

# **Fife Energy Park Offshore Demonstration Wind Turbine (FEPODWT)**

## **Non Technical Summary**

July 2012

## PREFACE

This document is the Non Technical Summary (NTS) of the Environmental Statement (ES) which accompanies the application by Scottish Enterprise to Marine Scotland on behalf of the Scottish Government, to develop a test facility for the demonstration of new designs of offshore wind turbines on the northern shore of Firth of Forth, Scotland.

The ES has been prepared by Arcus Renewable Energy Consulting Ltd on behalf of Scottish Enterprise and comprises the following:

- Environmental Statement Volume I containing the written statement;
- Environmental Statement Volume II containing the figures;
- Environmental Statement Volume III containing the technical appendices; and
- NTS providing a summary of the information presented in Volume I.

Hard copies of the Environmental Statement may be obtained from Arcus Renewable Energy Consulting Ltd (Tel: 01904 715470) at a charge of £250 or a copy on CD for £10. Electronic copies of this NTS are available free of from:

Arcus Renewable Energy Consulting Ltd.  
507-511 Baltic Chambers  
50 Wellington Street  
Glasgow  
G2 6HJ

The public can view the ES during normal office hours at the Scottish Government Library at Victoria Quay, Edinburgh, EH6 6QQ. The ES is also available for viewing by the public during normal opening hours at the following locations:

Buckhaven Local Services Centre  
Buckhaven Local Office,  
3 College Street,  
Buckhaven,  
Leven,  
KY8 1AB

Methil Local Services Centre  
Methil Library,  
Wellesley Road,  
Methil,  
Leven,  
KY8 3PA

Fife Council  
Development Services,  
Forth House,  
Abbotshall Road,  
Kirkcaldy,  
KY1 1RU

Any representations to the application should be made by email to The Scottish Government,  
Marine Scotland Licensing Operations Team mailbox at [Methil@scotland.gsi.gov.uk](mailto:Methil@scotland.gsi.gov.uk)

Or by post to:

The Scottish Government,  
Marine Scotland Licensing Operations Team,  
Marine Laboratory,  
PO Box 101,  
375 Victoria Road,  
Aberdeen,  
AB11 9DB

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## **1 NON-TECHNICAL SUMMARY**

### **1.1 Introduction**

This Non-Technical Summary (NTS) forms part of an Environmental Statement (ES) to accompany three applications, an application under Section 36 of Electricity Act 1989 and two applications for Marine License under the Marine (Scotland) Act 2010, for consent to Marine Scotland by Scottish Enterprise (“the Applicant”). The applications relate to the installation and operation of the Fife Energy Park Offshore Demonstration Wind Turbine (FEPODWT) on the northern shore of Firth of Forth at Methil, Scotland.

The project to be known as Fife Energy Park Offshore Demonstration Wind Turbine (“the Development”) will be located approximately 35 m from the mean high water springs (MHWS) mark and 48.3 m from the Fife Energy Park (FEP) boundary (Figure NTS 1). The Development involves installing and testing a new concept of offshore wind turbine that consists of a three-bladed turbine on a tubular tower which would be operational for five years.

The purpose of the ES is to:

- Explain the need for the Development and describe the physical characteristics, scale and design of the Development;
- Examine the existing environmental character of the Development site and the area with the potential to be affected by the Development;
- Predict the possible significant environmental effects of the Development;
- Describe measures which would be taken to avoid, offset or reduce adverse environmental effects;
- Report the potential residual effects of the Development; and
- Provide the public, the consenting authority and other consultees with information on the Development, which would assist Marine Scotland in the determination of the submission.

### **1.2 The Applicant – Scottish Enterprise**

Scottish Enterprise (“the Applicant”) is Scotland’s main economic development agency and aims to deliver a significant, lasting effect on the Scottish economy. Their role is to help identify and exploit the best opportunities for economic growth. They support ambitious Scottish companies to compete within the global marketplace and help build Scotland’s globally competitive sectors. The Applicant also works with a range of partners in the public and private sectors to attract new investment to Scotland and to help create a world-class business environment.

### **1.3 Proposed Development Summary**

The Development will be located at the FEP which comprises 133 acres of industrial land some of which is utilised by the FEP’s existing operators and some of which is currently semi-derelict. The site is owned by Scottish Enterprise and the FEP is currently undergoing a major redevelopment program which will create industrial facilities to support the offshore renewable energy sector in Scotland.

The purpose of the Development is to test new designs and models of offshore wind turbines. The turbine dimensions which are being applied for are based on those for new designs of turbines which are planned to be marketed for future offshore wind energy developments, including Scottish Territorial Waters and the UK wide Round 3 wind development zones.

To be able to be marketed for use on offshore wind farm sites, new turbine designs must be tested and approved in accordance with the International Standard IEC 61400-12 “Wind turbine generator systems”.

An application was submitted by 2-B Energy in April 2010 and subsequently granted consent by Marine Scotland in November 2011 for the testing of a turbine at the same location. This was for a single, 185 m two bladed wind turbine with an installed capacity of 6 MW (hereafter

referred as “the Consented Development”). This consent was subject to an agreement for the lease of the seabed being reached with the Crown Estate. The Consented Development is no longer proceeding. This application is to allow the testing of an alternative design of turbine in a similar location. The Development will not proceed alongside the Consented Development. Where appropriate the ES makes reference to the differences between the Consented Development and this application.

## 2 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

Environmental Impact Assessment (EIA) is a process intended to ensure that developments which are likely to have significant effects on the environment are only granted consent after a prior assessment of the likely environmental effects has been undertaken. The assessment of the effects allows for measures to be developed, either through project design, or the use of mitigation measures which will reduce the significance of these effects.

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); and
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011.

This legislation is hereafter referred to as “The EIA Regulations”. This ES presents the findings of the EIA of the Development as a whole, incorporating the offshore and onshore elements namely:

- The construction and operation of the turbine and associated foundation;
- Bridge connection between the FEP and turbine;
- Construction of an onshore crane pad on the FEP;
- Construction of an onshore Control compound.

In addition to the above components of the operational facility, the construction phase will involve:

- Construction of four lay down areas for the blades, tower, jacket, and nacelle.

The assessments have been undertaken in accordance with the EIA Regulations listed above.

The EIA Regulations require that an ES should include the information specified in Schedule 4 of The EIA Regulations.

Guidance in relation to good practice, which has been considered throughout the EIA process comprises of the following documents:

- Circular 3/2011 ‘The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2011, June 2011;
- A User’s Guide to the Environmental Impact Assessment (Scotland) Regulations 2011, Scottish Government, June 2011;
- CEFAS, Offshore Wind Farms: Guidance Note for Environmental Impact Assessment in Respect of Food and Environmental Protection Act (1985) (FEPA) and Coastal Protection Act 1949 (CPA) Requirements, June 2004;
- Guidelines for Environmental Impact Assessment, Institute of Environmental Management and Assessment, 2004;

- Guidelines on the Environmental Impacts of Windfarms and Small Scale Hydroelectric Schemes, SNH, 2002;
- Environmental Impact Assessment: Guide to Procedures, January 2000<sup>1</sup>; and
- Planning Advice Note (PAN) 58 'Environmental Impact Assessment,' Scottish Executive, September 1999<sup>2</sup>.

## 2.1 Scoping and Consultation

The aim of the Scoping process is to identify key environmental issues at as early a stage in the process as possible, to ascertain which elements of the Development are likely to result in significant effects on the environment and to establish the extent of survey and assessment required for the ES.

A Scoping Report was prepared that identified potential significant environmental effects of the Development and proposed a scope of work, including technical assessments that should be undertaken to allow the determining authority to determine the application. The report was circulated widely to statutory and non-statutory consultees, Community Councils and other interested parties.

A request for a Scoping Opinion was submitted to Marine Scotland in February 2012 and a response was received in April 2012 of which its content is considered and integrated into this ES.

As a result of the scoping responses and on-going consultation, the following issues are addressed in the ES:

- Landscape and Visual;
- Ecology and Ornithology;
- Water Resources and Coastal Hydrology;
- Archaeology and Cultural Heritage;
- Noise;
- Shadow Flicker;
- Existing Infrastructure Including Aviation and Telecommunications;
- Navigation;
- Socio-economics, Recreation & Tourism, Land-Use and Commercial Fishing; and
- Climate and Carbon Balance, Healthy and Safety and Traffic Management.

All elements of the project and associated infrastructure during the construction and operation phases have been assessed in the ES.

An initial public exhibition was held on the 15<sup>th</sup> March 2012 to introduce the concept of the Development to the local community. The Developer plans to hold another public exhibition day in August 2012 whilst the application is under consideration by Marine Scotland (on behalf of the Scottish Ministers).

## 3 PROJECT DESCRIPTION

The operational Development will comprise the following main components:

- A single, three bladed demonstration wind turbine with an installed capacity of up to 7 MW. The turbine tower is up to 110 m tall, from mean sea level (MSL), including the jacket, with a maximum blade rotor diameter of up to 172 m, giving a maximum level from the MSL to turbine tip of up to 196 m;

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<sup>1</sup> Communities and Local Government, (2000), 'Environmental Impact Assessment: Guide to Procedures', Available Online at:  
<http://www.communities.gov.uk/publications/planningandbuilding/environmentalimpactassessment>

<sup>2</sup> The Scottish Government, (2005), 'Planning Advice Note PAN 58 : Environmental Impact Assessment', Available Online at: <http://www.scotland.gov.uk/Publications/1999/10/pan58-root/pan58-pdf>



- A personnel bridge connection between the FEP and turbine tower;
- Construction of an onshore crane pad on the FEP; and
- Construction of an onshore Control compound .

In addition to the above components of the operational facility, the construction phase will involve:

- Construction of four lay down areas for the blades, tower, jacket, and nacelle.

Further infrastructure is associated with the Development, however consent for these installations has/will be applied for under separate applications and consenting regimes as detailed below. This is to permit the phased installation of these project elements, and to comply with the consents process for the various legislative regimes which apply to applications in a near shore environment. Details of these infrastructure and associated consents are:

- Erection of a single onshore wind monitoring mast. The mast will not exceed 110 m in height and will be installed for a maximum period of 6 years. A consent for the installation of this mast has been made to Fife Council under the Town and Country Planning (Scotland) Act 1997 (as amended);
- Erection of a single offshore temporary wind monitoring mast, not exceeding 110 m in height from the MSL. This mast will be installed for a period of 3 months and will be removed prior to construction of the demonstration turbine facility. Two applications for Marine Licenses to install this mast have been made to Marine Scotland under the Marine (Scotland) Act 2010. One relates to the preparation of the sea bed and one to the installation of the met mast;
- The demonstration turbine will be connected to the grid via an underground cable which will connect to an existing substation. The application for the grid connection will be made to the Distribution Network Operator (DNO), Scottish Power Energy Networks; and
- An application has been made to Fife Council under the Town and Country Planning (Scotland) Act 1997 (as amended) for the other onshore infrastructure required in connection with the turbine installation and on-going maintenance.

The demonstration turbine is similar in appearance to the offshore turbines currently in use with a matt pale grey finish and lighting and marking requirements taken into account. It would be of variable speed, varying according to the wind with the gearbox located within the nacelle on a tubular steel tower.

The turbine will sit on a steel jacket which will be piled into the sea bed. Access to the demonstration turbine would be via a personnel bridge which will provide permanent access between shore and platform which forms part of the jacket structure. The bridge would require piling at the FEP side along with a pile cap and concrete pier. Possible intermediate support will require piling which would be done above the MHWS. The underside of the bridge would also transfer electricity cables from turbine to shore which would be appropriately insulated.

In order to ensure that all mitigation measures outlined within this ES are carried out on site, contractors would be provided with the following documents which must be adhered to throughout 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.

The Development would be operational for 5 years. In the event successful testing of a turbine is completed this turbine would be removed and a further turbine may be installed on

the existing base. Only one turbine will be installed at any one time and the base will remain in position. All turbines will be removed after 5 years of operation.

#### **4 PLANNING POLICY 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 of national planning guidance and legislation, including the following:

- 2020 Routemap for Renewable Energy in Scotland;
- The Renewables Action Plan;
- A Low Carbon Economic Strategy for Scotland;
- Blue Seas - Green Energy - the Sectoral Marine Plan (SMP) for Offshore Wind Energy in Scottish Territorial Waters;
- The Climate Change (Scotland) Act 2009;
- The Marine (Scotland) Act 2010;
- Overarching National Policy Statement for Energy (EN-1);
- National Policy Statement for Renewable Energy Infrastructure EN-3; and
- Scottish Planning Policy and Planning Advice Notes (PANs).

The statutory Development Plan for the Development comprises the following:

- The Fife Structure Plan 2006-2026 (2009) (the "Structure Plan"); and
- The Mid Fife Local Plan (2012) (the "Local Plan").

Fife Supplementary Planning Guidance (SPG) Wind Energy (revised June 2011) should also be given due consideration.

#### **5 LANDSCAPE AND VISUAL EFFECTS**

An assessment has been carried out of the potential landscape and visual effects arising from the Development. Consideration has been given to how these compare with the Consented Development.

The objective of the assessment has been to identify what the 'significant' effects of the Development will be on the landscape and visual resource. A significant effect will occur where the Development causes a major change to the physical fabric of the Development site, to the landscape character of the surrounding area and to views, such that these 'receptors' become defined by the presence of the Development. A 'not significant' effect will occur where changes brought about by the presence of the Development are minor and the baseline characteristics of the Development site, the surrounding landscape character and views continue to prevail. In this instance the Development may have an influence but this will not be definitive.

An initial 30 km study area was considered in this assessment. The same viewpoints were used to determine the likely effects of the Development as were used for the Consented Development in order that direct comparisons can be made between both schemes. In addition to these viewpoints Scottish Natural Heritage, East Lothian Council and Edinburgh Council requested a further viewpoints be included. These additional viewpoints have been included and assessed as part of the assessment.

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 30 km radius of the Development to allow for overlapping visibility at the edge of the Development study area.

The assessment has concluded that there will be significant effects on the following landscape and visual resources within the 15 km radius of the Development:

- 'Wemyss unit' of the 'Coastal Hills' landscape character type, extending from the built-up edge of Buckhaven for a distance of approximately 5 km southwest of the Development;
- 'Mid-Leven Valley unit' of the 'Lowland River Basins' landscape character type, extending from the built-up edge of Kennoway for a distance of approximately 5 km west of the Development;
- 'Largo Law unit' of the 'Lowland Dens' landscape character type, extending from the built-up edge of Leven for a distance of approximately 5 km north of the Development;
- Houses on the coastal edge of Buckhaven and Methil (30-40no) and from some houses within these settlements that gain an open view;
- Small number of houses on the eastern edge of East Wemyss (10-15no);
- Houses on the southern edge of Kennoway (20-30no) and from some houses within the settlement that gain an open view;
- Small number of houses on the western edge of Lower Largo (3-5no);
- Section of Fife Coastal Walk, between West Wemyss and Lower Largo, covering a total distance of about 12 km; and
- Local views from a small number of individual houses, farmsteads and roads, primarily to the west and north of the Development, extending for a distance of about 5 km.

These effects are confined to the close vicinity of the Development and are very similar to the Consented Development. The effects are also considered to be 'negative' since they will not result in specific benefits to the affected landscape or views. However, the effects will be 'short term' and are limited to a period of no more than 5 years. The effects will also be 'reversible' upon removal of the turbine at the end of this period. Beyond those significant negative effects identified above, the Development is likely to have an effect on some of the other landscape character areas or views within the study area but these are not judged to be significant.

Whilst those significant effects will result in alterations to the localised landscape and visual resource in the vicinity of the Development, it is nevertheless considered to be acceptable in the broader context. This is due to a number of factors that relate to both the Development and the landscape setting within which it will be seen. A major factor is the single turbine proposed, which ensures it will be seen from fewer locations and will only occupy a small proportion of available views. Other factors include the medium to large-scale and predominantly horizontal nature of the coastal landscape in which the Development will be seen, which avoids awkward scale comparisons and ensures the Development will appear as a minor component in views; the vegetated and built-up nature of parts of the study area, which limits visibility; the absence of significant effects on landscape-related planning designations; and lack of significant cumulative effects. For local residents there is also a certain familiarity between the Development and the sight of large-scale structures associated with the offshore oil and gas industry that are manufactured and repaired at Methil.

## 6 NOISE

An assessment of noise from the operation of the Development has been carried out.

The potential effect of noise from operation of the Development has been assessed in accordance with ETSU-R-97: *The Assessment and Rating of Noise from Wind Farms* and with current best practice (Bowdler et al. 2009). The existing levels of background noise have been sourced from a selection of representative properties situated in the vicinity of the Development, and their relationship to wind speed established. Appropriate noise limits for

daytime and night-time periods have been derived from the relationship between background noise and wind speed for each period. Maximum permissible noise emission levels from operation of the turbine which would result in compliance with the requirements of ETSU-R-97 have been calculated. Control measures have been identified which would ensure compliance in the event that noise immission levels at the closest noise sensitive receptors are greater than the noise limits identified.

Noise during construction and decommissioning of the turbine will be addressed through the application of planning conditions restricting hours of working and the use of good practice measures.

## **7 ECOLOGY**

An ecological impact assessment has been carried out in accordance with IEEM (2006) Guidelines. This was based on data from a series of ecological surveys, consultations and desk based literature reviews. The information was used to generate a picture of the ecological baseline and assess the effects of the Development on the ecological interests of the area.

A desk-based assessment identified that the Development is located within three statutory designated sites including the Firth of Forth SSSI, SPA and Ramsar site. This area is noted for supporting an extensive mosaic of important intertidal and coastal habitats and also supports bird populations of European importance. No additional statutory or non-statutory designated sites are located within 5 km and 2 km of the Development respectively.

Onshore habitats within the survey area are dominated by bare ground formed by reclaimed colliery spoil, with small areas of ephemeral/short perennial vegetation also present. Littoral habitats comprise large boulders which act as shoreline reinforcement and subtidal habitats are likely to include sand overlying a soft clay substrate.

An otter survey did not record any evidence of otter within the survey area. A single common seal was recorded approximately 100 m offshore during the course of ecological surveys. No evidence of any other protected or notable fauna was recorded within the survey area.

Potential effects on ecological receptors principally include habitat loss, disturbance to otter and marine mammals and potential harm or disturbance to marine mammals as a result of construction piling. However such effects have been addressed through a range of mitigation measures including a pre-construction survey for otter and the presence of a Marine Mammal Observer (MMO) during construction works. Consequently the effects of the Development on ecology have been assessed as being not significant.

A cumulative assessment taking into consideration additional developments in the local area has not predicted any further significant effects on ecology.

Overall, potential effects of the Development on the ecological interests of the area are assessed as being not significant.

## **8 ORNITHOLOGY**

The assessment has considered and evaluated the potential for the Development to have effects upon ornithological interests in the local and wider area. Wind energy developments can have effects on bird populations as a result of the construction, operation and decommissioning of the Development. Birds may be affected by:

- the loss or change of habitats to accommodate the Development;
- disturbance due to construction/decommissioning or the presence and operation of the turbines;
- acting as a barrier to regular movements of birds; and
- collision with the rotors.

The scoping process highlighted that the key issue was the potential for effects on waterbirds and seabirds associated with internationally important sites designated as Special Protection Areas (SPAs) in the region, the Firth of Forth and the Forth Islands.

Baseline studies were carried out between September 2006 and September 2007 to quantify the use of the site and surrounding area by birds, and to assess the risk of bird collision with the turbine rotors. The species of nature conservation value that were present at the site and considered in detail in the assessment included:

- Eider;
- Long-tailed duck;
- Red-throated diver;
- Fulmar;
- Gannet;
- Cormorant;
- Shag;
- Oystercatcher;
- Kittiwake;
- Herring gull;
- Lesser-black-backed gull;
- Sandwich tern; and
- Common tern.

Several other species, including qualifying species associated with the SPAs were observed during the surveys, but were recorded so infrequently the potential for anything more than negligible effects on those species' populations is extremely unlikely.

Displacement of small numbers of eider, long-tailed duck, red-throated diver, cormorant, shag, herring gull and lesser black-backed gull may occur. It was concluded that this would not result in any significant effects on their populations because the number of birds affected was very small and more suitable habitats to accommodate displaced birds was abundantly available.

There may be a barrier to the normal movement of small numbers of birds along the coastline. This would mostly affect eider, cormorant and oystercatcher and to a lesser degree, shag, sandwich tern and common tern. These species making movements along the coastline may be forced to fly around the turbine, having energetic consequences for the individual birds, potentially affecting their ability to survive. It was concluded that this would not result in any significant effects on their populations because the number of birds affected would be low and the scale of the Development is very small, having inconsequential effects on their survival.

There is a very low risk of collision to fulmar, gannet, cormorant, shag, oystercatcher and kittiwake, and a low risk to sandwich tern and common tern. The collision risk would not increase overall mortality by more than 1% for the SPA qualifying populations of any of these species, resulting in the conclusion that collision risk to birds is not significant.

At the time the surveys were carried out, there was a pair of peregrine falcons nesting within the FEP and there would have a risk of collision for those birds as a result of the Development. However, peregrines no longer breed within the FEP or in close proximity to the Development, therefore there are no longer any predicted effects on peregrine falcons.

The potential effects of the Development on birds were considered in combination with the consented Hydrogen Office turbine to the northeast. The Methil Offshore Demonstration Wind Turbine contributed very little to the cumulative effect and no significant in-combination effects are likely to occur.

Mainly because of the small-scale of the Development and its location in a part of the Firth of Forth that is of lesser importance for birds, it is concluded that the potential effects of the Development on birds are not significant and that the integrity of the Firth of Forth SPA and Forth Islands SPA would not be adversely affected.

## **9 WATER RESOURCES AND COASTAL HYDROLOGY**

The assessment has been based on a detailed desk study, walkover, and consultations with a range of organisations, including Fife District Council, The British Geological Survey and the Scottish Environment Protection Agency.

No onshore surface water features, such as burns or drainage channels, exist within 500 m of the Development.

No private water supplies exist within 1 km of the Development.

Only one hydrological designation exists within 2 km of the Development, the Firth of Forth SSSI, which the Development sits in. No effects are predicted on this designation.

The strong flood and ebb currents, with maximum velocities of 0.9 m/s and 0.5 m/s on spring and neap tides respectively (Hydrographic Office, 1975), within the Firth of Forth tend to be deflected by the rocky headlands and are considered to have minimal influence on beach development. Typical tidal flows adjacent to the Fife Energy Park are between 0.25 m/s and 0.5 m/s during mean neap and spring tides respectively.

The Development is sheltered from waves approaching from between 045° and 090° by the headland at Elie Ness. The northern end of Fife Energy Park is protected from waves approaching from between 045° and 090° by Methil Harbour breakwater.

Potential impacts on coastal hydrology have been managed through surface and coastal water management measures and through best practice.

### **9.1 Water Management Measures**

Water management measures, referred to in the Surface and Coastal Water Management Plan, based on good practice, have been proposed to control and minimise effects on water quality and quantity of the receiving coastal environment. The water management measures proposed have been demonstrated elsewhere to be effective, and their effectiveness on this site will be ensured by supervision by the construction team and the Ecological Clerk of Works.

### **9.2 Good Practice**

A Pollution Prevention Plan (PPP) will include measures that will be used to avoid or reduce potential impacts for all phases of the Development, and will also include an Incident Plan to be followed, if pollution occurs. An engineer will also be appointed who will have specific responsibility to ensure measures within the PPP are followed during construction.

Method statements will also be applied, which will follow the principles laid out in relevant SEPA Pollution Prevention Guidelines (PPGs).

With the proposed mitigation measures, the potential effects of the Development on hydrology and hydrogeology are not considered to be significant in terms of EIA.

## **10 CULTURAL HERITAGE**

The archaeology and cultural heritage assessment considered the potential for the Development to have impacts upon features of cultural heritage interest within and beyond the site boundary. It has considered both the potential for direct impacts (damage or destruction of archaeological features within the site, both on shore and offshore) and indirect impacts (principally the potential for visual impacts upon the settings of cultural heritage features beyond the site boundary).

A desk-based assessment was undertaken, and data collected on cultural heritage features at various ranges beyond the site boundary. Available historic records primarily relate to the development of the site in terms of the former mining and other industrial activity that has taken place along the coast. Due to this activity no archaeological features are likely to be affected by onshore infrastructure associated with the turbine. The foundations for the turbine

itself are not considered to affect any archaeological or other features at below the high water mark.

Consideration was given to the potential for cultural heritage features outside of the Development site to receive significant indirect impacts upon their settings. The visibility of turbines from locations at and/or around these features was considered against their defining setting (the parts of their surroundings contributing to the reason they have been scheduled or listed). The assessment method identifies the sensitivity of receptors to draw conclusions about significance. Despite the visibility of the proposed turbine itself, given its limited lifespan and fully reversible nature of the Development (on decommissioning) as well as the industrial and developed nature of the coastline around Methil, no significant effects are predicted upon the settings of any cultural heritage features (i.e., the significance or special qualities of the historic assets will not be harmed as a result of the Development).

The assessment concluded that the Development will not have a significant effect upon any identified archaeological or cultural heritage features.

## **11 SOCIO-ECONOMICS, TOURISM, LAND-USE AND COMMERCIAL FISHING TRAFFIC AND TRANSPORTATION**

The assessment has been based on a desk study, relevant offshore guidance and consultations with Scottish Government and organisations related to commercial fishing and marine recreation and tourism.

The construction of the Development and setting up of the Scottish subsidiary will create 5 full-time office-based job opportunities within the local area as well generate opportunities for approximately 60 local workers to establish site facilities, office, workshop and grid connection cabling and buildings. Once the Development is operational, there will be 6 full-time maintenance and administrative jobs created.

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

- Remove barriers in the UK industrialisation of offshore wind;
- 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 up to 6 km along the Fife Coastal Path. Beyond 6 km, there will be no significant impact due to distance, screening and limited visibility. No other significant visual effects are associated with the operation of the Development. It is however, relevant to note that the Development, a single demonstration wind turbine will be operational for 5 years that is located within an industrial area and any effects will be fully reversible after the turbine is relocated to another offshore position after the operational period.

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 FEP is an improvement to the existing land in Fife region.

During construction a 500 m exclusion zone will be in place for vessels to safeguard the safety of the construction team working on the Development, and vessel operators. This will be a short term measure which will be negligible due to the near shore location of the Development. Consequently, no potential financial losses are predicted on commercial fishery vessels, given the small scale, location and type of Development, number of fishing operations within the vicinity and availability of alternative fishing grounds in the area.

## 12 NAVIGATION

The assessment examined the effect of the Development on navigation. It considered shipping navigation, fishing vessel movements, recreational vessel movements and other navigational issues.

The assessment has been based on:

- Desk studies (including data gathering from the Department of Energy & Climate Change Maritime Data/DTI Shipping Database and Fisheries data obtained from the Sea Fisheries Division of the Scottish Government);
- Consideration of relevant offshore guidance and consultations with Scottish Government; and
- Various organisations responsible for navigation, fishing associations and recreational sailing clubs.

No significant effects on shipping and fishing activities is predicted due to the following factors:

- The near shore intertidal location of the Development;
- The shallow water depth at the Development location;
- The Development will be connected to shore with a bridge;
- Data from the Maritime Data online GIS Shipping Database and the Sea Fisheries Division of the Scottish Government indicates that the Development is located within an area of very low density for shipping and that there is relatively little fishing vessel activity near the Development, with the majority of fishing activity located further out to sea;
- Consultation and previous comments from the Scottish Fisherman's Federation and local fishing associations confirmed there is very limited use of this area for fishing due to its near shore location and the shallow water depths and no concerns were raised;
- No significant concerns were raised during consultations with recreational sailing groups;
- Any changes in tidal and current flows close to shore resulting from the turbine foundation are considered to be of negligible magnitude, due to the limited nature of the turbine foundation, and will have no effect on the navigation of small recreational crafts along the coast;
- The Admiralty Chart for the area shows that the Development is not in close proximity to any navigational aids such as major lights and lit buoys.

In addition a number of mitigation measures will be put in place to ensure navigational safety at all times, including:

- Appropriate navigational markings will be used following Northern Lighthouse Board recommendations and in agreement with Forth Ports and Methil Docks (FPMD) Harbour Master and based on guidance that includes painting the turbine a light colour and the use of appropriate navigation lights and markings;
- Information on the location of the Development will be provided to FPMD and to mariners via "Notices to Mariners", radio navigational warnings and marking on admiralty charts; and



- No permanent exclusion zone is considered necessary around the Development for fishing vessels or recreational craft. However, a temporary exclusion zone will be provided during the temporary construction phase for health and safety reasons. Construction of the Development will be undertaken in accordance with relevant health and safety procedures and regulations.

The Developer will continue to consult with FPMD, local fishing associations, Royal Yachting Association (RYA) Scotland, local boat clubs and the Scottish Canoe Association throughout the development and construction process to ensure there is a good level of awareness of the Development.

### 13 TELECOMMUNICATION AND EXISTING INFRASTRUCTURE

Ofcom identified three microwave links that either travel through or end in the vicinity of the Development. Due to the close vicinity of these links to the site, further information was sought from each link operator, Vodafone, Scottish and Southern Energy (SSE) and Everything Everywhere Ltd (Orange).

The Joint Radio Company (JRC) were also consulted and response based on radio link infrastructure operated by Scottish Hydro (Scottish & Southern Energy) and Scottish Power and Scotia Gas Networks. It was advised that one microwave Point to Point is located within the vicinity of the development however, this link has been cleared and JRC does not foresee any potential problems with the development

Atkins Ltd has taken over telemetry link operations from CSS Spectrum Management (CSS). They identified one link in the vicinity of the Development.

The closest civilian airports to the Development are Dundee (approximately 31.5 km north of the Development) and Edinburgh Airport (approximately 33.4 km southwest of the Development). The Development will have no effect on the operations of Dundee Airport. BAA confirmed that the Development will have no effects related to operations or safeguarding of the Edinburgh Airport.

The Development has been assessed against the NATS En Route Plc ("NERL") maps, which confirmed the Development is not sited in an area where it is likely to interfere with NATS operations.

It is possible for interference on television reception to occur in any direction within 500 m of a wind turbine (known as the reflection zone), or within an area of up to 5 km in the line of site between a transmitter and receiver (shadow zone)<sup>3</sup>. Consultation with BBC via the online assessment tool identified two transmitters – Black Hill Ch5 and Craigmally Ch5 that may be affected. Further assessment confirms that the affected zone lies entirely over the Firth of Forth and is not considered to affect properties located onshore.

In the event of any technical complaints registered by the Local Authority, the Developer will endeavour to reduce any adverse effects to television reception by providing technical solution such as re-tuning television receivers to another transmitter or stronger signal, or provide an alternate off-air service to each affected residence i.e. digital set-up boxes. Following mitigation, no further significant effects are predicted.

Existing telecommunications and aviation will not be affected by the Development. Effects on television and radio reception are considered unlikely however in the event of adverse effects being reported and proven to relate to the turbine the appropriate mitigation, would be implemented.

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<sup>3</sup> Ofcom (2009). Tall structures and their impact on broadcast and other wireless services. Online - [http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/wind-farms/tall\\_structures.pdf](http://licensing.ofcom.org.uk/binaries/spectrum/fixed-terrestrial-links/wind-farms/tall_structures.pdf) [Accessed 12/04/2012]

Once mitigation has been implemented, no significant effects are predicted on telecommunications or existing infrastructure.

## 14 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.

An assessment of shadow flicker during operation of the demonstration wind turbine has been carried out in line with relevant guidelines, specifically, Scottish Executive - Scottish Government (2012) Onshore Wind Turbines, online planning advice<sup>4</sup> and Department of Environment, Northern Ireland - *Best Practice Guidance to Planning Policy 18 'Renewable Energy'* (2009)<sup>5</sup>.

It has been established that there are limited atmospheric conditions in the UK during which shadow flicker can take place and occurrence relates to the position of the sun relative to the turbines and the window opening. The distance over which this effect can occur is generally within ten rotor diameters (in this case 172 m) and 130 degrees of north relative to the proposed turbine location. The shadow flicker effect usually decreases with increasing distance and becomes fainter. A significant shadow flicker effect will occur if shadow flicker effect exceeds beyond 30 hours per year or 30 minutes per day at offices or houses within 500 m of a wind turbine. There are no residential properties within 500 m of the turbine location.

A detailed shadow flicker assessment has been undertaken using a computer model designed specifically for wind turbines (WindFarm version 4.2.1.2) and Geographic Information System. However, it is worth noting that the model has its own limitations and does not predict whether or not effects would actually be received at a particular receptor due to localised screening provided by vegetation or other buildings.

The assessment identified numerous potential receptors within the shadow flicker study area in which effects could occur. Further analysis was used to help to narrow down the receptors as well as inform the choice of the assessment locations and include those that were within the worst-affected areas. As a result, the final choice of representative "Assessment Locations" has undergone an iterative approach/subsequent revisions and refinement.

The final assessment calculated approximate times of day and year that effects may occur based on a number of worst-case assumptions, including the likelihood of bright sunshine occurring at those times. There is potential that effects are likely to exceed 30 hours at 5 of the assessment locations. However, all of these locations are located over 500 m from the turbine as per the recommended guidance (PPS18).

Due to the short-term nature of the Development, its location within a site designated for renewable energy enterprises, and the low magnitude of likely effects predicted, no mitigation for shadow flicker is proposed at this stage.

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<sup>4</sup> Scottish Government; Onshore Wind Turbines (2012) <http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/renewables/Onshore> [Accessed on 14/03/2012]

<sup>5</sup> Department of Environment, Northern Ireland - Best Practice Guidance to Planning Policy 18 'Renewable Energy' (2009) Available at; [http://www.planningni.gov.uk/index/policy/policy\\_publications/planning\\_statements/planning\\_policy\\_state ment\\_18\\_\\_renewable\\_energy\\_\\_best\\_practice\\_guidance.pdf](http://www.planningni.gov.uk/index/policy/policy_publications/planning_statements/planning_policy_state ment_18__renewable_energy__best_practice_guidance.pdf) [Accessed on 14/03/2012]

### 14.1 Cumulative Effects

The operational Hydrogen Office Wind Turbine at Methil Docks is located within 10 rotor diameters of the Development. A shadow flicker study area was mapped around the area of the operational Hydrogen Wind Turbine within a distance of ten rotor diameters (560 m) and 130 degrees either side of north in addition to the previous assessment area for the Demonstration Turbine. The area of overlap between the two shadow flicker study areas identifies the area where cumulative effects could potentially occur.

The final assessment calculated approximate times of day and year that effects may occur based on a number of worst-case assumptions, including the likelihood of bright sunshine occurring at those times. Based on calculations alone, effects are likely to be less than the 30 hours threshold. As a result cumulative shadow flicker effects calculated are not considered to be significant.

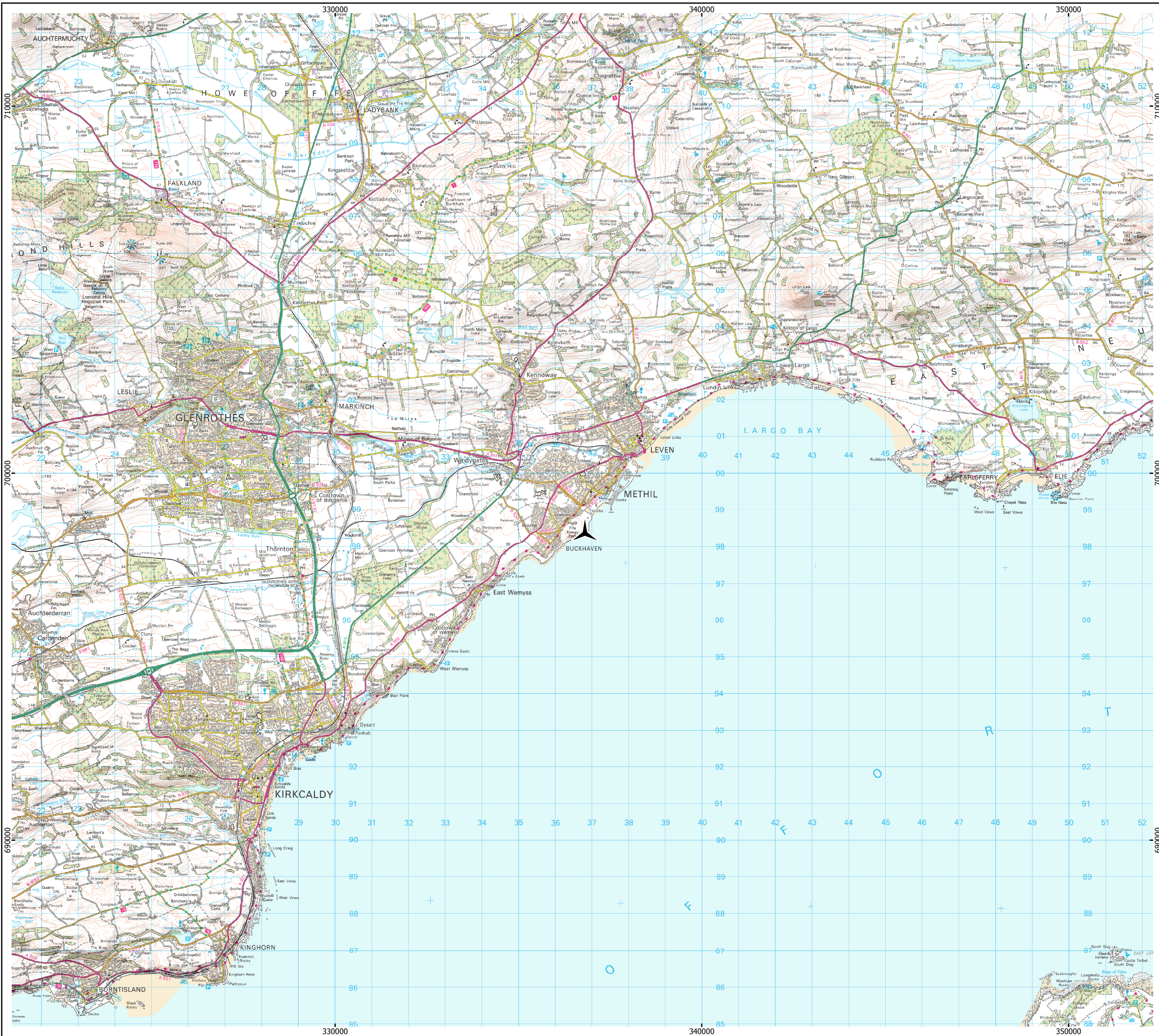
## 15 MISCELLANIOUS ISSUES

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

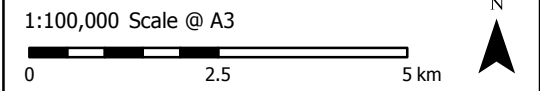
The wind turbine will have a positive benefit on carbon dioxide (CO<sub>2</sub>) emission savings. Energy generated by the wind turbine will have the potential to displace electricity generated from other sources such as fossil fuels. As the Development is a test facility it is highly likely that its electricity production will vary significantly over the 5 year operational period. Whilst not the primary purpose of the Development, 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 CO<sub>2</sub>, with associated environmental benefit.

A comprehensive health and safety assessment would 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.

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Proposed Turbine Location



Produced: LHU  
 Reviewed: SC  
 Approved: JH  
 Ref: 867/PA/013  
 Date: 23/07/2012

**Site Location**  
 NTS 1

**Fife Energy Park  
 Offshore Demonstration  
 Wind Turbine (FEPODWT)**