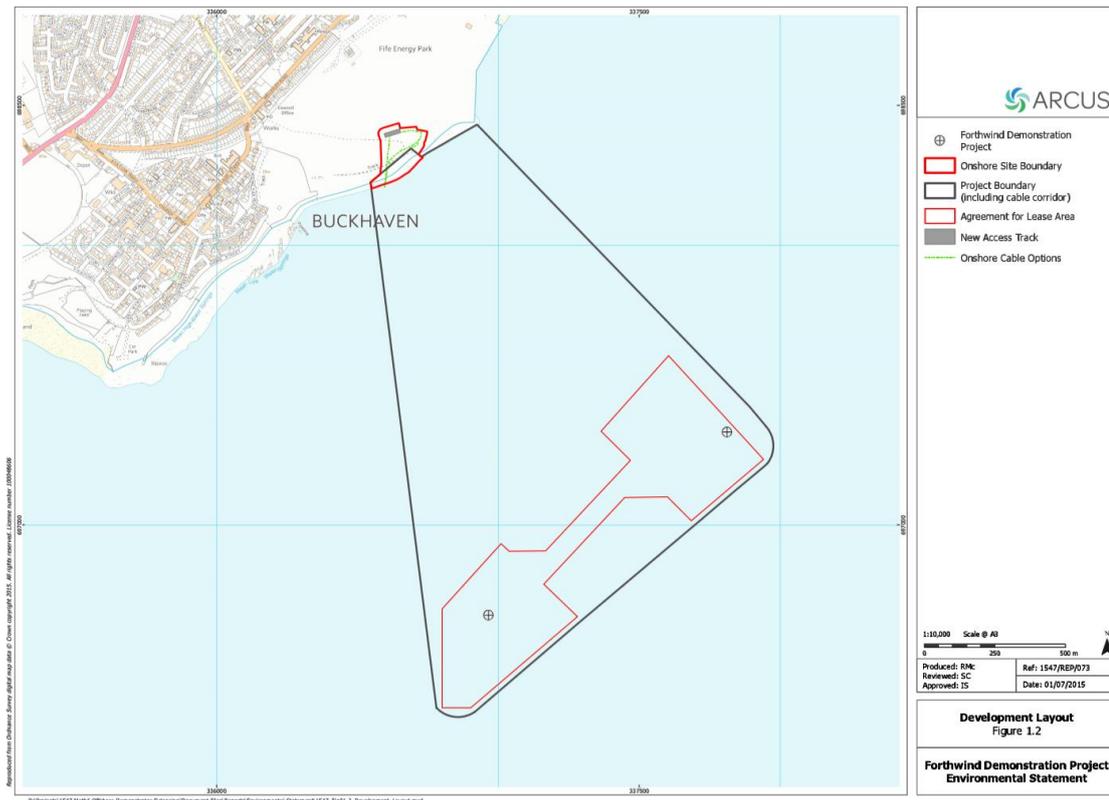


Figure 2 – Development Layout

3.1 2B6 Turbine

The 2B6 turbine, which will be installed on the development site, represents a step change in offshore wind turbine design, with the ambition to significantly reduce the cost of offshore renewable wind energy. The turbine itself is a downwind turbine, meaning that the nacelle faces away from the wind and the blades are downwind from the tower. The blades will be manufactured from fibre-reinforced epoxy.

The turbine is of variable speed, meaning that the turbine rotor speed varies according to the energy available in the wind. The rotor speeds varies between 5 and 13.25 revolutions per minute, dependant on the wind speed. The turbine will generate electricity in wind speeds between 4 and 25 metres per second (m/s) (9 to 56 mph or force 3 to 10 on the Beaufort scale). At the cut out wind speeds (i.e. speeds in excess of the above parameters) the turbine will shut down for self-protection.

The turbine nacelle, which houses the gearbox and generator, is mounted on a steel lattice tower. The tower will have three legs strengthened by diagonal crossbeams, which have been designed to discourage bird roosting.

The lower section of the tower would be constructed so that boats servicing the turbine can moor safely within the lattice structure of the tower. This enables maintenance and operations (M&O) activities, such as servicing equipment or replacing parts or machinery, to be hoisted up the central column directly from the craft below. M&O activities will be undertaken primarily by smaller vessels less than 15 m in length.



Figure 3 – Visualisation of the 2-B Energy Wind Turbine Technology

The nacelle is accessed via an elevator within the lattice framework. For safety purposes, ladders will be constructed within the lattice framework of the tower with rest platforms at appropriate intervals.

3.2 Onshore Construction Activities

In order to ensure that all mitigation measures outlined within this ES are carried out on site, contractors will be provided with the following documents which must be adhered to through the construction process:

- Pollution/Spill Prevention Plan, relevant environmental procedures and method statements;
- Noise management plan;
- Planning conditions; and
- Other requirements of statutory bodies.

Site safety and emergency procedures will also be required during the construction, operation and decommissioning of the Development.

3.3 Decommissioning

Following the cessation of commercial operations, the Development will be decommissioned in accordance with an approved decommissioning plan. This will involve the removal of the turbines. Following a significant period of time it is possible that removal of below ground infrastructure (including the foundations) could be more environmentally damaging than leaving it in place. Provision will be made to remove this infrastructure, however the requirement to decommission will be re-evaluated at that time. The infrastructure beneath the seabed will be left in situ.

The onshore elements of the Development will be decommissioned in accordance with the approved decommissioning plan at the time.

The processes involved in decommissioning are likely to be similar to the installation and construction activities, but of a smaller environmental impact magnitude.

Alternatively, it is possible that consent will be sought to extend the operational life of the Development, although this will require the relevant assessments and consents being undertaken and obtained prior to the end of the operational period, and in accordance with the legislation at the time.

4 PLANNING POLICY AND CONTEXT

In order to construct, operate and decommission the Development, a Section 36 Consent (Electricity Act, 1989) is required. Fife Council is a Statutory Consultee and regard must be given to the Development Plan.

The planning framework and the various policies that form the relevant planning context against which to assess the Development have been identified. It has been the intention of the ES to assess whether the Development complies with policy.

Advice on offshore wind energy is provided through a suite a national planning guidance and legislation, including the following:

- Blue Seas – Green Energy – the Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters (2011);
- Scotland’s National Marine Plan (2015);
- National Renewables Infrastructure Plan (2010);
- 2020 Routemap for Renewable Energy in Scotland (June 2011, updated October October 2012 and December 2013);
- The Renewables Action Plan (updated March 2011);
- A Low Carbon Economic Strategy for Scotland (2010);
- The Climate Change (Scotland) Act 2009;
- The Marine (Scotland) Act 2010;
- Overarching National Policy Statement for Energy (EN-1) (2011);
- National Policy Statement for Renewable Energy Infrastructure (EN-3) (2011);
- National Planning Framework 3 (2014); and
- Scottish Planning Policy and Planning Advice Notes (PANs).

The statutory Development Plan for the Development comprises the following:

- The TAYplan Strategic Development Plan (2012) (the “Structure Plan”); and
- The Mid Fife Local Plan (2012) (“the Local Plan”).

Fife Supplementary Planning Guidance (SPG) Wind Energy (revised June 2013) should also be given due consideration.

5 SEASCAPE LANDSCAPE AND VISUAL RESOURCES

A Seascape, landscape and Visual Impact Assessment (SLVIA) has been carried out of the potential landscape and visual effects arising from the Development.

The SLVIA focussed upon the assessment of effects on landscape and visual receptors within a 25 km radius of the Development as it is within this area that significant effects are more likely to occur. The SLVIA has also assessed the effects on 25 viewpoints which are representative of visual receptors found within 25 km of the Development. Effects on the landscape and visual resources arising from developments can occur in one of five ways: firstly, effects on the physical fabric of the Development site (loss of trees, etc.); secondly, effects on the surrounding landscape character; thirdly, effects on areas designated for their scenic beauty; fourthly, effects on views; and finally, cumulative effects arising from the addition of the Development to other windfarms. Assessment of cumulative effects considers windfarm developments that are within a 35 km radius of the Development to allow for overlapping visibility at the edge of the Development study area.

The assessment concluded that there will be significant effects on the following landscape and visual resources:

- Section of the Fife Coastal Walk between East Wemyss and Buckhaven and between Lundin Links and Buckhaven;
- Southern areas of Buckhaven where there are clear views of the Development, the esplanade at Leven and the shoreline area at West Wemyss, although the majority of these settlements will not experience significant effects;
- The shoreline area of the Wemyss Coast Special Landscape Area (SLA);
- Shoreline area of the "Coastal Hills" Landscape Character Type (LCT); and
- The West Wemyss to Buckhaven Local Seascape Character Unit (LSCU) and the Leven Links LSCU.

The limited significant effects on landscape and seascape resources are due to the heavily modified context to the Development site and the location of the Development 1.5 km seaward of MHWS. Such effects are not unacceptable due to the heavily modified context of the receiving environment and the reversibility of effects.

The Development will not affect any landscape designations of national importance.

The Development will result in significant effects on the West Wemyss Special Landscape Area (SLA). The Development will not result in any significant effect on any other SLA's within the study area, nor will it result in any significant effect on the landscape and visual amenity of any Gardens and Designed Landscapes (GDLS).

In general, significant effects on visual amenity will be limited to areas within 5-6 km of the Development. However, there will be areas within 5-6 km where there is no visibility of limited visibility and therefore no significant effect due to screening by local topography, buildings and vegetation.

The addition of the Development will result in significant cumulative effects with the already operational test turbine at the Fife Energy Park (known as 'FEPODWT' – Fife Energy Park Offshore Wind Demonstration Turbine). The Zone of Theoretical Visibility (ZTV) analysis indicated that the area most likely to be affected by cumulative effects will be the area between Kirkcaldy, Glenrothes and Methil and the coastal area between Methil and Crail. However it is considered that any significant cumulative effects will be no greater than those significant effects identified for the Development alone.

6 PHYSICAL PROCESSES

An assessment of the Development on the physical processes and water quality resource has been undertaken.

The core area of the Development is located in the Methil coastline, in water depths of up to 14 m, on a seabed of gravelly sands and rock outcrops. Potential impacts during the construction, operational and decommissioning phases may include increased suspended sediment levels, deposition of the sediment plume, release of sediment contaminants, changes to the local hydrodynamic regime (how the water moves in the area) and sediment transport, and impacts on the adjacent coastline. Each of these impacts was assessed in terms of their likely effects on the physical processes and water quality receptors.

All effects and cumulative effects assessed have been considered to be of negligible or minor significance. Therefore, no specific mitigation measures are suggested for the physical processes and water quality receptors.

Therefore, it is considered that any changes to the physical processes and water quality within the Development area will be highly localised and will not result in a significant effect on the Firth of Forth wider hydrodynamic regime, coastal dynamics or water quality.

7 ORNITHOLOGY

An assessment of the construction, operation and decommissioning of the Development on ornithological receptors has been undertaken. The assessment focussed on the key species and designated sites (i.e. a Natura site) considered to have connectivity with the Development (i.e. a connection between the development site and a designated site) due to potential collision, and disturbance/displacement impacts.

On the basis of current information, it has been determined that the Development will have no significant impacts on the ornithological resource during construction, operation and decommissioning. The estimated collision risk (i.e. the risk of death through collision or interaction with turbine blades) for all species that have relatively frequent flight activity at the potential collision risk height is considered to be low with the total estimated collision risk for all species to be approximately 11 birds per year. Given the very small scale of the effects, no mitigation is considered necessary to reduce effects, however a Pollution Prevention Plan will be in place to protect birds from pollution during all phases of the Development.

As a result, it is considered that there would be no significant adverse effects on ornithological receptors, the integrity of the Firth of Forth SPA, the Forth Islands SPA and the proposed Outer Firth of Forth and Tay Bay Complex SPA as a result of the construction, operation and decommissioning of the Development, alone or in combination with other similar developments.

8 MARINE MAMMALS

An assessment of the construction, operation and decommissioning of the Development on marine mammals has been undertaken.

Potential impacts from the Development on marine mammals include habitat loss, disturbance during construction and operation and indirect changes to prey availability. However such effects have been addressed through a range of mitigation measures including the presence of a Marine Mammal Observer (MMO) during construction works.

Based on the information available regarding the presence of marine mammals and the likely pathways from the effects during construction, operation and decommissioning, any impact from the three phases on marine mammals are deemed to be negligible and therefore not significant.

9 COMMERCIAL FISHERIES

An assessment of the construction, operation and decommissioning of the Development on the commercial fishing resource has been undertaken.

The Development area is of importance to local fishing fleets, especially those targeting lobster, crabs and, to a lesser extent, scallops; confirmed by landings, tracking data and consultation with local and national fishing organisations.

Moderate impacts on the commercial fishing resource could occur during construction and decommissioning when fishing vessels may be excluded completely from the area, however, the duration will be relatively short and mitigation through the application of safety zones and proper promulgation of information should keep disruption to as low as possible.

During the operational phase of the Development, much of the potting activity for lobsters and crabs will be able to resume operation in close proximity to the Development, however, if cables cannot be buried a minor impact will occur for fishing methods which are susceptible to snagging. To mitigate the impact procedures will be put in place for the event of interactions between wind farm construction and fishing activities (i.e., claims for lost and/or damaged gear). Burial, or where not possible, protection of the electricity export

cabling will be undertaken together with removal of seabed obstacles during and post-construction. A post-construction survey will be undertaken and seabed rectification procedures will be identified.

10 BENTHIC ECOLOGY

An assessment of the construction, operation and decommissioning of the Development on the benthic ecology (i.e. the organisms that live on or in the seabed) resource has been undertaken. The receptors that have been considered in this assessment include seabed habitats and the communities of plants and animal species typical associated with each habitat type.

In order to assess the potential effects of the Development on benthic ecology, a site specific survey was undertaken in 2014 with 19 sites selected within and around the site boundary with drop down videos and faunal grab samples taken at each site. In addition, five trawl sites were selected across the survey array for 2 m scientific beam trawling.

Potential effects were identified for the 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, electromagnetic field emissions 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 and as a result of embedded development design mitigation measures, no significant effects are anticipated.

In addition, no specific mitigation measures are suggested for construction or operational effects as all effects and cumulative effects assessed are considered to be of negligible or minor significance. Therefore, it is considered that any changes to the local and regional benthic habitats / species of the core study area within the Firth of Forth will be within naturally occurring population fluctuations and as such they will not be adversely affected by the Development.

11 MARINE ARCHAEOLOGY

An assessment of the potential impacts of the Development upon the maritime archaeology environment has been undertaken. A desk-based review of available information and consultation with Historic Scotland has been undertaken to identify and describe the archaeological environment around the site.

As a result, no known sites exist within the site and although three wrecks are listed with arbitrary locations, no evidence for them has been found during site surveys. In order to mitigate the risk of damage to any previously unrecorded archaeological remains, a Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) will be prepared to mitigate construction impacts on the event of any unexpected archaeological discoveries during construction. This protocol will also include appropriate archaeological 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.

12 ARCHAEOLOGY AND CULTURAL HERITAGE

An assessment of the construction, operation and the decommissioning of the Development upon the terrestrial cultural heritage resource was undertaken. 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 Fife Council's Historic Environment Record (HER).

The assessment intended to identify archaeological and cultural heritage sites which may be affected, either directly (e.g. through physical disturbance during construction of the Development) or indirectly (e.g. through visual changes to the historic or archaeological setting) during construction, through the operation or from decommissioning of the Development.

In order to identify cultural heritage features with the potential for their settings to be affected by the Development, an initial search area was defined based on boundary 15 km radius of the proposed turbines. Detailed assessment was given to nationally important features within approximately 5 km of the turbine locations, as based on previous experience and using professional judgement, these were judged to have the potential to receive a likely significant effect upon their settings.

As a result of desk-based studies, site visits and consultation with relevant statutory and non-statutory consultees, no significant direct effects are anticipated as there are no known archaeological features within the site, nor is there considered to be any potential for any unknown remains to exist and therefore no mitigation is proposed or considered necessary.

No significant effects are anticipated to occur to the settings of any cultural heritage assets arising from the construction, decommissioning and operation of the proposed Development. Although a number of non-significant effects have been identified, these are considered temporary (albeit long-term, lasting only for the lifetime of the Development) and are fully reversible upon the decommissioning of the Development.

13 AIRBORNE NOISE

An assessment of the effects of noise from the Development on noise-sensitive receptors was undertaken.

Construction noise will be of a limited impact and duration, being confined to working hours as agreed with Fife Council through planning condition. The application of mitigation measures where applicable will also ensure that any noise from site will be adequately controlled such that construction noise effects are considered not significant.

The effects of noise from operation of the Development, taking account of the cumulative effects of the FEPODWT, have been assessed using the methodology described in ETSU-R-97 and in accordance with best practice guidance. ETSU-R-97 provides a framework for the assessment and rating of noise from wind turbine installations and has become the accepted standard for wind farm developments in the UK. Subject to the application of an appropriate mitigation scheme (to be agreed between the Applicant, the operator of the FEPODWT, Marine Scotland and Fife Council) noise levels during operation of the Development would be acceptable in terms of ETSU-R-97, and are therefore considered to be not significant in terms of the EIA regulations. The appropriate mitigation scheme may, for example, require modifying the operation of either or both developments in certain wind speeds and directions, for the 18 month duration when there is potential for cumulative impact. At the end of the overlap period with FEPODWT, the Development can operate within the limits defined by ETSU-R-97, and impacts will therefore continue to be insignificant.

It is anticipated that following decommissioning of the FEPODWT (in approximately 4 years' time), the full ETSU-R-97 noise limits would be transferred to the Development, and that this could be applied through a suitable planning condition at the time of any consent. It has been shown that noise levels due to the operation of the Development without the influence of the FEPODWT are below the derived noise limits and therefore compliant with the requirements of ETSU-R-97.

Noise during decommissioning will be managed to ensure compliance with best practice, legislation and guidelines current at the time in order to ensure that effects are not significant.

14 SHIPPING AND NAVIGATION

An assessment of the navigational safety issues arising from the construction, operation and decommissioning of the Development was undertaken. Potential impacts may include collision with foundation installation and wind farm service vessels, turbine and foundation collision, grounding on sub-sea cable protection and effects on communication, radar and positioning systems.

The risks to navigation during the construction phase have been assessed to be as low as reasonably practicable and will be mitigated by measures such as implementing a 500 m safety zone around the Development, appropriate marking and lighting of installation vessels and temporary and incomplete structures as well as the implementation of an Emergency Response Cooperation Plan.

The potential risks to navigation during the operational phase of the Development has been assessed to be as low as reasonably low subject to the application of such risk controls such as appropriate marking and lighting of the individual turbines, a minimum rotor clearance of 22 m above Mean High Water Spring (MHWS), and the turbines and associated cabling to be charted using the appropriate symbols.

It is difficult to predict shipping traffic far into the future, however it is anticipated that the likely impacts from decommissioning will be the same, or less than, those described during construction and therefore the same mitigation measures will be applied.

15 SOCIO-ECONOMICS, RECREATION AND LAND-USE

An assessment of the Development on the local and national economy, nearby tourist attractions and recreational facilities and land-use was undertaken and was based on desk-based studies, reviews of relevant offshore guidance and consultations with Scottish Government and organisations related to marine recreation and tourism.

The construction of the Development and setting up of the Scottish subsidiary will directly create job opportunities for ten local staff in the areas of project management, legal and accountancy services, in addition to generating opportunities for up to 60 local workers during the construction period to establish site facilities and grid connection cabling. Once the Development is operational, there will be 6 full-time maintenance and administrative jobs created.

There is an even greater potential for the local Scottish supply chain to benefit from the construction programme from the Development. There is a realistic opportunity for Scottish companies to supply a number of components and services to this project, equating to around 45% of the total project costs. The remaining 55% of non-Scottish contribution relates to areas where there is no existing indigenous Scottish supply chain capacity or infrastructure.

In addition to the direct and indirect job impacts, successful delivery of the Demonstrator Scheme in Fife will help to:

- Increase local industry and academic collaboration, thereby building knowledge capacity in the local area;
- Make significant progress in integrated system technology for offshore wind;
- Facilitate the growth and development of the industry, develop industry process, workforce skills and industry culture in the Fife area; and
- Raise the profile of Fife at an international level.

The construction of the Development is not predicted to have any indirect or direct effects on any land-based or marine-based recreational and tourist facilities. The area surrounding the turbine will not be accessible to marine recreational users for health and safety reasons. However, the assessment concludes that there will be numerous other opportunities for marine activities to be carried further along the coastline.

The operation of the Development is likely to have a significant impact on local views along the Fife Coastal Path, particularly from Buckhaven. The Development would be a noticeable new feature in views although it would not become a focal point due to the presence of the FEPODWT and the activities within the Fife Energy Park.

Impacts on tourism and recreation resource relate strongly to the attitudes of the individuals experiencing the wind farm. Studies undertaken by professional bodies across the UK have suggested that the public is generally in favour of generating energy from renewable resources and that the majority of those surveyed do not have a negative attitude towards wind farms.

The Development will be located offshore and as such there will be change in land-use. The redevelopment of Fife Energy Park is an improvement to the existing land in Fife region.

16 FISH AND SHELLFISH ECOLOGY

An assessment the Development upon the fish and shellfish ecology was undertaken. The construction, operation and decommissioning of the Development has the potential a variety of direct and indirect effects, particularly on those populations living within the Firth of Forth. Receptors are assessed in relation to key spawning, nursery, feeding and over-wintering areas as well as important potential migratory pathways.

A detailed review of the current literature and the site-specific data gathered during the benthic ecology 2 m beam trawl survey was used to give an overview of the general fish and shellfish ecology of the core study area and the wider Firth of Forth region. As a result, the core study area of the Development was identified as a potential nursery and spawning ground for species such as lemon sole, plaice, cod and Norway lobster. It is also considered that the wider area could be an important migratory pathway and foraging ground for a number of ecologically important species that include salmon, sea trout, sea lamprey, European eel and European smelt. Overall these species were considered typical of the Firth of Forth area and central North Sea.

Potential effects were identified for both the construction, operational and decommissioning phases. These include: underwater noise and vibration, increased suspended sediment, sediment deposition and smothering, habitat disturbance / loss, release of environmentally harmful substances, introduction of new habitats and a change to the local hydrodynamic regime. Each of these effects were assessed in terms of their likely impact on fish and shellfish ecology.

Development design mitigation measures are proposed to minimise the significance of underwater noise, suspended solid concentrations, sediment deposition, EMF (Electromagnetic Field) and pollution prevention planning. As a result, no specific mitigation measures are suggested for construction or operational effects as all effects and cumulative effects assessed are considered to be of negligible or minor significance. Therefore, it is considered that any changes to the local and regional fish and shellfish species of the core study area within the Firth of Forth will be within naturally occurring population fluctuations and as such they will not be adversely affected by the Development.

17 MISCELLANEOUS ISSUES

An assessment of the Development on the following miscellaneous issues was undertaken:

- Access and Transport;
- Air Quality;
- Climate and Carbon Balance;
- Health and Safety Considerations; and
- Shadow Flicker.

17.1 Access and Transport

The majority of the turbine components will be delivered to the site by sea, either directly or via a suitable port. Therefore, an abnormal loads study relating to preferred route options for transporting the turbines on land is not required. The traffic generated during the construction and operation of the turbines will be minimal and use the surrounding trunk road network. Vehicular access to the site will be via the entrance to the Fife Energy Park which is suitable for Heavy Goods Vehicles (HGVs) and it is not proposed to construct any additional tracks within the Fife Energy Park, due to the nature of the ground and the current use of the site. Overall, the traffic generated, as a result of the demonstration facility will be minimal throughout construction, operation and decommissioning and as such will have no significant effects on the surrounding road network.

17.2 Air Quality

The potential effects of exhaust emissions during construction is likely to be very low given the small number of vehicles and vessels anticipated to be involved in the construction of the Development, and the zone of any effects would be highly localised to the vehicle or vessel in question to the extent that there is considered to be 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 would require fewer vehicle movements than construction, the same conclusion of no significant effects therefore applies.

Dust from construction activities has the potential to be a nuisance to receptors close to the Development. Given the existing hardstanding nature of the Fife Energy Park, the limited duration and extent of the onshore construction activities, and the implementation of good working practices to control dust emissions through an appropriate Construction and Environmental Management Plan (CEMP), there is considered to be no potential for a likely significant effect in relation to dust as a result of the construction of the Development. As there is less potential for emissions during operation and decommissioning of the Development, the same conclusion of no significant effects applies.

17.3 Climate and Carbon Balance

The wind turbine will have a positive benefit on carbon dioxide (CO₂) emission savings. Energy generated by the wind turbine will have the potential to displace electricity generated from other sources such as fossil fuels. As the Development is a demonstration facility it is highly likely that its electricity production will vary significantly over the 20 year operational period. However 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.

A comprehensive health and safety assessment will be carried out prior to construction by the selected contractor in accordance with relevant legislation and construction of the site would comply with all relevant Health and Safety Regulations.

17.4 Shadow Flicker

Shadow flicker is the term used to describe the effect that occurs when the shadow of a wind turbine blade passes over a narrow opening (usually a window) and the shadow appears to quickly turn on and off within the room. Various sources conclude that shadow flicker does not affect the health and well-being of the occupants but if the property is located close to the wind turbine it can be considered to have an effect on amenity. Shadow flicker is a phenomenon that only occurs once the turbines are installed and operational, thus no shadow flicker effects are anticipated during the construction phase of the Development, until turbine construction has been completed.

A detailed shadow flicker assessment was undertaken using a computer model designed specifically for wind turbines (WindFarm version 4.2.1.7) and Geographic Information System (GIS) software. It was calculated that, theoretically, shadow flicker is likely to occur at some properties along the coast which are closest to the Development. The model output has also shown that potential effects would occur between late October and mid-February, between the hours of 08:00 and 10:10. Given the duration and the time of day and year during which the effects are predicted to occur (i.e. in the winter when bright sunshine is less likely), it is considered that the effect is of minor significance.

The effect may be further reduced given that the predominant wind direction is west-south-westerly, meaning that the most common resulting in the blades being most commonly aligned in a perpendicular direction to the affected properties, reducing the likelihood for shadows to be cast in a north-westerly direction. Any screening provided by other vegetation or curtains/blinds would further reduce this effect.

In the event that reports or complaints of shadow flicker are received by the Applicant, site operator or Fife Council, and an appropriate investigation confirms the occurrence, then measures such as those outlined above would be used to prevent re-occurrence and protect residential amenity.

18 OTHER MARINE USERS

An assessment was undertaken to assess the potential effects of the Development upon other marine users including cables and pipelines, dumping and disposal sites, recreation and tourism (principally sailing), oil and gas, marine aggregates, military activities and other renewable energy activities.

Potential effects have been identified during the construction, operational and decommissioning phases. These include 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.

18.1 Cables and Pipelines

A review of charted subsea cables in the Firth of Forth has identified that there are no subsea telecommunication or power cables in the vicinity of the Development. In addition, with the absence of offshore oil and gas production in the region, there are no pipelines serving this industry and therefore no pathway exists for an effect to arise and as such this is scoped out of further assessment.

18.2 Dumping and Disposal Sites

A number of closed disposal sites have been located within the Firth of Forth, the closest of which is approximately 10 km from Development and therefore have not been assessed any further in this assessment as they are not in use and are not in close proximity to the Development.

Three open disposal sites are located within the vicinity of the Development with the closest open disposal site 0.8 km to the east. Given their nature, disposal sites generally have high background suspended sediment concentrations and are considered to have a high adaptability and tolerance to suspended and deposited sediments and therefore the significance of the effect from the Development is considered to be negligible.

18.3 Recreation and Tourism

The loss of the area taken up by the Development is mostly likely to affect sailors using the RYA (Royal Yachting Association) sailing area (covering the Firth of Forth), the medium

use route through the Development site, activities taking place within the development or within Largo Bay such as kitesurfing and recreational/shoreline fishermen.

Sailors using the RYA sailing area and medium use route are likely to be cruising past the Development and will take a slightly diverted course if required however the loss of area in comparison to the wider Forth RYA sailing area is minimal. Kitesurfers and recreational shoreline fishermen utilise the foreshore and therefore will not occur within the Development which is approximately 1.5 km offshore. The loss of area in comparison to the wider Forth for recreational boating fishermen is minimal.

18.4 Oil and Gas

No fixed oil and gas infrastructure has been identified near the Development and therefore this has been scoped out of further assessment. Potential effects on vessel activity to and from Grangemouth Port and Hound Point marine tanker loading terminal have been considered in Section 14: *Shipping and Navigation* of this NTS.

18.5 Marine Aggregates

One licensed marine extraction site was located within the inner Firth of Forth, south-west of Methil. Various sources suggest 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.

18.6 Military and Aviation 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. The Firth of Forth at Fife is partially covered by a MOD Safeguarding consultation zone, the 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. Consultation with the MoD stated that there were no issues expected to arise from the Development on their facilities. However, given the scale of the turbine, they would require it to be lit for aviation safety reasons. This is commonplace for the majority of modern offshore and onshore turbines.

The Development is not located within any aviation safeguarding zones and during consultation, neither the British Aviation Authority, Civil Aviation Authority (CAA) or the National Air Traffic Services En Route Plc (NERL) had any objections to the Development. As a result, a detailed assessment on effects on military and aviation activities has not been undertaken as no effects would be anticipated.

18.7 Other Marine Renewable Energy Activities

One fully commissioned offshore turbine is located at Fife Energy Park, located in 5 m water depth 1.25 km from the Development. An additional four consented offshore wind farms are located within 60 km of the Development and five potential offshore wind farms are currently in the concept/early planning stages are all located within 80 km of the Development.

There are no wave and tidal renewable energy activities within the vicinity of the Firth of Forth. Therefore wave and tidal activities have been scoped out of further assessment.

19 TERRESTRIAL ECOLOGY

An assessment of the Development upon the terrestrial ecology resource was undertaken. Due to the turbines being located offshore, the geographical scope of this assessment was

restricted to the onshore elements of the Development, the cable route from the landfall point to these elements and the potential cable trench within the intertidal zone.

The area within the Fife Energy Park which will house the onshore elements is reclaimed colliery spoil which is subject to repeated severe disturbance from reshaping and heavy industrial activities. The very limited range of semi-natural habitats within the Fife Energy Park is considered unlikely to support a notable invertebrate assemblage and there are no records of notable invertebrates associated with the site. In addition, although the site may offer potential basking and hunting habitat for some reptiles, the high level of disturbance and the lack of other habitats (such as water features, mature vegetation and sheltering locations) suggests that reptiles are extremely unlikely to occur on site. Furthermore, previous bat surveys at the Fife Energy Park have recorded extremely low levels of activity and did not identify any bat roosts. The site, including the coastline, provides sub-optimal foraging and roosting habitats and there are no historical records of bats associated with the site.

As a result of the very limited value of the Fife Energy Park, the regular disturbance of the area associated with ongoing operations and the limited footprint and construction requirements associated with the onshore elements of the Development, there is considered to be no potential for likely significant effects on terrestrial ecological receptors during construction, operation or decommissioning of the Development.

Three designated sites lie within 5 km of the Development; the Firth of Forth Site of Special Scientific Interest, the Firth of Forth Special Protection Area and the Firth of Forth Ramsar, however none of the habitats or species listed as 'features of special interest' are present in or near to the Development and so disturbance to these features is extremely unlikely. In addition, given the ongoing shoreline management and nearby industrial activity, any impacts, however unlikely, would fall below current background levels of disturbance and would be not significant.

20 TERRESTRIAL HYDROLOGY, HYDROGEOLOGY AND SOILS RESOURCES

An assessment of the Development on the terrestrial hydrology, hydrogeology and soils resources was undertaken.

Potential effects that may occur during the construction of the Development on this resource include chemical pollution, sedimentation and erosion, migration of pollutants from contaminated land and flooding.

To limit the uncontained release of chemicals from onshore elements of the Development, mitigation measures such as absorbent spill pads and impermeable geosynthetic membranes will be implemented and all onshore machinery will be equipped with drip pans to contain minor fuel spillage or equipment leakages. As a result, chemical pollution effects on all terrestrial hydrological receptors are considered to be very low risk and not significant.

Erosion and sedimentation from the onshore elements of the Development has limited potential to impact upon groundwater as excavation depths for hardstanding are likely to be less than 1 m depth into made ground, with the buildings requiring limited foundation preparation. As such, there will negligible magnitude of effect, the significance of effects associated with erosion and sedimentation on groundwater is considered to be negligible.

In the event that potentially contaminated land be encountered during excavations, it will be tested and appropriate action taken in accordance with The Environmental Protection Act 1990 (Amendment) (Scotland) Regulations 2001. As a result, effects associated with contaminated land are, therefore, considered to be of minor magnitude and significance.

The Landfall Point and a small area of hardstanding are the only onshore elements of the Development which are located within areas described as having a 0.5 % or greater annual

risk of coastal inundation, according to the SEPA Flood Map¹. As a precautionary measure, all onshore elements of the Development will be constructed with an element of flood protection in the event of coastal ingress. The impermeable nature of the made ground on-site and the underlying geology means that, in the baseline scenario, there will be relatively low infiltration and relatively high run-off rates, and hence the addition of the Development would have a minimal impact upon infiltration and run-off rates.

Potential effects that could occur during the operation of the Development include pollution, further erosion and sedimentation and alterations to natural flow pathways. These effects have been discussed in relation to the construction phase, and as there would be substantially less activity during operation combined with the unlikelihood of ground disturbance during operation, the magnitude of these effects is similarly reduced. Any changes during construction would continue through operation, as the majority of infrastructure would remain in place. This will be further reduced through adopting best practice design and construction, such as retaining silt traps, and adherence to a PPP, as discussed above. As a result, the magnitude and significance of all effects associated with operation of the Development are assessed as being negligible. This is not considered significant in terms of the EIA Regulations.

Appropriate pollution prevention measures will be adopted during the decommissioning of the Development in line with best practice at the time to ensure that effects are sufficiently low to not be of concern.

21 CONCLUSIONS

An assessment of the Environmental Impacts of the Development has been carried out in accordance with EU, UK and Scottish regulations, and has consulted statutory and non-statutory bodies and interested parties. The findings have been presented in an Environmental Statement, which includes technical appendices.

Significant impacts are limited to:

- Visual amenity within 5-6 km of the Development, however these are not unacceptable due to the heavily modified context of the receiving environment and the reversibility of effects
- Cumulative operational noise effects in combination with the FEPODWT. However this will be mitigated to acceptable levels through an agreement between the applicant, FEPODWT, Marine Scotland and Fife Council; and
- Potential shadow flicker effects at some properties along the coast which are closest to the Development. However the potential for occurrence is limited to between late October and mid-February, between the hours of 08:00 and 10:10. With the effect further reduced by the blades being most commonly aligned perpendicular to the affected properties due to the predominant wind direction and the screening effect from vegetation.

Measure to mitigate negative impacts, where achievable, are proposed. Forthwind has made a number of commitments to establish plans for quality, health, safety and environmental management for the project, ensuring that all operations are conducted in a responsible manner.

The Forthwind Demonstration Project offers a positive contribution to the UK and Scottish national ambitions to install renewable energy capacity by 2020 and the Development will also contribute to Scotland's efforts in demonstrating its indigenous capability in the international offshore wind sector.

¹ SEPA Flood Maps [online]. Available at: <http://map.sepa.org.uk/floodmap/map.htm> [Accessed 11/03/2015].

22 FURTHER INFORMATION

Copies of the Environment Statement are available for public viewing at the following locations within normal opening times:

2-B Energy Ltd,
The Boathouse,
Siversands,
Hawkcraig Road,
Aberdour,
Fife.
KY3 0TZ

Fife Council
Methil Local Area Office
Wellesley Road,
Methil,
Fife,
KY8 3PA

Fife Renewables Innovation Centre
Ajax Way
Methil Docks Business Park
Methil,
Fife
KY8 3RS

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

Copies of the Environment Statement may be obtained from:

- Forthwind Ltd, c/o 2-B Energy Ltd, The Boathouse, Siversands, Hawkcraig Road, Aberdour, Fife KY3 0TZ. Telephone 01383 662 160 at a charge of at a charge of £400 hard copy and £5 on CD/DVD.
- Alternatively a downloadable version of the Environment Statement can be viewed online on the 2-B Energy website at www.2benergy.com.