



CHAPTER 8 CONCLUSIONS

NWP Offshore (NWPO) Ltd has submitted an application for consents to construct and operate North Hoyle Offshore Wind Farm located approximately 7.5km from the North Wales coast off Prestatyn and Rhyl.

The wind farm will generate up to 90MW (megawatts) of clean, pollution free electricity, equivalent to the average domestic demand of approximately 70,000 homes; this is equivalent to over one third of all the homes in the three counties located nearest to the wind farm (Denbighshire, Flintshire and Conwy) combined. The generation output is also equivalent to approximately 1.5% of Welsh electricity demand.

The UK Government has a target of generating 10% of UK electricity supplies from renewable sources by 2010. The Government has stated that wind, both onshore and offshore, will be significant contributors to achieving this target. The recent report by the Royal Commission on Environmental Pollution confirms the widely acknowledged fact that the development of wind energy both onshore and offshore will be needed in order to achieve these targets.

The UK has a commitment of reducing greenhouse gas emissions by 12.5% by 2008-2012, and a target to reduce carbon dioxide (CO₂) emissions by 20% by 2010. The generation of electricity from renewable energy sources (such as the wind) produces no emissions, and by offsetting the combustion of fossil fuels helps to reduce emissions of environmentally harmful gases.

The primary objective of the development is the generation of energy from a renewable source. The electricity generated by North Hoyle Offshore Wind Farm will contribute to both of these Government targets, and will offset the annual release of approximately 250,000 tonnes of carbon dioxide, the main greenhouse gas.

Energy Minister Brian Wilson has predicted that 2002 will be "the year of renewables" in which the potential contribution of power generated from clean sources will finally be recognised in the UK. He said recently: *"I certainly want to see us aiming higher than ten per cent in the years beyond 2010. However, the reality is that we are starting from a low base it will take a lot of commitment, not least by government itself, to reach the 10% [target]"*.

The development proposed is an emphatic expression of the implementation of the UK's policy towards renewable energy. The proposed North Hoyle Offshore Wind Farm should be seen in the context of, and as a response to, the strong encouragement of the UK Government to the development of renewables generally, to wind energy specifically, and to offshore wind energy in particular. North Hoyle Offshore Wind Farm will make a measurable and important contribution to the achievement of the Government's policy of delivering 10% of electricity requirements from renewable energy by 2010.

8.1 Summary of the Environmental Assessment

8.1.1 Physical Environment

The maximum total volume of sediments that could be released as a consequence of the construction operations, assuming a drilled piled Turbine Support Structure, is approximately 12,000m³, of which the majority would be contained and not released into the environment.

Two alternative Turbine Support Structure configurations are proposed, mono-pile or multi-pile, with the volume of sediment released, during construction and scour (operation), being similar for both configurations, which is considered very small. The maximum extent of scour around the base of the support structures is expected to be a maximum of 6m deep and 40m along the direction of peak current flow, with no overlapping of scour hollows between individual Turbine Support Structures.

The material that is released into the water as a consequence of construction activities or scour would be substantially less (approximately one thousand times smaller) than the volume of material already in motion across the area due to natural processes.

8.1.1.1 Hydrography

The proposed development has been shown to have a minor effect on hydrography within the immediate vicinity of the Turbine Support Structures. Outside the area of the turbine array, no noticeable effects of the support structures on hydrography have been predicted.

8.1.1.2 Water Quality / Suspended Sediments

Available data suggests the proposed development site is devoid of fine sediments. Therefore, the impacts during construction are unlikely to be significant in terms of elevated suspended sediment concentrations.

If, however, large amounts of fine material were to be released during the construction phase, modelling assessments have shown that this would result in an increase of suspended sediment concentrations in the Dee Estuary of less than 10%, this is a conservative estimate, and is not environmentally significant. Evaluation of nearshore changes suggest these have not been influenced by the suspended sediment levels generated by much more major offshore activities, for example aggregate dredging on the adjacent site.

The impact of any contaminants released into the environment either through construction (on background concentrations of mercury and arsenic) or operation (copper from eroded slip rings) is minor, with all predicted concentrations of contaminants significantly within their respective Environmental Quality Standards.

8.1.1.3 Longshore Drift

The environmental impact of the proposed development on sediment transport and hydrography is limited to within the bounds of the development site. Longshore drift is a nearshore process; the nearest proximity to the development site of a nearshore zone is approximately 7.5km. There is therefore limited potential for the development to affect longshore drift.

In conclusion, no significant adverse impacts are anticipated from the proposed North Hoyle Wind Farm on the physical environment.

8.1.2 Biological Environment

8.1.2.1 Suspended Sediments Effects on Biology

Sediments of the wind farm site, and cable route, are typical of the wider eastern Irish Sea, predominantly medium and coarse sand with some infrequent pockets of gravel, stone and clay. Therefore marine invertebrate communities present in the wind farm area fit well with the Irish Sea Shallow Venus community. This is a community widely distributed in medium to coarse sands around the Irish Sea coastline, including much of Liverpool Bay.

Neither levels of suspended sediment nor contaminants released during construction, operation and decommissioning present a risk to marine species within the Liverpool Bay area or species within the Estuaries of Liverpool Bay.

8.1.2.2 Benthic Communities

The physical effects of installing turbine support structures and cabling would be minor and localised to the immediate construction area. Impacts are not significant in terms of the benthic communities present in areas affected.

Recovery post construction would be rapid in areas of cable laying. The Turbine Support Structures and any associated scour protection would be colonised by a hard substrate invertebrate community. Introduction of such different habitats would lead to local increases in species diversity and productivity and would provide shelter and foraging habitat for fish and higher predators. Local modifications of currents due to the presence of turbines may change sediment characteristics with minor modifications of invertebrate communities.

8.1.2.3 Marine Fish Communities and Commercial Species

The loss of natural habitat will be very small relative to the total area available. It is improbable that this small loss will be sufficient to have a discernible effect on the stability or integrity of the local fish populations.

The loss of natural habitat will be mitigated by new habitats created by the presence of the Turbine Support Structures in the water column. These will form artificial reefs and thus act as 'fish aggregation devices'. The potential net effect is to increase biodiversity in the immediate area of the wind farm.

All of the species indigenous to North Hoyle are tolerant of high sediment loads and are unlikely to be affected by any small increase in suspended sediment associated with wind-farm construction or operation.

It is improbable that the redistribution of sediments in the near field will have any effect on fish other than influencing their micro (feeding) distribution in response to any changes in benthos distribution.

Although there will be occasions when (short-term) noise levels during construction cause a startle response, it is not anticipated that there will be a discernible effect, and certainly not beyond the near field.

Electrical fields in the immediate vicinity of the buried subsea cables will be extremely weak, any significant avoidance behaviour of sharks, skates and rays is not anticipated. Some local attraction of individual fish to the cable route is possible, but this would not affect populations of electro-sensitive species in the local area.

It can therefore be concluded that there will be no significant negative impact resulting from the proposed North Hoyle Offshore Wind Farm on Marine Fish and Shellfish.

8.1.2.4 Migratory Fish

The physical presence of an offshore wind farm is unlikely to have any discernible effect on the behaviour or abundance of migratory species along the coast of North Wales or entering the Clwyd Estuary.

As the three existing electricity cables crossing the Clwyd Estuary have not affected the migratory fish runs it is not anticipated that further buried Onshore Cables will have any discernible effect either.

Cable laying and or burial will take place in the winter period to mitigate the impact on the numbers of fish: elvers, smolts, adults and grilse, moving through the estuary.

8.1.2.5 Marine Mammals

Cetacean numbers within the eastern Irish Sea are generally low, with only six species (harbour porpoise, bottlenose dolphin, common dolphin, minke whale, long-finned pilot whale and Risso's dolphin) being regularly found in the area. Of these, only harbour porpoise are recorded with any regularity in Liverpool Bay.

For cetaceans, impacts would primarily arise from noise generated during wind farm construction (and decommissioning) and operation. Odontocete cetaceans (such as the harbour porpoise) appear less sensitive to the low frequency noise generated during both construction and operation. Any effects during construction would therefore be limited to immediate avoidance behaviour. During wind farm operation individuals would habituate to noise and to the physical presence of turbines, and may exploit these as feeding areas. Minke whales (the only mysticete species regularly recorded in the eastern Irish Sea) are seldom present in Liverpool Bay. Any avoidance behaviour due to noise generation would not, therefore, be significant.

Seals in Liverpool Bay are grey seals, most commonly found at well-established haul-out sites between West Hoyle Bank and Hilbre Island at the mouth of the Dee Estuary. Numbers here peak in late summer and have increased consistently over recent decades. No breeding takes place at this site.

Avoidance behaviour in grey seals would be more likely directed to human activity rather than noise. Given the distance between the North Hoyle site and the haul out areas, no impacts would occur during

construction or decommissioning. During operation, seals would habituate to the presence of turbines and may exploit these as feeding areas.

8.1.2.6 Intertidal and Adjacent Terrestrial Ecology

The coastline of northeast Wales is characterised by long sandy beaches extending between the Great Orme and the Dee Estuary. These sandy beaches support similar intertidal invertebrate communities throughout the area, which are typical of this habitat type. Towards the Point of Ayr and Dee Estuary, these beaches are backed by shingle ridges and sand dunes. Within the Dee Estuary, sediments become increasingly muddy with distance upstream and sand dunes are increasingly replaced by saltmarshes. The Clwyd Estuary at Rhyl presents a narrow area of muddy sediments and saltmarshes. Habitats within the estuary are typical of such estuarine environments, but are not commonly represented along this stretch of coastline.

Cable laying operation in the Clwyd Estuary will involve temporary disruption of mudflat and saltmarsh habitats within the estuary and disruption of an extremely minor area of ditches and hedgerows along the short stretch between the estuary and the existing electricity substation. No significant impacts on estuarine habitats or water quality would arise as a result of these works. The timing of works will also prevent impacts on local bathing water quality. Mitigation is specified to ensure proper restoration of saltmarsh and terrestrial habitats and to confirm that no rare or protected amphibians or mammals are using habitats within the construction area.

8.1.2.7 Birds

The proposed North Hoyle site and surrounding area has low populations of birds, despite surveys of Liverpool Bay during 2000/2001 demonstrating that the inshore waters have wintering populations of common scoter and red-throated diver that would justify classification of some areas as designated European Site(s).

The River Clwyd, which lies along the cabling route, is a non-statutory wildlife site, noted for migrant and wintering populations of county importance of a number of waterbird species.

The proposed North Hoyle site, some 7.5km from land and in water depths of 6-10m, is beyond the foraging range and water depths preferentially selected by most of the important seabird populations in Liverpool Bay. North Hoyle is of negligible importance as a feeding area for seabirds and terns during the breeding season. In winter, the nearest significant common scoter population is 5km to the south of North Hoyle, at Chester Flats/Middle Patch. The nearest high red-throated diver densities occur 10km to the west, between Rhyl Flats, Colwyn Bay and Constable Bank. No significant movements, through North Hoyle, of important populations were observed or would be expected.

The proposed North Hoyle Offshore Wind Farm will not contribute significant effects to the cumulative impact of the offshore wind farms mooted to be proposed for development in Liverpool Bay on bird populations.

8.1.2.8 Designated Sites and Qualifying Populations

There are a number of statutory and non-statutory designated sites in the region, although the proposed site does not lie within any designation boundaries. Surveys undertaken in and around the site of the proposed wind farm and cable route have not shown any species populations which would render it necessary for any part of the site or adjacent areas to be designated for the purposes of nature conservation.

The environmental impacts of the wind farm were assessed, in relation to the European designated sites and any cumulative impacts with other developments. These assessments conclude that the proposed North Hoyle Offshore Wind Farm will not affect such sites or areas of Liverpool Bay having populations of species that could be so designated. An assessment of impacts, for the Stage 1 scoping opinion required under Article 6(3) of the Habitats Directive (92/43/EEC), is that there will be no significant effects on the qualifying populations of classified or potential European Sites, therefore it is concluded there is no requirement for "Appropriate Assessments" associated with the proposed North Hoyle Offshore Wind Farm.

In conclusion, no significant adverse impacts are anticipated from the proposed North Hoyle Offshore Wind Farm on the biological environment.

8.13 Seascape and Visual Environment

The 'seascape' consists of views from the land to the sea and vice versa; views along the coastline; and the effect on landscape at the conjunction of sea and land. The seascape between Rhos-on-Sea and the Mersey has been evaluated for this Assessment.

The proposed North Hoyle site lies within one national seascape unit. Within this, six regional seascape units have been identified. North Hoyle lies closest to the regional seascape units of Vale of Clwyd and Clwydian Hills and at the outermost limits of the remaining four units. Both the national and the closest regional seascape units have a high to moderate capacity to accommodate an offshore wind farm such as North Hoyle.

Zones of Visual Influence maps (ZVI's) and photomontages for 12 viewpoints, agreed with the Local Authorities and statutory consultees, were produced to assess the visual impact of North Hoyle, taking into account the degree of change in the view and the sensitivity of the receptors to that change.

The degree of visual impact will be highest from those viewpoints closest to North Hoyle, where sensitivity of receptors is high. Only Point of Ayr falls into this category. Moderate to high impacts are predicted at the car park viewpoint at Bryn-llwyn and from the hilltop of Marian Ffrith, the only inland view of North Hoyle for walkers on Offa's Dyke Path. Moderate impacts are predicted at Prestatyn's Nova Centre, Graig Fawr and Hilbre Point. Low to moderate impacts are predicted at Rhos-on-Sea and Abergele/Pensarn (both on the route of the North Wales Path), Bryn Euryn, Rhyl Aquarium and Thurstaston Common. Finally, low impacts are predicted at Mynydd Marian on the eastern outskirts of Old Colwyn.

Assessments have also been made of the cumulative effect of North Hoyle in combination with other wind farms in Liverpool Bay that have been mooted for development.

In conclusion, the proposed North Hoyle Offshore Wind Farm will be sited in a seascape that has capacity to accept the proposal. Visual impacts will be moderate or less from the majority of viewpoints and predicted impacts have been mitigated through layout and orientation.

8.14 Human Environment

8.14.1 Socio-economic

The proposed offshore wind farm development will provide a major inward investment opportunity to the area, resulting in significant benefits from construction and spin-off effects in other parts of the local economy.

Up to 53 full-time equivalent jobs will be created; the majority (an estimated 44 jobs) would be directly associated with construction activity, with around 6 full-time staff required for its operation. An additional 2 jobs will be created to provide year round boat access to the wind farm site for maintenance.

Overall, the potential impacts on the local and wider economy are considered positive.

8.14.2 Traffic

Onshore traffic movements associated with the proposed development will be minimal with the relatively few journeys required for construction personnel travelling to the area. The movement of heavy goods vehicles (HGV) (associated with the onshore construction activities) is not anticipated to be significant.

8.14.3 Military

The Northern Irish Sea is an area of interest for military activity, with submarine, surface vessel and aircraft exercising in the region. The Ministry of Defence has confirmed that North Hoyle will have no discernible effect on its operations.

8.14.4 Civil Aviation

The two nearest aerodrome/ATS facilities, Liverpool Airport and Hawarden Airport, and the National Air Traffic Services Ltd (NATS) have confirmed that North Hoyle will not conflict with civil aviation.

8.14.5 Electromagnetic Interference (EMI)

Consultation with the telecommunications industry indicates that radio waves and microwaves utilised for communication purposes in the vicinity of the North Hoyle site will not be affected by the proposed development.

8.14.6 Noise

Construction of the wind farm may involve piling, which may be audible from the shore depending on background noise levels at the coast. However the noise level and duration are not expected to be significant.

Onshore construction activities will be undertaken by conventional construction equipment and activities. Noise will be subject to control with noise limited by exercising a reasonable degree of control over site activities, and by adhering to the recommendations set out in British Standard 5228 'Noise Control on Construction and Open Sites'.

The distance to shore from the nearest wind turbine is 7.8km. During operation, the noise levels at the coast due to the wind farm will be very low and usually inaudible.

8.14.7 Offshore Industries

8.14.7.1 Offshore Oil and Gas

Liverpool Bay has number of offshore oil and gas fields operated by BHP Billiton Petroleum Limited. With the exception of precautionary construction methods where the Offshore Cables cross the main gas pipeline from the Douglas gas production facility, the development of North Hoyle Offshore Wind Farm will not be to the detriment of the gas pipeline or the operation of the BHP facilities.

8.14.7.2 Aggregate Dredging areas

The Hilbre Swash licensed extraction area is immediately to the north of the proposed wind farm site. The dredging activities will not be affected by the proposed wind farm.

8.14.7.3 Cables and Pipelines

The only offshore pipelines of interest for the proposed development is the gas pipeline owned by BHP Billiton Ltd., as described above.

There are a number of cables and pipelines that will need to be crossed during installation of the Onshore Cables along the Clwyd Estuary. These include gas mains, water mains, power cables, and communication cables, which can be crossed using standard construction techniques.

8.14.7.4 Waste Disposal Sites

The development location is not situated within any licensed waste dumping areas and therefore no effect is anticipated.

8.1.4.7.5 Shipping and Navigation

The wind farm has been sited in a relatively low risk area for commercial navigation, being 5.5 nautical miles south of the shipping lane into Liverpool and 2.5 nautical miles north of the shipping lane for the Port of Mostyn. In addition the site will be marked in accordance with Trinity House Lighthouse Service recommendations, and will be marked on Admiralty Charts.

The potential for an impact during construction and decommissioning is regarded as low, however operational measures will be instigated to reduce risks. Assessments have concluded that the risk of collision from a large vessel is extremely low.

A number of navigational radar systems are in place within the area from Anglesey to Liverpool to control and monitor vessels entering or leaving the Ports of Liverpool and Mostyn, which cover the area proposed for North Hoyle.

The sea off northeast Wales and the Wirral is home to a range of marine leisure and recreational pursuits. Despite this, the area of sea in and immediately around the proposed offshore wind farm is relatively lightly used. The impact upon marine recreation is considered low.

The risk to sailing vessels is highly dependent on the approach of the skipper and local conditions. Due to the minimal seabed area taken by the turbines, and the regular pattern of the wind turbines (with minimum turbine separations proposed of about 350m), the presence of the turbines and support structures will not unduly restrict navigation of smaller vessels/craft. However, some skippers may prudently elect to navigate around the turbine array, resulting in slightly longer transit times.

The proposed wind farm structures will create a permanent obstruction to navigation, however the area of sea in and immediately around the proposed offshore wind farm is relatively lightly used, and mitigation measures are proposed to inform users of the sea to minimise risks as far as possible.

There will be no exclusion zone during wind farm operation.

8.1.4.7.6 Commercial Fisheries

The location of the wind farm has been chosen to minimise any potential effects on the commercial fishing industry. Recorded commercial fishing effort in the vicinity of North Hoyle is very small compared to that recorded elsewhere in the Irish Sea. Only three full time commercial fishing vessels fish the site on a regular basis, though their fishing activities extend over an area much larger than the wind farm site.

Construction of the wind farm will result in a loss of access to the site for these several fishing vessels. During operation, smaller inshore trawlers will be able to manoeuvre and fish within the site. There will be a loss of fishing grounds to local netters known to fish the area.

In conclusion, no significant adverse impacts are anticipated from the proposed North Hoyle Wind Offshore Farm on the human environment. It is recognised that the proposed wind farm will result in the loss of fishing grounds to local netters, albeit small given the low intensity of fishing on the site; this must be balanced by the overall positive socio-economic impacts of the development and specifically the jobs created to provide year round boat access to the wind farm site for maintenance.

8.15 Archaeology and Wrecks

The area around Rhyl has considerable potential for buried archaeological deposits, generally associated with past changes in sea levels and the advance and retreat of the coastline since the end of the last glaciation (about 10,000 BC). It is possible that further such deposits may lie beneath agricultural land at the southern end of the proposed on-shore cable route and a programme of sampling will be undertaken in mitigation.

The Onshore Cables route will result in a cutting being made through a 19th-century reclamation embankment at the point of landfall (in the vicinity of SJ 0052 7947), resulting in only minor damage to this site, and appropriate mitigation measures will be implemented.

An analysis of known wrecks has identified a number of wrecks within the Foryd Harbour and the Clwyd estuary, one of which could be affected by the proposals and an exclusion zone will be implemented in mitigation. The analysis of survey data for the seabed, in the area of the proposed turbine array, as well as for the Onshore Cables route, has produced no evidence for further wrecks; although there is always the potential for buried structures which were not detected by the existing survey.

In conclusion, no significant adverse impacts are anticipated from the proposed North Hoyle Offshore Wind Farm on archaeology or wrecks.