

## CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>1.1</b>	<b>BACKGROUND</b>	<b>1</b>
<b>1.2</b>	<b>PROJECT PROPONENTS</b>	<b>1</b>
<b>1.3</b>	<b>PROJECT PHILOSOPHY</b>	<b>1</b>
<b>1.3.1</b>	<i>Background</i>	<b>1</b>
<b>1.3.2</b>	<i>Project Outline</i>	<b>2</b>
<b>1.3.3</b>	<i>Exclusion Zone</i>	<b>2</b>
<b>1.3.4</b>	<i>Project Justification</i>	<b>5</b>
<b>1.3.5</b>	<i>Outline Schedule</i>	<b>8</b>
<b>1.4</b>	<b>THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS</b>	<b>8</b>
<b>1.4.1</b>	<i>Introduction</i>	<b>8</b>
<b>1.4.2</b>	<i>Consultation</i>	<b>8</b>
<b>1.4.3</b>	<i>Data Sources</i>	<b>10</b>
<b>1.4.4</b>	<i>Scoping</i>	<b>10</b>
<b>1.4.5</b>	<i>Approach to the Assessment of Impacts</i>	<b>11</b>
<b>1.5</b>	<b>STRUCTURE OF THIS ENVIRONMENTAL STATEMENT</b>	<b>14</b>

# **1 INTRODUCTION**

## **1.1 BACKGROUND**

Celtic Offshore Wind Ltd (COWL) is developing proposals for an offshore wind farm and associated infrastructure at Rhyl Flats, approximately 8km north of Abergele and 10km north-west of Rhyl, on the North Wales coast (hereafter referred to as the Rhyl Flats project). The site is illustrated in *Figure 1.1*.

This document constitutes the Environmental Statement (ES) for the project and presents the findings of the Environmental Impact Assessment (EIA).

## **1.2 PROJECT PROPONENTS**

COWL is a consortium of two companies, Renewable Development Company Ltd and First Hydro Renewables Ltd, a subsidiary of Edison Mission Energy Ltd (EME).

Renewable Development Company Ltd (RDC) is based in Mold, North Wales, and specialises in the planning and development of renewable energy facilities. Currently the company is engaged in the development of approximately 400MW of wind energy projects within the UK and elsewhere in Europe, at both onshore and offshore locations. Along with its sister company West Coast Energy Ltd, RDC employs over 50 locally-based technicians and employees.

First Hydro Renewables Ltd (FHR) has been established to develop, own and manage renewable energy assets in Wales. FHR is a sister company to First Hydro Company, who operate and manage the pumped storage hydro-electric facilities at Dinorwig and Ffestiniog in the Snowdonia region of Wales.

FHR and First Hydro Company are subsidiaries of Edison Mission Energy Ltd. (EME). EME has extensive experience of the management, operation and maintenance of power generation facilities, with approximately 19,000 MW of generating assets worldwide. EME is a partner in one of the largest wind farm developments in Europe, in Southern Italy.

## **1.3 PROJECT PHILOSOPHY**

### **1.3.1 Background**

Rhyl Flats is considered suitable for an offshore wind farm due to its water depths, wind resource and availability of grid connection route. In addition to the offshore wind farm and connecting cables to the shore, there will be

onshore components facilitating the grid connection to the existing electricity network from a landfall in the vicinity of Towyn.

### 1.3.2 *Project Outline*

The wind farm will consist of 30 turbines, each of which will be rated for a maximum power output of between 2.5 MW to 5 MW (depending on the exact technology which is selected), giving a total installed capacity of up to 150MW and providing significant energy and emissions savings. The energy output of the wind farm will vary with the wind conditions but the wind farm has been designed and positioned to capture as much of the available wind resource as possible. Annual output of electricity will vary depending on the annual wind regime, but is expected to equate to the wind farm operating continuously at about 35% of its maximum output.

The turbines will be located offshore, approximately 10 km north-west of Rhyl, as shown in *Figure 1.1*. Over the site area, the water depth is approximately 3 m to 21 m chart datum.

The project comprises the following key components:

- 30 wind turbines;
- subsea cables between the turbines;
- subsea cables from the wind farm to the shore;
- the cable landfall;
- two meteorological masts;
- an electrical substation (either onshore or offshore); and
- onshore grid connections to the existing electricity grid (underground and overhead).

A number of features of the project design are still under review for technical feasibility and optimisation. Where appropriate these options have been assessed during the Environmental Impact Assessment (EIA) and are described in this Environmental Statement (ES). The main option presented in this ES is the location of the substation. One substation is required and two locations are under consideration, one onshore and one offshore.

### 1.3.3 *Exclusion Zone*

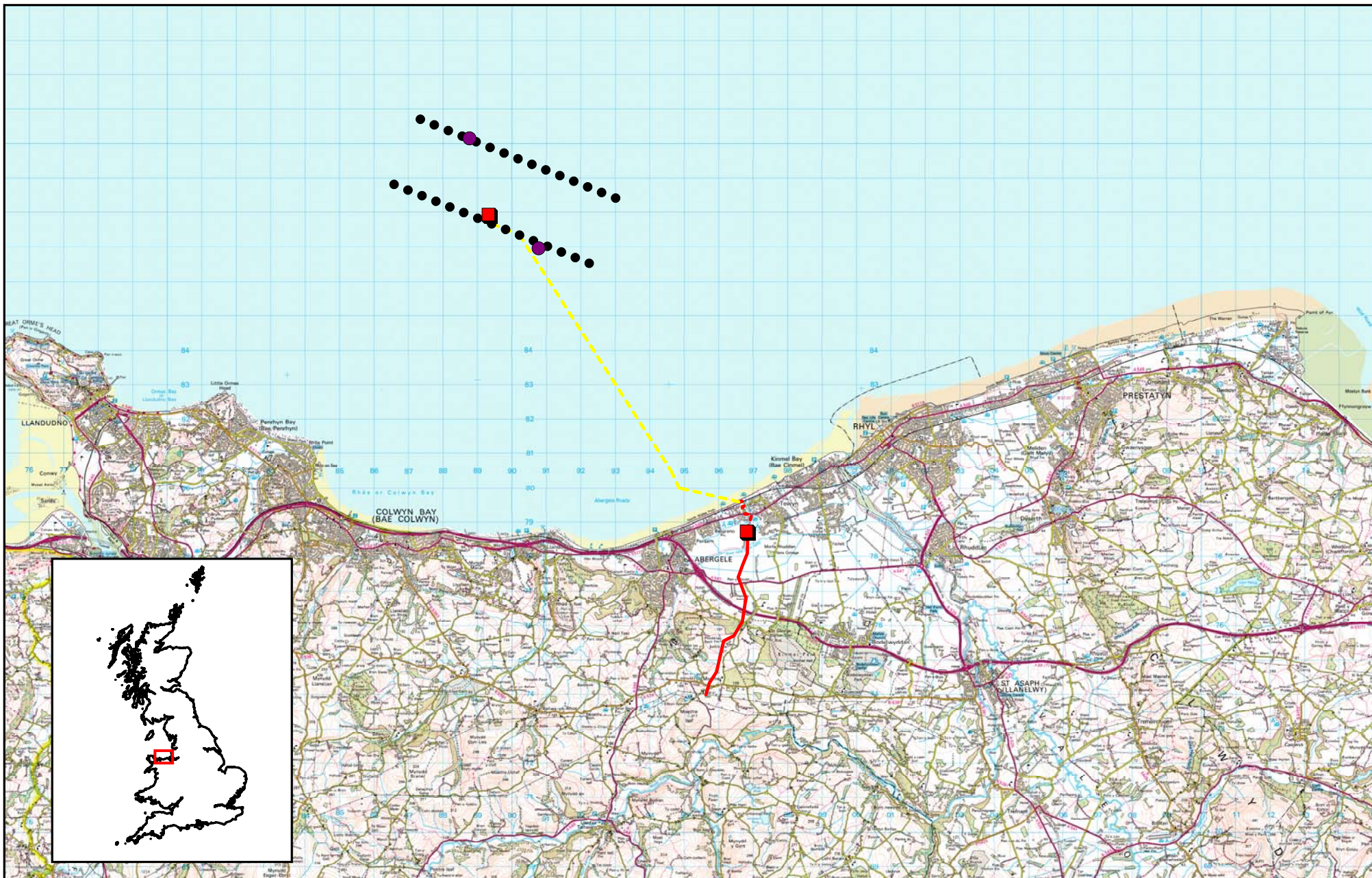
COWL is proposing to implement the following exclusion zone policy during the operating life of the project:

- a total exclusion zone of 50m around each turbine or structure;

- a total exclusion for mobile fishing gear<sup>1</sup> covering the full extent of the wind farm area, extending to 50m around the perimeter of the rectangle defined by the two turbine rows; and
- access for static gear<sup>2</sup> within the wind farm area, excluding the 50m from each turbine.

(1) Mobile gear includes trawls, beam trawls and dredges. These methods would all have the capability to snag the cables between the turbines if they became exposed.

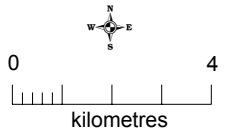
(2) Static gear includes bottom gill nets or tangle nets.



**Figure 1.1**  
*Rhyll Flats Project*

- Proposed Turbines
- Met Masts
- Substations
- Offshore Cable Route
- Onshore Cable Route

NOTE: Three substations are presented on this figure and assessed as part of the EIA. However, only one substation will be constructed.



*Background*

The development of offshore wind projects will assist the UK in achieving a number of targets and policy goals relating to greenhouse gas emissions, renewable energy and security and diversity of supply. These issues are outlined below.

These policies and targets reflect the increasing concern in relation to pollution from fossil fuelled power stations and, in particular, emissions of carbon dioxide and other greenhouse gases and the contribution that these make to global warming. By helping the UK meet these policy objectives and targets, wind farm developments will assist in reducing greenhouse gases which would otherwise result from the generation of electricity from fossil fuels. In a global context the development will, therefore, be beneficial in environmental terms.

*Key UK Policies and Targets*

In March 1999, the UK government published a consultation paper <sup>(1)</sup> seeking views on the kinds of support mechanisms which might be used to promote the development of renewable energy projects. After discussion with interested parties, the government has concluded that it should move away from the existing Non-Fossil Fuel Obligation (NFFO) arrangements and adopt a supply obligation which will enable the UK to make progress towards a policy target of generating 10.4% of electricity requirement from all renewable sources by 2010.

In the Energy Review published in February 2002 <sup>(2)</sup>, the UK government was advised that a further target of 20% of electricity supply from renewable sources should be set for 2020. The UK government will consult on the issues raised in the Energy Review and publish an Energy White Paper later in 2002.

The proposed Renewables Obligation and the associated Renewables (Scotland) Obligation <sup>(3)</sup> will oblige licensed electricity suppliers to supply a specified proportion of their electricity from renewable sources of energy. Any additional cost of supplying electricity from renewables will be met by suppliers and may be passed onto their customers.

At the Kyoto Summit in 1997, agreement was reached for a new international protocol committing developed nations to a 5.2 % reduction in the six main greenhouse gases below 1990 levels over the period 2008 to 2012. The European Union agreed to a cut of 8 % to be met jointly by Member States and in 1998 the UK agreed to cut its emissions by 12.5 % as its contribution to the European target. At the Kyoto summit, the UK committed itself to a more

(1) New and Renewable Energy: Prospects for the 21st Century

(2) Performance and Innovation Unit, February 2002: **The Energy Review**, DTI

(3) Similar measures are under consideration in Northern Ireland

challenging domestic goal of a 20 % reduction in carbon dioxide emissions below 1990 levels by 2010. The UK and the EU as a whole is expected to ratify its agreement to the Kyoto Protocol later in 2002.

The development of the Rhyl Flats project will, therefore, assist the government in meeting this important policy objective and in moving towards a more sustainable form of power generation.

The UK is also committed to progressively reducing emissions of acid gasses. In June 1994, the UK signed the United Nations Economic Commission for Europe (UNECE) Sulphur Protocol. This commits the UK to reducing its sulphur dioxide (SO<sub>2</sub>) emissions to one fifth of 1980 emissions by 2010.

Many countries (including the UK) are extremely reliant on the consumption of fossil fuels for electricity generation. Such a reliance can, and in the past has, caused severe power system and economic impacts (during, for example, the oil crisis of the early 1970's and 1980's). Forecasts for energy consumption and power generation are that this reliance will continue, and indeed the sources for fuels will increasingly be from politically less stable countries. As such, many countries are taking an increasing interest in the potential role of renewable energy in diversifying energy sources and securing energy supply.

The further development of renewable energy sources will therefore help to meet these concerns about diversity of electricity supply.

#### *Wind Energy in the UK*

Wind energy is the single most rapidly expanding energy sector in the UK, accounting for 0.37% of total UK demand at the start of 2002 (total renewable capacity was only 2.5% of UK demand, or 1.5% excluding large hydro-electric schemes). There were 64.6 MW of wind energy installed in the UK last year, which brought the total UK wind power capacity to 473.6 MW (1.24 TWh per year), an increase of 31%.

In the coming year, ERM forecasts indicate that development of known wind power projects will increase the UK's total installed capacity by 62 MW and result in lifting UK renewable generation towards 3%.

#### *Offshore Wind*

While 'traditional' renewable capacity, such as landfill gas, onshore wind and small scale hydro-electric schemes, continue to be developed, attention is being increasingly focused on mid-term technologies, such as offshore wind. Successful deployment of these technologies is widely recognised as being key to achieving the government's 10% target by 2010.

In December 2000, the Crown Estate announced the release of offshore sites for the development of offshore wind farms. In April 2001, the Crown Estate announced that 18 development consortia had successfully qualified under

the first bidding round. Rhyl Flats was one of the 18 qualifying sites <sup>(1)</sup>. This first round of allocations allows development to take place within a development area of 10 square kilometers, with a maximum of 30 turbines and a minimum installed capacity of 20 MW. All leases are subject to the securing of the relevant permits and consents prior to development.

Offshore wind farm projects are less constrained by competing land uses and although the marine environment provides challenges for construction it does offer the potential for some technological advantages. The offshore marine environment is more uniform (with no physical obstacles such as trees, buildings, changes in topography) and this can result in an increase in yield, when compared with onshore wind power.

### *Project Benefits*

There will be no gaseous emissions or particulate emissions associated with the operation of the wind farm, with the exception of minor emissions of NO<sub>x</sub>, PM<sub>10</sub> and CO<sub>2</sub> from the service vessels.

The generation of energy from wind contributes to the reduction in the emission of greenhouse gases with subsequent benefits in terms of climate change. This is achieved through substituting energy which would have been produced from the burning of fossil fuels with 'renewable' alternatives.

Table 1.1 presents a comparison of the CO<sub>2</sub> emissions which would arise from generating the same amount of electricity as the wind farm by using different fuels in thermal power stations.

These numbers should only be used as a guide, as there are large uncertainties in each value due to a variation in generation efficiency between different plants.

**Table 1.1 Comparison of CO<sub>2</sub> Emissions**

Fuel	CO <sub>2</sub> Emissions kg/MWh <sup>(a)</sup>	Annual CO <sub>2</sub> Emissions /ktonnes	
		75 MW Installed Capacity	150 MW Installed Capacity
Wind	0	0	0
Natural Gas	452	104	208
Oil	583	134	268
Coal	920	212	423

(a) Source: IEA/OECD *CO<sub>2</sub> Emissions from Fuel Combustion*, 1999

(b) The rated capacity of the wind farm is estimated at 35% therefore the expected output of the wind farm will range from 26 MW to 52 MW for 75 MW and 150 MW installed capacity, respectively.

The rated capacity of the wind farm is assumed at 35% of the installed capacity <sup>(2)</sup>. This equates to an output ranging between 26 MW and 52 MW on average. On an annual basis therefore, it is estimated that the wind farm will

(1) <http://www.crownestate.co.uk/estates/marine/windfarms.shtml>

(2) For the proposed site and layout, it is anticipated that the rated capacity of the wind farm would be higher than the assumed 35% of installed capacity.



supply the equivalent demand of between 53,000 and 105,000 households <sup>(1)</sup>, or between one third and three quarters of all the homes in Denbighshire, Flintshire and Conwy.

### **1.3.5 *Outline Schedule***

It is anticipated that the contractor, turbine model and other equipment details will be selected during 2002.

Construction work at the site is then projected for April to September 2004, with the wind farm entering commercial operation in September 2004. The design operating life of the project is 20 years.

## **1.4 *THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS***

### **1.4.1 *Introduction***

The methodology adopted for the Environmental Impact Assessment (EIA) sought to establish a detailed definition of the offshore and onshore environment and then identify any aspect of the proposed wind farm operation with the potential, or perceived potential, to impact upon the environment.

### **1.4.2 *Consultation***

In accordance with best practice and government guidance, full and early consultation was undertaken from the scoping phase of the project onwards with those agencies and parties likely to have an interest in the proposed project, and consultation will continue throughout the project planning and development process.

Both statutory and non-statutory stakeholders were identified, including departments of national government, government agencies and local government, commercial shipping and fisheries interests, non-governmental organisations, recreational interests and other commercial interests.

Organisations contacted included, but were not limited to, those in *Table 1.2*. COWL contacted stakeholders and consultees for their views regarding:

- the baseline environment (biological, physical, and socio-economic) which could potentially be affected by this development; and
- interactions between the proposed wind farm and the environment which, from the stakeholder's perspective, raised issues that should be formally addressed in the EIA.

(1) Assuming an average domestic consumption of 4377 kW per annum (Digest of UK Energy Statistics, 2000)

The information gathered by COWL during consultation was crucial in ensuring that the company properly understood the local environment and provided sufficient focus on matters of importance to external audiences.

Consultation is an ongoing and iterative process which informs design and assists in the identification of constraints and the development of any appropriate mitigation measures.

**Table 1.2** *List of Consultees*

<p><b>National Government, Government Agencies and Regulatory Bodies</b></p> <p>Civil Aviation Authority (CAA)</p> <p>CADW Welsh Historic Monuments</p> <p>Centre for Environment, Fisheries and Aquaculture Science (CEFAS)</p> <p>Countryside Agency</p> <p>Countryside Council for Wales (CCW)</p> <p>The Crown Estate</p> <p>Department for Culture, Media and Sport (Buildings, Monuments and Sites Division)</p> <p>Department for Environment, Food and Rural Affairs (DEFRA)</p> <p>Department of Trade and Industry (DTI)</p> <p>Department of Transport, Local Government and the Regions (DTLR)</p> <p>District Inspector of Fisheries</p> <p>English Nature</p> <p>Environment Agency</p> <p>Government Office for the North West</p> <p>Joint Nature Conservation Committee (JNCC)</p> <p>Maritime and Coastguard Agency (MCA)</p> <p>Marine Consents and Environment Unit (MCEU)</p> <p>Ministry of Defence (MOD)</p> <p>Monuments of Wales (RCAHMW)</p> <p>The National Assembly for Wales (NAW)</p> <p>Royal Commission for the Ancient &amp; Historic Radiocommunications Agency</p> <p>The Wales Office</p> <p><b>Local Government</b></p> <p>Sefton Borough Council</p> <p>Denbighshire County Council</p> <p>Conwy County Borough Council</p> <p>Flintshire Borough Council</p> <p>Technical Services</p> <p>Fylde Borough Council</p> <p>Lancashire County Council</p> <p>Metropolitan Borough of Wirral</p> <p>Tidal Dee Users Group</p> <p>Environmental Advisory Services (formerly Joint Countryside Advisory Service)</p>	<p><b>NGOs</b></p> <p>Campaign for the Protection for Rural Wales (CPRW)</p> <p>Friends of the Earth</p> <p>Liverpool Bay Coastal Group</p> <p>Marine Conservation Society (MCS)</p> <p>Sea Mammal Research Unit</p> <p>Royal Society for the Protection of Birds (RSPB)</p> <p>The Wildlife Trusts</p> <p>Wildfowl and Wetlands Trust (WWT)</p> <p><b>Fisheries Organisations</b></p> <p>National Federation of Fisherman’s Organisations (NFFO)</p> <p>North Western and North Wales Sea Fisheries Committee</p> <p>National Federation of Sea Anglers</p> <p>Interfish Ltd</p> <p>Fleetwood Fish Producers Organisation</p> <p>Lancashire and South Western Sea Fisheries Committee.</p> <p><b>Recreational Interests</b></p> <p>Anglesey Divers College</p> <p>British Sub-Aqua Club</p> <p>PADI International Ltd</p> <p>Royal Yachting Association (RYA)</p> <p>North West Venturer’s Yacht Club</p> <p>Welsh Yachting Association</p> <p><b>Other Interests</b></p> <p>BHP Billiton Petroleum Limited</p> <p>National Wind Power</p> <p>Clwyd Powys Archaeological Trust</p> <p>Joint Nautical Archaeology Policy Committee</p> <p>Distribution Network Operator</p> <p>Mersey Docks and Harbour Company</p> <p>Myti Mussels Ltd</p> <p>National Air Traffic Services (NATS)</p> <p>Post of Mostyn</p> <p>Trinity House Lighthouse Service</p> <p>P&amp;O European Ferries (Irish Sea) Ltd</p> <p>Chamber of Shipping</p>
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### 1.4.3 *Data Sources*

During the EIA, data were obtained from the following sources:

- statutory and non-statutory consultees;
- COWL and its consultants;
- field studies carried out as part of the EIA; and
- published data sources.

### 1.4.4 *Scoping*

Scoping is an essential step in the EIA process, having several main purposes as summarised below.

- The principal objective of scoping is to identify, at a high level, the key environmental issues relating to the construction and operation of the Rhyl Flats project. These issues are then taken forward for more detailed assessment as part of the EIA. The scoping phase also allows any issues which are not significant to be identified. These are then wholly or partially omitted from the EIA (*ie* scoped out).
- Scoping also aims to establish the scope and methodology of the EIA, based on a consideration of the potential environmental impacts and opportunities arising from the construction and operation of the proposed scheme.
- Scoping reports form a basis of common reference for consultation about the scope and methodology of the EIA.

Separate scoping reports were produced for the onshore and offshore elements of the project and made available to stakeholders. Subsequent communications, including meetings, where appropriate, were carried out.

Detailed scopes for some assessments were discussed and developed in consultation with the relevant organisations, including those listed below.

- Benthic survey: Centre for Environment, Fisheries and Aquaculture (CEFAS) and the Countryside Council for Wales (CCW).
- Assessment of coastal and marine processes: CEFAS, CCW and the Environment Agency.
- Seascape, landscape and visual amenity assessment: CCW and the Local Authorities.
- Ornithological assessment: CCW and RSPB.

The key aspects for consideration identified during consultation have helped to define the scope of the EIA and these issues are addressed in the relevant sections of this ES. Key issues included, but were not limited to, the following:

- Offshore components (turbines, cable to shore, landfall and offshore substation (option)):
  - seabirds (especially common scoter), breeding waders, migrant and wintering waterfowl;
  - fish spawning and nursery areas;
  - commercial fishing interests;
  - navigation risks;
  - landscape/seascape character and visual amenity;
  - coastal processes; and
  - cumulative impacts.
  
- Onshore components (onshore cable, buried and overhead), and onshore substation (option):
  - landscape character and visual amenity;
  - ornithological impacts; and
  - terrestrial ecology.

#### **1.4.5 Approach to the Assessment of Impacts**

##### *General Considerations*

The key aim of the EIA is to assess the likely environmental effects of the proposed development. The general approach followed in this EIA process acknowledges a number of factors:

- that some potential impacts have been avoided through choice of location, technology and materials;
  
- that mitigation has already been built into the project in design and that further mitigation may be identified as part of the assessment; and
  
- that there may be some impacts which are unavoidable.

It is also recognised that there can be uncertainty over a number of matters such as:

- the precise baseline environmental quality and characteristics;
- changes in project planning;
- the accuracy of impact prediction; and
- the effectiveness of mitigation measures.

For these reasons, monitoring will form a key future activity.

### *Dealing with Uncertainty*

The predictions presented in this ES have been arrived at through varying means ranging from qualitative assessment and expert judgement through to quantitative techniques such as predictive computer modelling using validated computer models (for example, for sediment transfer and subsea noise predictions). Use of these techniques allows an appropriate degree of accuracy in predicting changes to the existing environmental conditions and making comparisons with relevant environmental quality standards. Where assumptions have been made, the nature of any significant uncertainties which stem from the prediction process are explained.

Uncertainty can also arise as a result of the stage reached in the project planning process at the time of preparation of an ES. Where there is any potential uncertainty, and the uncertainty is material to the findings of this EIA, it is clearly stated and measures to address that uncertainty will be included in an Environmental Management Plan which will be developed before construction.

Where project options are still under consideration, the assessments have focussed on those options which are most likely to have significant effect.

### *Study Area*

The definition of the study area for the EIA varies depending on the impact and the nature of the activity. The spatial area over which impacts are assessed are defined within each of the environmental topics. There is no set study area for the assessment of all environmental impacts.

### *Cumulative Impacts*

A key issue raised by consultees related to the possibility of cumulative or combined environmental effects which could result from this project in combination with other projects in the vicinity. This was considered particularly relevant in relation to two proposed offshore wind farms that are to be located at North Hoyle and Burbo Bank. These two sites are shown together with the Rhyl Flats Project on *Figure 1.2*.

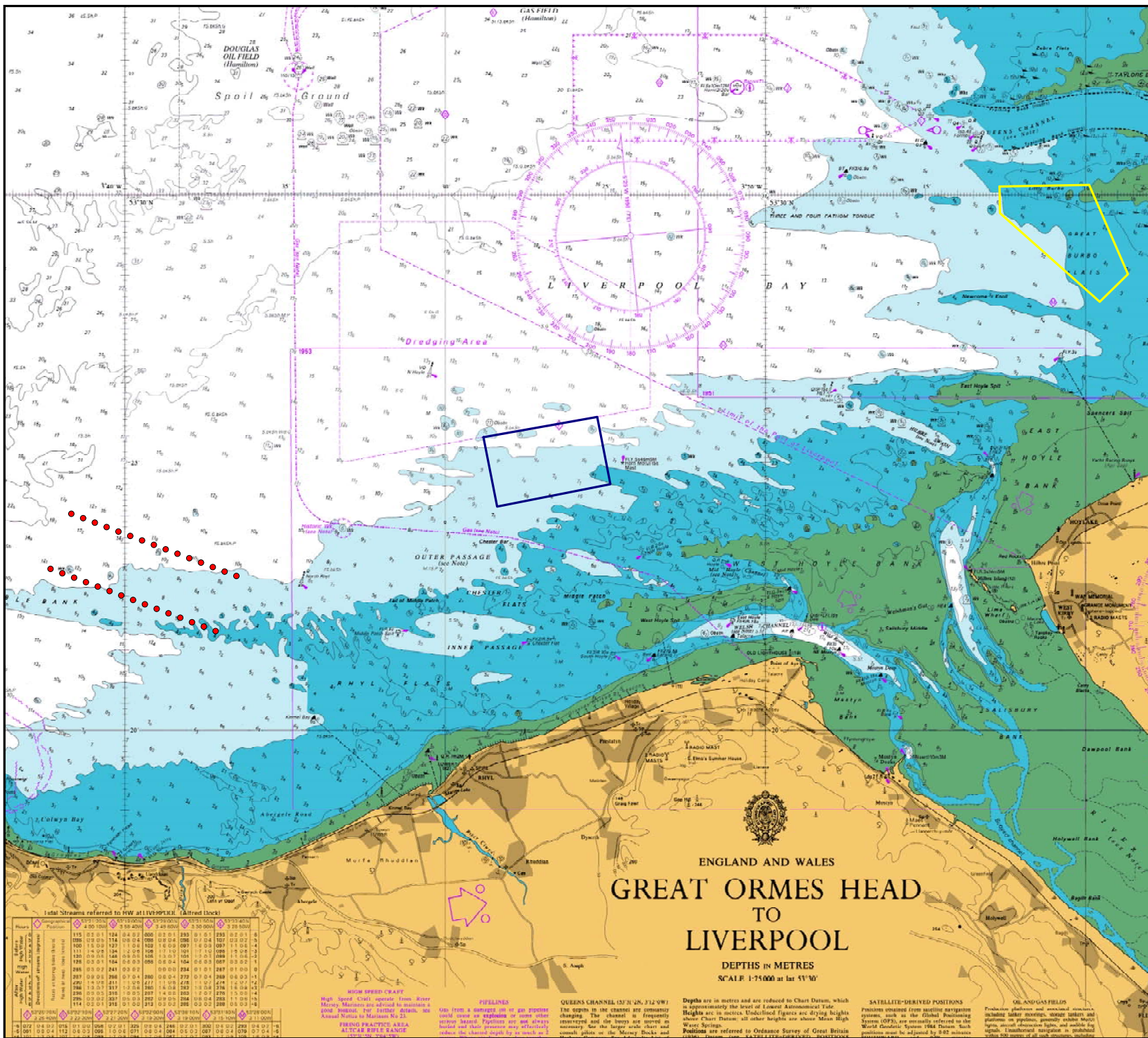
In the absence of any recent direct guidance for Wales, it is noted that in a recently published *Planning Advice Note (PAN 45)* <sup>(1)</sup> the Scottish Executive advised the following:

*'The cumulative effects of wind farm development can arise as the combined consequences of:*

- *an existing wind energy development and a proposed extension to that development;*

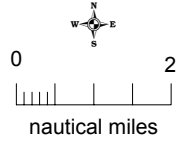
(1) Scottish Executive Development Department, January 2002: Planning Advice Note, **Renewable Energy Technologies**, PAN 45, Revised 2002.

**Figure 1.2**  
**Proposed Offshore**  
**Wind Farm Projects**  
**in vicinity of the North**  
**Wales Coast**



- Rhyl Flats  
(Celtic Offshore Wind Ltd)
- North Hoyle  
(NWP Offshore Ltd)
- Burbo Bank  
(Seascope Energy Ltd)

NOTE: Turbine locations for Burbo Wind Farm are not known. Turbine locations for North Hoyle are taken from NWP Environmental Statement February 2002.



- proposals for more than one wind energy development within an area;
- proposal(s) for new wind energy development(s) in an area with one or more existing development(s);
- any combination of the above.

*In assessing cumulative effects, it is unreasonable to expect this to extend beyond schemes in the vicinity that have been built, those which have permissions and those that are currently the subject of undetermined applications.'*

Of the two sites discussed above, only the planning application for the North Hoyle wind farm has been submitted. Hence, as part of the EIA for this project, the potential for cumulative effects of the North Hoyle wind farm with Rhyl Flats is considered. Consideration is also given to the Burbo Bank project where appropriate.

## 1.5 STRUCTURE OF THIS ENVIRONMENTAL STATEMENT

This ES is presented in five volumes, of which this is the first volume.

The offshore components (wind turbines, buried cables to shore, offshore substation (option) and landfall) and onshore components (onshore cable, both the buried and overhead sections, and the onshore substation(option)) are examined in separate volumes (*Volumes II and III*, respectively) of this ES.

The remainder of this ES is structured as follows and a full contents list is provided at the front of *Volumes I, II and III*:

- ***Volume I - Introduction to the Project:*** This Volume contains the Non-Technical Summary, sets out the background to the project, describes the legislative and planning context, contains the full project description and includes an examination of alternatives.
- ***Volume II - Offshore Environmental Impact Assessment of the Offshore Components:*** This Volume sets out the assessment methods, the baseline environment and the impact assessment for the offshore components of the scheme.
- ***Volume III - Onshore Environmental Impact Assessment of the Onshore Components:*** This Volume sets out the assessment methods, the baseline environment and the impact assessment for the onshore components of the scheme.
- ***Volume IV - Photomontages and Visibility Maps.*** The photomontages are presented in this volume together with the ZVIs for the proposed development.
- ***Volume V - Annexes:*** The Annexes contain supporting information for the assessments.