

Supplementary Environmental Information – August 2007  
Non-Technical Summary

## ***Gwynt y Môr Offshore Wind Farm***



**Gwynt y Môr Offshore Wind Farm**

<b>Project</b>	Gwynt y Môr Offshore Wind Farm
<b>Document Reference</b>	GyMOWF/Supplementary Environmental Information Non-Technical Summary
<b>Type of Project</b>	Offshore Wind Farm
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## Gwynt y Môr Offshore Wind Farm

### Introduction

Gwynt y Môr Offshore Wind Farm Ltd submitted an application to the Department for Business, Enterprise and Regulatory Reform (BERR) (formerly the Department of Trade & Industry) in November 2005 to construct and operate the Gwynt y Môr Offshore Wind Farm off the North Wales coast within Liverpool Bay. The registered office and contact address for the Gwynt y Môr project is as follows:

Gwynt y Môr Offshore Wind Farm Limited  
Triginos  
Windmill Hill Business Park  
Whitehill Way  
Swindon  
Wiltshire  
SN5 6PB  
Company Number: 2904841

npower renewables is acting as agents for the project developer, Gwynt y Môr Offshore Wind Farm Ltd, and will be referred to hereafter.

An Environmental Statement (ES) describing the existing environment, the proposed project and the environmental impacts (both positive and adverse) potentially arising from the construction, operation and decommissioning of the Gwynt y Môr Offshore Wind Farm was submitted with the application for consent in November 2005.

### This Supplementary Environmental Information

Subsequent to the application and submission of the ES, Supplementary Environmental Information (SEI) has been prepared which reviews certain aspects of the EIA as well as describing certain refinements to the offshore aspects of the project. Specifically, the SEI document presents two main types of information as follows:

- Refinements to the project details and the implications of those changes in relation to the information contained in the original Gwynt y Môr ES.
- Additional information provided in response to requests from consultees seeking extra information or clarification in relation to the details contained in the ES

In each case, the information is presented under the main headings drawn from the ES – in relation to the physical, biological and human environments.

The SEI has been voluntarily provided by npower renewables. However, it is intended to proceed as if this document were a response to a requisition for further information by the Secretary of State under Regulation 13 of the Electricity Works (Environmental Impact Assessment) (England & Wales) Regulations 2000. npower renewables will, therefore, advertise the submission of the SEI as part of a single environmental statement that includes the ES submitted with the application in November 2005. The SEI document should for all purposes be read with the original Gwynt y Môr ES.

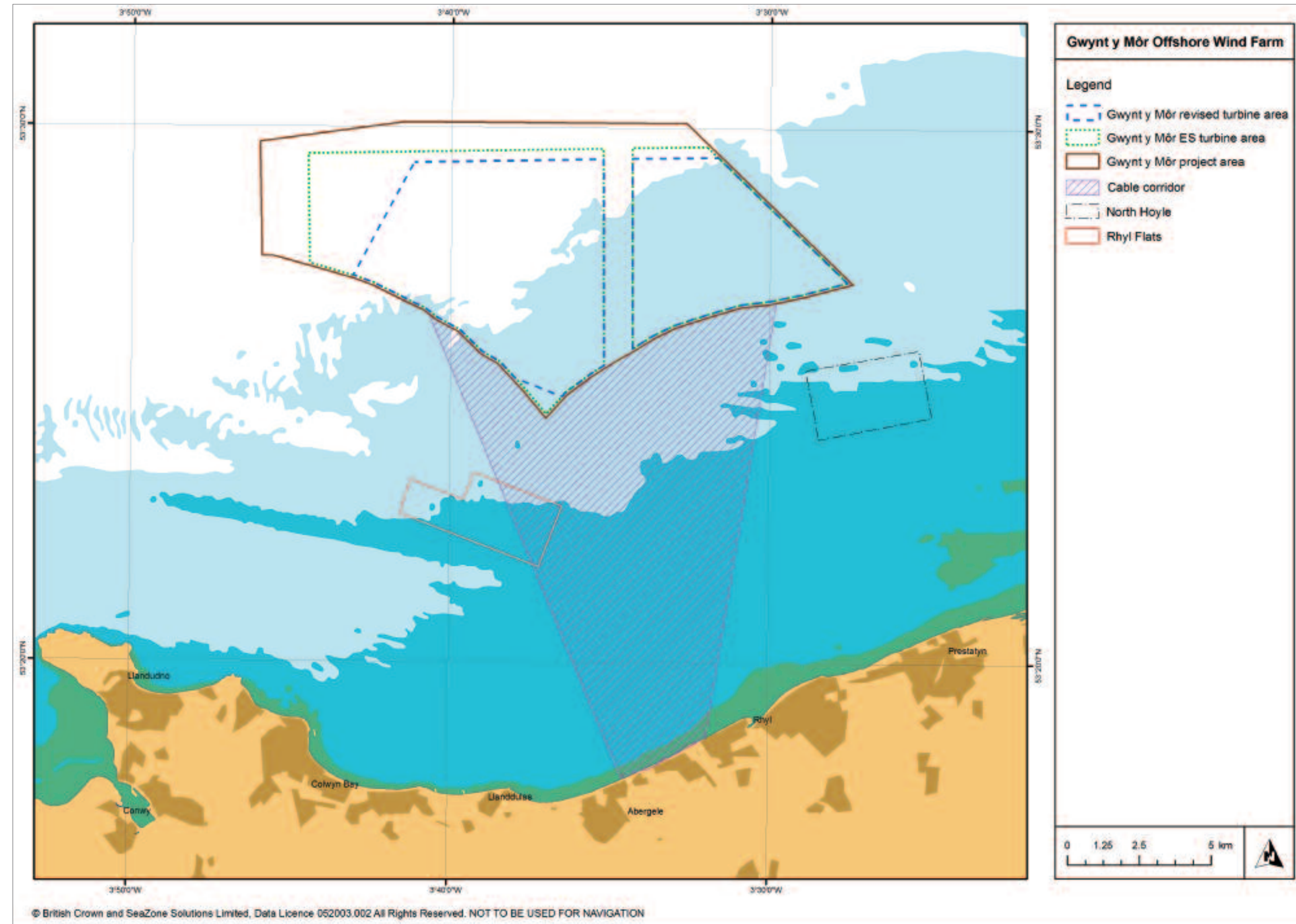


Figure 1: The Gwynt y Môr Offshore Wind Farm Revised Turbine Area

## Need & Benefits

The 750MW Gwynt y Môr project will contribute to meeting local, regional and national targets for generating electricity from renewable sources in response to the challenge of climate change. The project could also provide enough electricity to power around 500,000 homes every year (equivalent to around 40% of all Welsh homes) whilst preventing the release of approximately 2 million tonnes of polluting carbon dioxide gas that might otherwise be produced by electricity generated by fossil fuel based power stations.

The development of Gwynt y Môr also has the potential to bring economic benefits to the North of Wales and the North-west of England through construction and operational jobs and supply chain opportunities (the need, policy and economic benefits relating to the project are set out in more detail in the original Gwynt y Môr Environmental Statement and accompanying Non-technical Summary).

## Refinements to the Project Details

A full description of the proposed project is provided in the Gwynt y Môr ES and may be briefly summarised as follows.

The Gwynt y Môr Offshore Wind Farm is located approximately 13 to 15km off the North Wales coast and approximately 18km from the coast of the Wirral. The Gwynt y Môr Offshore Wind Farm will be constructed within a lease area granted by the Crown Estate which covers a total area of seabed of circa 124km<sup>2</sup>.

The project, as described in the ES, will feature between 150 and 250 modern, efficient wind turbines with a maximum project capacity of 750 MWe. The final number of turbines required to produce the maximum generating capacity remains uncertain, largely because of the ongoing technological development of offshore wind turbines. As a result, npower renewables developed three layout scenarios for the ES setting out the likely turbine capacities, turbine numbers and dimensions. Turbines in the range of 3MW Class to 5MW Class were considered with a maximum tip height of 165m with a maximum hub height and rotor diameter of 98m and 134m respectively. The distance between turbines is estimated to be in the range of circa 450m to 1000m, with a minimum spacing of 350m to provide for micro-siting between turbines.

Each turbine will be placed on a support structure composed of tower sections and foundations, the choice of foundations being dependent on factors such as the turbine design and ground conditions. Associated with the main turbine array will be a number of auxiliary structures including up to five meteorological monitoring masts and up to four offshore substations. Cables will connect each of the turbines to an offshore substation before export cables transmit the electricity to shore. Buried onshore cables will subsequently complete the link to the onshore substation, located to the south of the St Asaph Business Park where electricity will be fed to the adjacent, existing 400kV distribution network via a short length of overhead lines.

The construction phase of Gwynt y Môr is anticipated to last for up to 3 years, assuming the continuous build of 750MW. Following construction, servicing of the wind farm will take place from a base at a suitable port. Decommissioning of the project would occur at the end of the 50 year Crown Estate lease period.

The majority of the project details presented in the Gwynt y Môr ES have not changed since the application including the maximum dimensions of the turbines and the support structures, the nature of the cabling and auxiliary structures and the proposed methods of construction and operation.

Several key refinements have, however, been made which are described and assessed as part of the SEI. These refinements have arisen as the design of the Gwynt y Môr project has evolved through the development process and as more information has become available, subsequent to the consent application in November 2005. Specifically these refinements relate to:

- A revision of the Gwynt y Môr turbine area (referred to as 'The Revised Turbine Area')
- A revision of the turbine layout scenarios
- A revised start date for the construction program

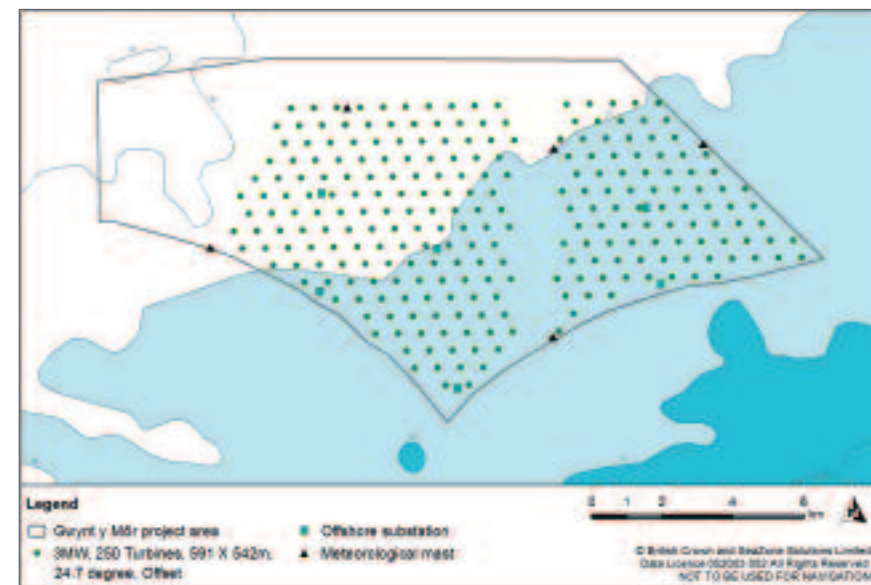


Figure 2: Revised 3MW Class Turbine Scenario

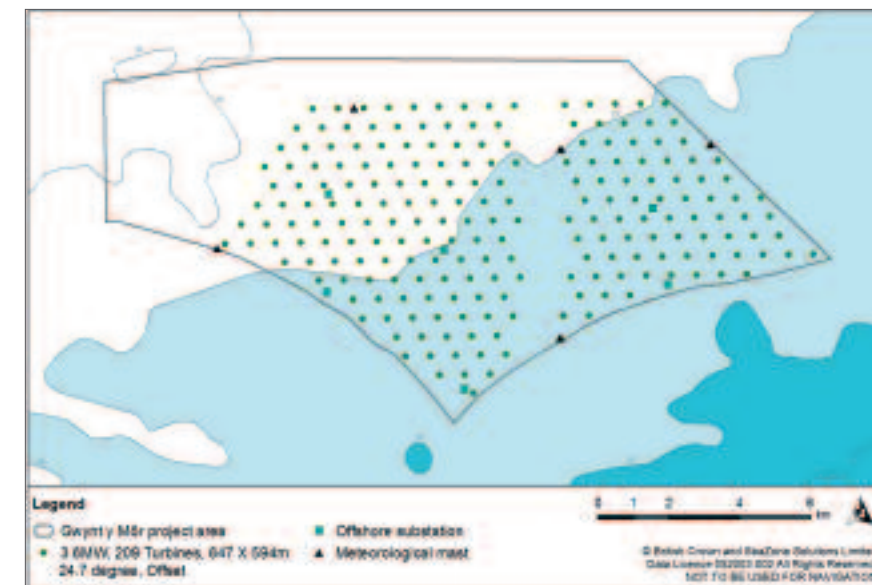


Figure 3: Revised 3.6MW Class Turbine Scenario

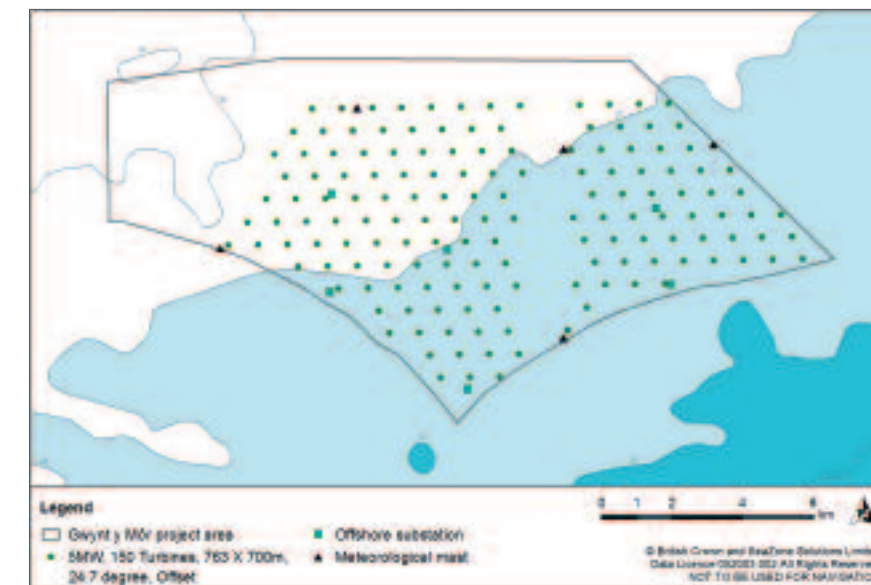


Figure 4: Revised 5MW Class Turbine Scenario

### The Revised Gwynt y Môr Turbine Area

Within the 124km<sup>2</sup> Crown Estate lease area, the area within which turbines will be constructed has been reduced from 94.8km<sup>2</sup> (as set out in the ES) down to 79km<sup>2</sup> – a reduction in the turbine area of 16%. The reduction in the turbine area is reflected in amendments to the northern, southern and western boundaries of the original turbine area (see figure 1). In particular the western boundary has been drawn back eastwards by between 1.6 and 3.7km. The distance of the nearest turbine to the coast has also marginally increased.

The revision to the turbine boundary has resulted from additional information and project design work subsequent to the application and particularly:

- An improved understanding of the wind resource at Gwynt y Môr using wind data collected on-site since August 2005.
- Responses received to the Gwynt y Môr application and understanding gained through the EIA process.

The Revised Turbine Area has been designed to provide for:

- Greater separation from shipping passing to the north and south of Gwynt y Môr
- A reduced spread of turbines on the horizon from viewpoints on the Welsh and English coasts with an associated reduction in visual effects
- More room for helicopters approaching the adjacent Douglas oil and gas platform
- Engineering benefits by moving some turbines away from areas of deeper water

### Revised Layout Scenarios

The turbine layout scenarios presented in the ES have also been refined to fit within the revised turbine area. The turbines in each case have been moved somewhat closer together which has resulted in turbine spacing in each of the layouts being reduced by circa 50 metres in each direction. In addition, a layout based on a 3.6MW turbine (rather than the combined 3MW and 5MW layout scenario presented in the ES) has been described (see figures 2 to 4).

The revised turbine arrays also have the benefit of reducing the total length of the cabling required to electrically connect the turbines to each other and to the offshore substations (from an estimated range of 150 to 200km in the ES to a revised range of circa 125 to 175km).

### The Construction Timetable

The overall construction program remains as described in the ES, although construction is now expected to start in 2010 rather than 2008 as originally stated. Total build time remains unchanged at 3 years, assuming the continuous build of 750MW.

In all other considerations, the project details for the offshore components of the Gwynt y Môr offshore wind farm, as described in ES, remain unchanged.

## Review of the Gwynt y Môr EIA

The refinements to the Gwynt y Môr project details, particularly the revised turbine area and associated revised layouts, have been reviewed in relation to the findings of the Environmental Impact Assessment (EIA) presented as part of the original ES. The review has considered in turn each of the potential impacts on the physical, biological and human environments.

The review of the EIA has highlighted a number of significant, positive benefits in relation to the potential environmental effects of the Gwynt y Môr project arising from the refinements made to the project details, notably:

- **A significant reduction in the predicted visual impacts** at a number of key viewpoints is shown – most notably the viewpoints along much of the Llandudno promenade but also views from the Great Orme and Conwy Mountain. These reductions in significance largely reflect the considerable decrease in the spread of the project across the horizon at the western extent of the turbine area. The reduced spread of the Gwynt y Môr project on the horizon (compared to the turbine area set out in the ES) are shown in the following table.

Viewpoint	Reduction in the spread of the project on the horizon (%)
Conwy Mountain	21.6%
Great Orme, near summit	23.9%
Great Orme, Cemetery	24.0%
Great Orme's Head, café.	24.7%
Llandudno, memorial	17.8%
Llandudno, conference centre	21.6%
Llandudno, paddling pool.	20.2%

- **A significant reduction in the predicted cumulative visual effects** of Gwynt y Môr when considered alongside other existing or proposed offshore wind farms (particularly the Rhyl Flats Offshore Wind Farm) at the Llandudno conference centre viewpoint.
- **A significant improvement in the ability of helicopters to access the Douglas oil platform** to the north of Gwynt y Môr as a result of the changes to the northern boundary of the turbine area.

In addition, a range of positive gains have been identified in terms of the potential effects on the environment which although not considered sufficient to change the significance set out in the ES are worthy of note, particularly:

- **A positive effect on the visual perception** of the project at a number of key viewpoints including Penmon Point, Beaumaris, Bangor, Llanfairfechan and at locations on the northern part of the Sefton coast such as Formby Point and Southport Pier, due largely to the reduction in the spread of the project across the horizon. The reduced spread of the Gwynt y Môr project on the horizon at these viewpoints (compared to the turbine area set out in the ES) is shown in the following table.

Viewpoint	Reduction in the spread of the project on the horizon (%)
Penmon Point	38.7%
Beaumaris	25.5%
Bangor	29.7%
Carnedd Llewelyn	19.9%
Llanfairfechan	22.0%
Formby Point	8.9%
Southport pier	12.0%

- **A positive effect on the safety of navigation** as a result of the increase in sea room to the north of Gwynt y Môr with associated slight reduction in the collision risk and the need for vessels to deviate from their courses
- **A positive effect on the safety of navigation** between the Gwynt y Môr and Rhyl Flats Offshore Wind Farms as a result of the changes to the southern boundary
- **A decrease in the overlap with commercial fishing operations** as a result of the reduction of the turbine area by circa 16%
- The reduced turbine area **reduces the overlap with a range of recreational activities** including angling, sailing and diving
- The reduced project footprint also **reduces the potential overlap with habitats** used by fish, birds and marine mammals
- The associated reduction in the length of cabling required to connect the turbines **reduces the area of seabed habitat disturbed and the area potentially affected by electro-magnetic fields**



The Operating North Hoyle Offshore Wind Farm.

The closer spacing of the turbines in the revised layout scenarios could have a **slight (adverse) effect on waves** passing through the wind farm where the very largest gravity base foundations are considered (the worst case scenario). This could lead to a marginally greater loss of wave energy at the coast although the nature and significance of such an effect remains as described in the ES.

In all other cases, the potential environmental effects of the Gwynt y Môr project remain unchanged by the refinements to the project details and remain as described in the ES.

## Photomontages

As part of the review of the EIA, wireframes and photomontages illustrating the refinements to the project details have been produced for the viewpoints assessed in the original ES. Four of the photomontages produced, at the Great Orme, Llandudno Conference Centre, Abergele and Hilbre Island viewpoints are included in this NTS (see Figures 6 to 9) to provide a representation of the views available within the study area.

Each photomontage is made up of three separate images. The following text explains what the three images on each photomontage are illustrating.

Top image - shows the changes in the horizontal spread of the wind turbines for both the Gwynt y Môr and Rhyl Flats offshore wind farms. The change for Gwynt y Môr is as a result of the revision to the turbine area whilst the change for Rhyl Flats is as a result of confirming the turbine layout which is actually to be constructed, rather than the maximum consented layout. The red lines show the spread of the wind turbines as presented in the ES for Gwynt y Môr and the maximum consented layout for Rhyl Flats. The green lines show the spread of the wind turbines for the revised turbine area for Gwynt y Môr and the recently confirmed layout for the Rhyl Flats Offshore Wind Farm.

Middle image - shows the Gwynt y Môr Offshore Wind Farm layout as presented in the ES submitted in November 2005, and the maximum consented layout for Rhyl Flats Offshore Wind Farm. This image shows Gwynt y Môr with 150 x 5MW wind turbines and Rhyl Flats with the maximum consented 30 x 5MW wind turbine layout.

Bottom image - shows the revised turbine area layout for Gwynt y Môr, and the Rhyl Flats Offshore Wind Farm layout which will actually be constructed. This image shows Gwynt y Môr with 150 x 5MW wind turbines and Rhyl Flats with the recently confirmed 25 x 3.6MW wind turbine layout.

## Additional Environmental Information

The SEI also includes a variety of additional information relating to the potential effects of Gwynt y Môr which has been produced following the submission of the consent application and accompanying ES. This additional information has been produced in response to specific requests received from a number of consultees following the Gwynt y Môr application.

Additional information has been produced in relation to the potential effects on the physical, biological and human environments and is summarised below.

### The Physical Environment

#### **The movement of Sediments on the Beach at Gronant Dunes**

An examination of the effects of the project on wave energy at the coast and particularly the effect on the transport of sediments along the beach at Gronant Dunes (a Site of Special Scientific Interest). It was concluded that a slight decrease in transport rates could occur under the worst case scenario although this was not considered significant. It was also noted that the effects of sea level rise would tend to increase drift rates.

#### **Storm Effects on The Transport of Sediment at the Seabed**

The effect of storm surges on the transport of sediments on the seabed was analysed using data collected at Gwynt y Môr during a storm event. The study concluded that sediment transport is dominated by wave and tidal forces rather than storm surges and therefore the conclusions presented in the ES, that the effects on sediment transport will be negligible, remain unchanged.

#### **Water Stratification in Liverpool Bay**

The study investigated the potential for stratified water fronts to develop within Liverpool Bay and the influence of Gwynt y Môr on those fronts. The study indicated that stratification does occur during the summer months. However, it was concluded that the wind farm will not affect that process because of the very small scale of the effects of the turbine structures on the water column.

### The Biological Environment

#### **Birds**

Additional information has been collected on the movement of birds, particularly common scoter, in and around the wind farm, the feeding behaviour and availability of food for scoter and the behaviour of birds during storms within Liverpool Bay.

The additional information on birds has demonstrated that small scale movements of scoter occur throughout the day and night with movements offshore at night to roost but that there was no significant movement between populations off North Wales and off the coast of North West England. It was also shown that the deeper water within the wind farm area combined with a lower density of prey (when compared to shallower inshore areas) means that scoter are unlikely to favour the wind farm area for feeding.

Information on bird movements during storms showed that seabirds (such as Leach's storm petrel) tend to arrive in the northern parts of Liverpool Bay and then follow a coastal route south and along the North Wales coast. It is also noted that these birds tend to fly very close to the sea. It was concluded that there was no increased risk of collision with the Gwynt y Môr turbines

#### **Fish**

A review of the potential effects of underwater noise arising from the pile-driving of foundations on the spawning of sole was conducted using new information on the location of sole spawning and their likely response to the piling noise. Having considered the updated information it was concluded that the issue may be of greater significance during the main sole spawning season than was originally concluded. Mitigation through the appropriate control of piling activities will be put in place following discussions with Government authorities which will reduce or avoid this potential effect.

Additional information on the distribution and behaviour of species of skates and rays in the wider Irish Sea was also provided which confirms that Liverpool Bay is not of specific importance for these species.

### Marine Mammals

The mitigation set out in the original ES in relation to the potential effects of underwater noise derived from pile driving of turbine foundations on species such as porpoises and seals was reviewed in the light of new work conducted in the Thames estuary. The review concluded that the assessment of the potential effects arising from Gwynt y Môr set out in the ES was overly precautionary and the potential significance has therefore been reduced. The mitigation proposed in the ES was consistent with that proposed in the Thames estuary and both mitigation and monitoring remain in place, as described in the Gwynt y Môr ES.

### The Human Environment

#### Ship & Shore Based Radar

Studies have been conducted to investigate the potential effects of the Gwynt y Môr turbines on upgrades to the shore based radar used by the Mersey Docks & Harbour Company. It was concluded that the effects on the upgraded radar systems would be similar to those described in the ES for the existing radars where impacts were considered to be of low significance.

Potential cumulative effects on ship radar and other navigation and communication systems for ships passing between the Gwynt y Môr and Rhyl Flats offshore wind farms have also been reviewed. It was concluded that the effects arising from each wind farm would be similar to those previously described for Gwynt y Môr in isolation, although a greater degree of radar clutter would be evident since both wind farms would be seen on the radar screen. Effects on communication and navigation system were not significant. Importantly, the effects on the safety of navigation as described in the Gwynt y Môr ES are unchanged when considering the cumulative effects between the two wind farms.

In addition a draft proposal for a maritime traffic routeing measure within Liverpool Bay being taken forward by the Maritime & Coastguard Agency (to be adopted by the International Maritime organisation) is presented (see figure 5).

#### Aviation

The potential effects of the Gwynt y Môr turbines on the operation of helicopters at the adjacent Douglas oil and gas platform (to the north of the wind farm) has been reviewed. The review has highlighted a number of operational procedures that would safeguard helicopters approaching and leaving the platform. These will be developed and agreed with the helicopter operators, the owners of the oil and gas platforms and the Civil Aviation Authority.

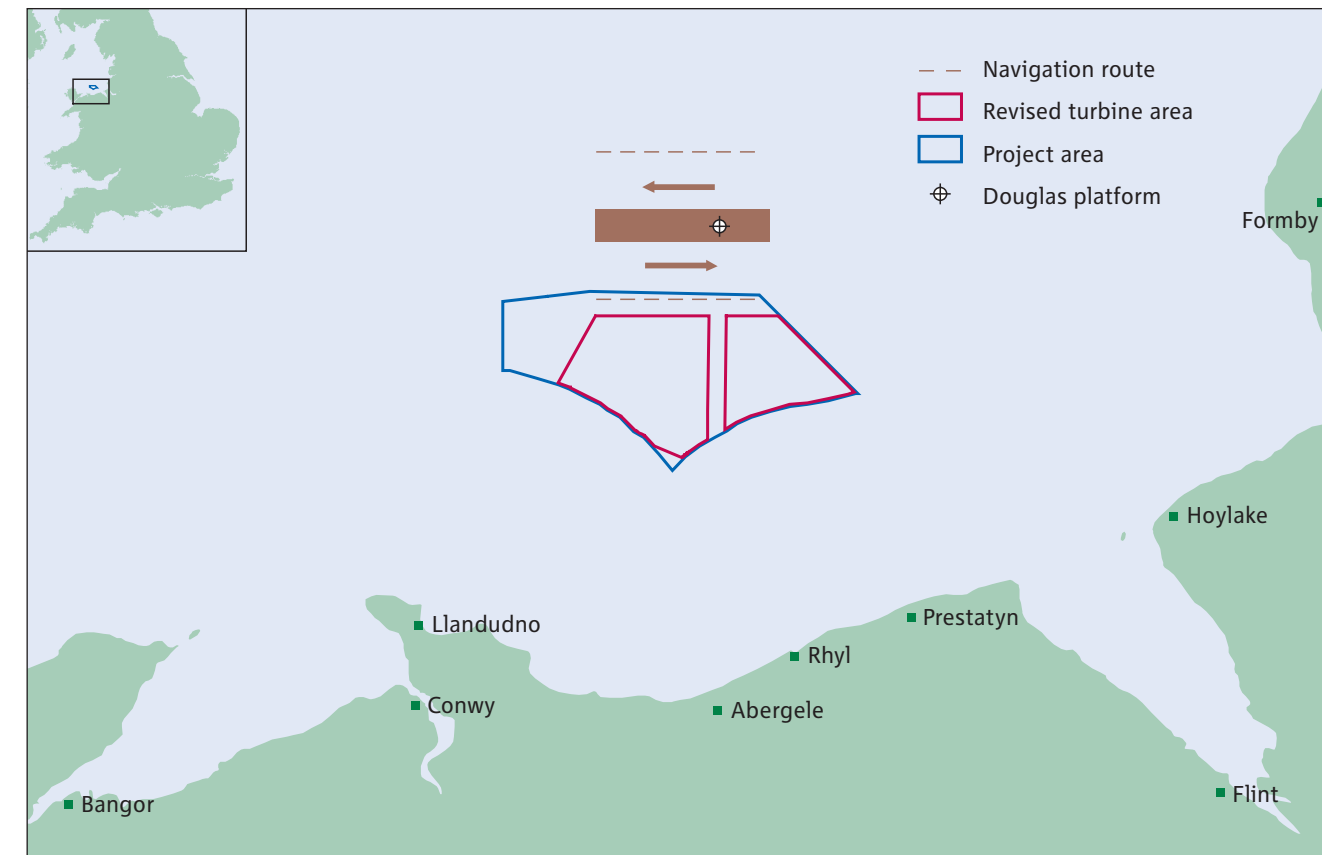


Figure 5: The Traffic Separation Scheme for Liverpool Bay.

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NOT TO BE USED FOR NAVIGATION.

In addition, potential effects on radar systems used to monitor en-route aircraft have also been identified by National Air Traffic Services (NATS) in the airspace above Gwynt y Môr. NATS have confirmed that air traffic control concerns are restricted to the effects that might arise should false aircraft tracks to be generated on their St Anne's radar. This issue can be taken into account in the design and installation of the NATS replacement radar which is planned to be commissioned at St Anne's in 2009, and a range of further mitigation measures have been identified to ensure the wind farm will not have an adverse effect on NATS ability to control airspace. Appropriate measures are being discussed with NATS.

#### Visual Effects

In relation to the potential visual effects on landscape and seascape, two studies have been completed following submission of the ES. The first of these sets out how the design of the project has considered the potential visual effects at the adjacent coastline throughout the development process and in defining the wind farm area and turbine layouts described in the ES. The study reports on the process that resulted in the definition of the project area and the consideration of a variety of turbine layouts and orientations in producing the layout scenarios set out in the ES.

Following on from this study, further work has been completed which has investigated the potential to mitigate the visual effects of the project at particular viewpoints by altering the orientation and layout of the turbines. It has been concluded that it is not possible to mitigate visual effects at specific viewpoints through alterations to the orientation of the turbine layout without leading to knock-on effects at adjacent viewpoints.

#### Historic Landscapes

Subsequent to the ES, new guidance has been highlighted with regard to the assessment of development on the features of historic interest in Wales. A new study has been completed using this guidance which has investigated the potential direct and indirect effects of the Gwynt y Môr Offshore Wind Farm on landscapes and features of historic importance listed on the Register of Historic Interests in Wales. The study has concluded that there will be no direct effects on features of historic landscapes. Indirect (visual) effects will occur but are not generally considered to be significant. Opportunities for the mitigation of these indirect effects are noted and will be discussed with the Countryside Council for Wales and Cadw.

### Further information

If you have any questions on the project, or would like any further information, please contact:

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Dolgarrog Power Station  
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E [gwyntymor@npower-renewables.com](mailto:gwyntymor@npower-renewables.com)  
W [www.npower-renewables.com/gwyntymor](http://www.npower-renewables.com/gwyntymor)

**During the consultation period for the Gwynt y Môr Supplementary Environmental Information, copies of the complete SEI document will be available for the public to view at the following locations:**

- Denbighshire County Council, Planning Offices, Caledfryn, Smithfield Road, Denbigh, Denbighshire, LL16 3RJ
- Isle of Anglesey County Council, Council Offices, Llangefni, Anglesey, LL77 7TW
- Conwy County Borough Council, Civic Offices, Colwyn Bay, North Wales, LL29 8AR
- Wirral Metropolitan Borough Council, Town Hall, Brighton Street, Wallasey, Wirral, CH44 8ED
- Sefton Metropolitan Borough Council, Magdalen House, 30 Trinity Road, Bootle, L20 3NJ
- Llandudno Library, Library Building, Mostyn Street, Llandudno, Gwynedd, LL30 2RP
- Rhyl Tourist Information Centre, Rhyl Children's Village, West Parade, Rhyl, Denbighshire, LL18 1HF.

**To comment on the Supplementary Environmental Information, please write to:**

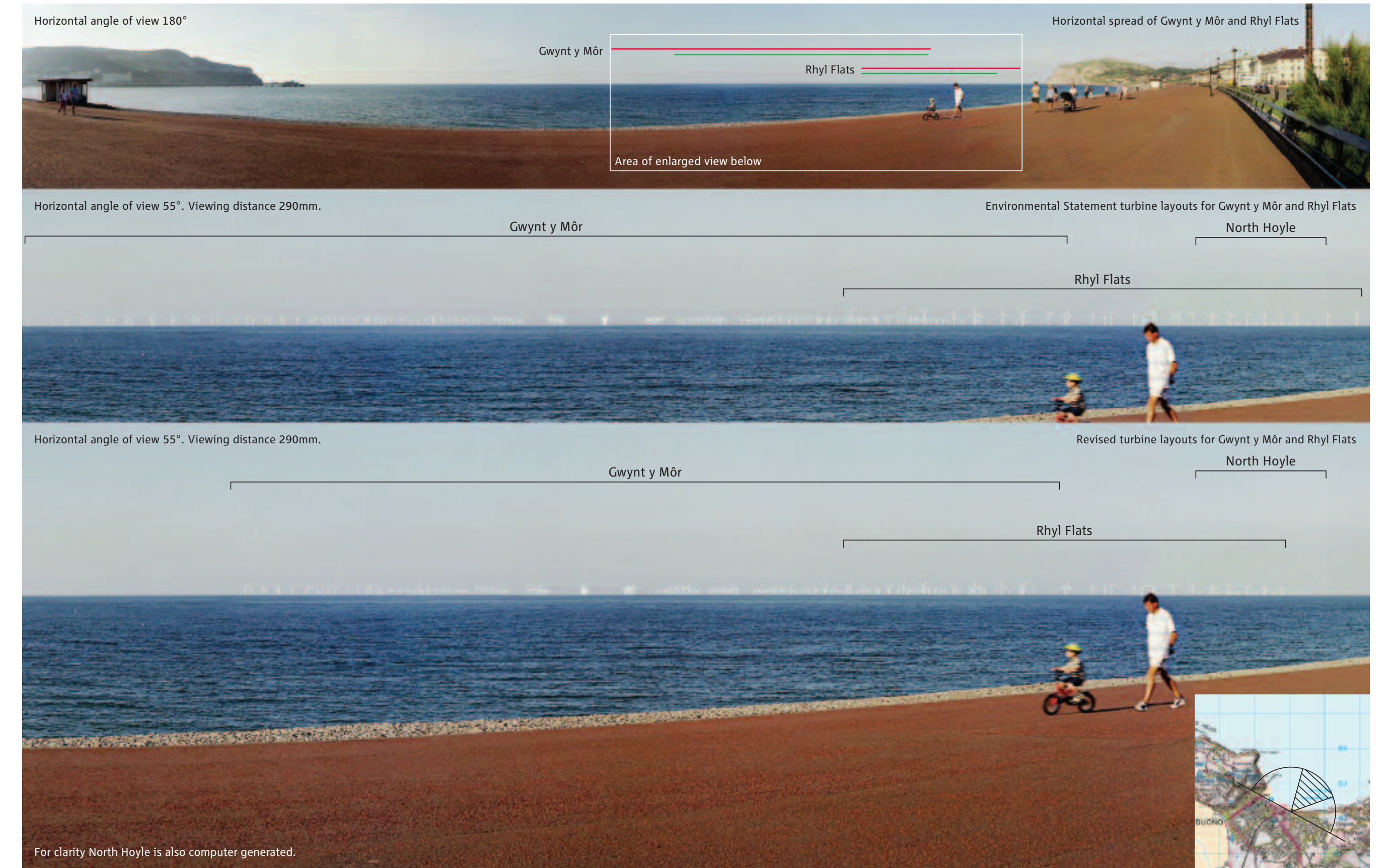
Department for Business Enterprise and Regulatory Reform  
c/o Offshore Renewables Consents Unit  
Bay 2117  
1 Victoria Street  
London SW1H 0ET



**Figure 6: Illustrative view from Great Orme.**  
 Comparison of Environmental Statement and Revised Turbine Area 5MW Class Layouts  
 Distance from viewpoint to nearest wind turbine at Gwynt y Môr (proposed) 16.3km;  
 North Hoyle (operating) 26.9km; Rhyl Flats (consented): 12.1km

— Previously published horizontal spread of wind turbines  
 — Revised horizontal spread of wind turbines

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**Figure 7: Illustrative view from Llandudno Conference Centre.**  
 Comparison of Environmental Statement and Revised Turbine Area 5MW Class Layouts  
 Distance from viewpoint to nearest wind turbine at Gwynt y Môr (proposed) 16.2km;  
 North Hoyle (operating) 25.0km; Rhyl Flats (consented): 10.6km

— Previously published horizontal spread of wind turbines  
 — Revised horizontal spread of wind turbines

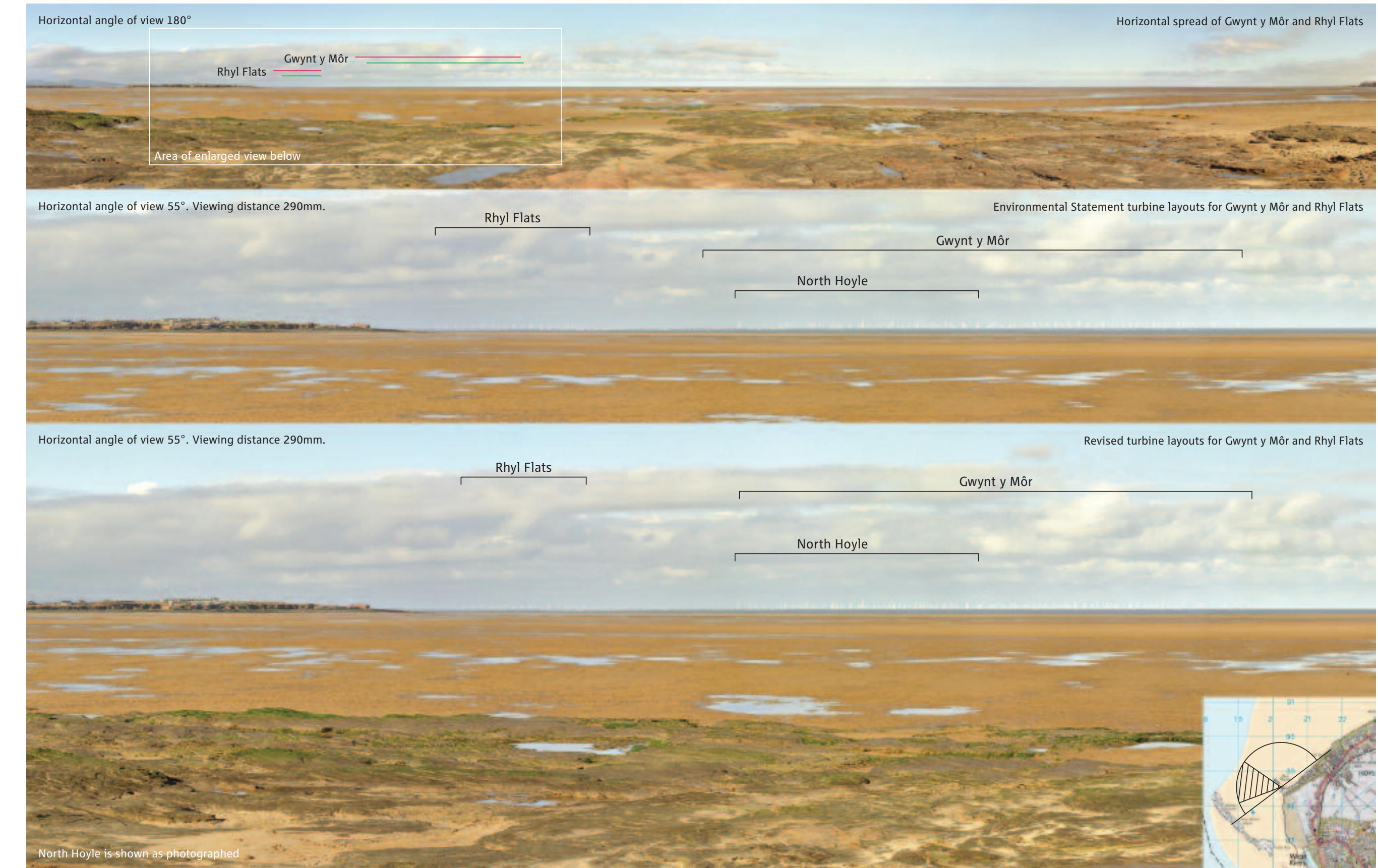
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**Figure 8: Illustrative view from Abergele.**  
 Comparison of Environmental Statement and Revised Turbine Area 5MW Class Layouts  
 Distance from viewpoint to nearest wind turbine at Gwynt y Mor (proposed) 14.1km;  
 North Hoyle (operating) 14.6km; Rhyll Flats (consented): 8.9km; Burbo Bank (consented): 32.7km

— Previously published horizontal spread of wind turbines  
 — Revised horizontal spread of wind turbines

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**Figure 9 Illustrative view from Hilbre Point.**  
 Comparison of Environmental Statement and Revised Turbine Area 5MW Class Layouts  
 Distance from viewpoint to nearest wind turbine at Gwynt y Mor (proposed) 19.1km;  
 North Hoyle (operating) 15.1km; Rhyll Flats (consented): 27.3km; Burbo Bank (consented): 9.8km

— Previously published horizontal spread of wind turbines  
 — Revised horizontal spread of wind turbines

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