YELLOW RIVER WIND FARM

NON-TECHNICAL SUMMARY

1.0 INTRODUCTION

1.1 Scope

This Environmental Impact Statement (EIS) has been compiled to accompany an application for planning permission for development of a 32 turbine wind farm, on a site, in the townlands of Derryarkin, Derryiron, Coolcor, Coolville, Ballyburly, Greenhills, Bunsallagh, Derrygreenagh, Knockdrin, Wood, Killowen, Corbetstown, Carrick, Garr and Dunville, in a location just north of Rhode, on a relatively flat area of predominantly improved grasslands.

The site is located entirely within County Offaly, however, it is approximately 275m from the County Westmeath border, approximately 60m from County Meath and approximately 4,500m from County Kildare. Please refer to Figure NTS 1 - Site Location Map.

The development will comprise thirty-two (32) electricity generating wind turbines with a hub height of up to 110 metres and a rotor diameter of up to 113 metres and an overall height of up to 166 m, hardstandings, a 110 kV substation containing two (2) control buildings, an electrical compound and a wastewater holding tank, ten (10) watercourse crossings, temporary construction compound, a permanent meteorological mast, a new access road off the R400 Roundabout at Rhode and upgraded access roads, associated site roads, drainage and site works.

The EIS describes the procedures, findings and recommendations of the Environmental Impact Assessment process.

1.2 The Developer

Green Wind Energy (Wexford) Limited (GWE) is an Irish owned commercial company operating in the renewable energy business for over 10 years. The five directors have extensive experience and track record in the energy industry, land acquisition and the planning process. In addition to the Yellow River site, GWE has been involved in the preliminary development of sites in Wexford, West Cork, East Cork, Sligo and other sites in the midlands.

GWE has been engaged with the Yellow River Wind Farm for over 3 years and has acquired the necessary legal options from the 22 separate landowners of the site.

GWE applied for a grid connection for the Yellow River Wind Farm in April 2012.

1.3 Site Description

The site can be located on Discovery Series Map No.s 48 and 49 at approximate centre grid co-ordinate N 525 370. The site is irregular in outline and is bisected by the R400 and the Garr Road. The site is quite dispersed and is located in the townlands of Derryarkin, Derryiron, Coolcor, Coolville, Ballyburly, Greenhills, Bunsallagh, Derrygreenagh, Knockdrin, Wood, Killowen, Corbetstown, Carrick, Garr and Dunville, approximately 1.6 km north of Rhode, Co. Offaly.

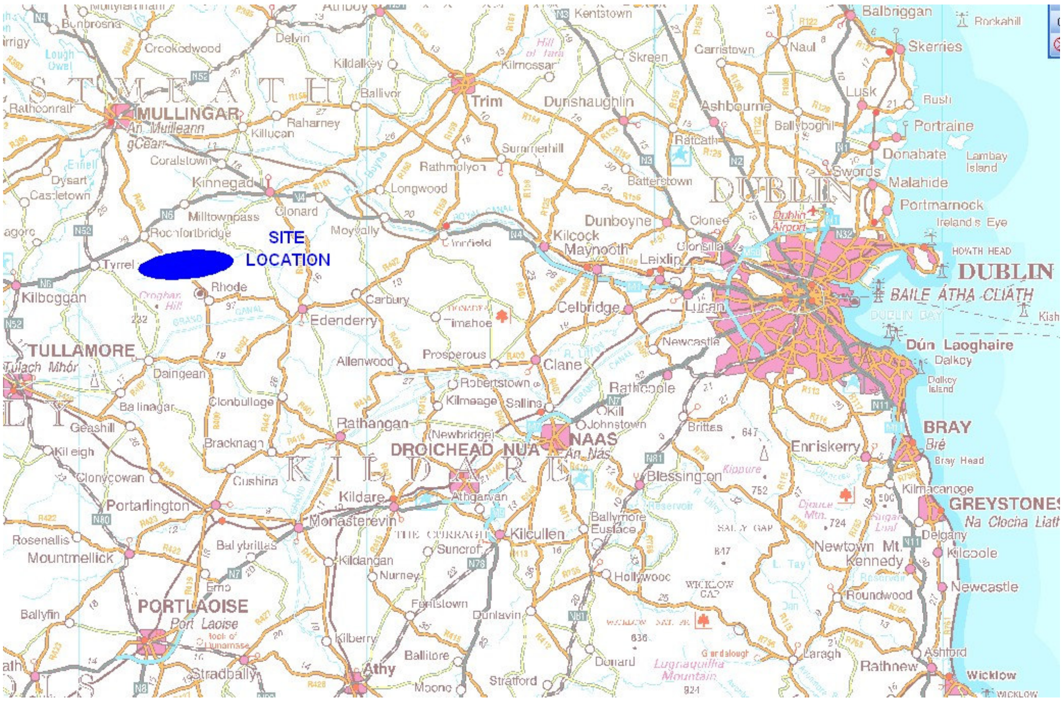

Figure NTS 1 – Site Location

The landholding outline of the site is approximately 1,002.234 hectares. The site is relatively flat, ranging in elevation from 75 m to 93 m OD (Malin Head). The site is predominantly improved agricultural grassland underlain with peaty soil. There has been extensive turf cutting in the western section of the site with old and new turf banks evident. Peat has been removed from considerable areas of the site and these areas have subsequently been further drained, improved and seeded with grasses for

grazing of cattle and sheep. A network of existing local roads and private access tracks allow vehicular access to the various sections of the site.

The development will comprise thirty two (32) electricity generating wind turbines with a hub height up to 110 metres and a rotor diameter up to 113 metres and an overall height of up to 166 m, hardstandings, a 110 kV substation, an electrical compound, a temporary construction compound, a permanent meteorological mast, associated site roads, drainage and site works.

1.4 Duration of Permission

Given the scale and element of uncertainty in grid scheduling, a duration of 15 years is being sought for any planning permission issued on foot of this application. An operational lifetime of 30 years is being sought for the proposed wind farm, plus a 3 year construction/commissioning period and a 2 year decommissioning period. The DoEHLG Wind Farm Planning Guidelines state:

"*Planning Authorities may grant permission for a duration of longer that 5 years if it is considered appropriate, for example, to ensure that the permission does not expire before a grid connection is granted*".

1.5 Neighbouring Wind Farms

The closest four wind farms are listed in NTS Table 1. The closest wind farm being Mount Lucas Wind Farm, 10km South of the Yellow River Wind Farm site and the furthest being Carrig / Skehanagh Wind Farms, 65km South west of the site.

Wind Farm	Status	Output (MW)	Direction from the Site	Distance (km)
Mount Lucas	Construction	79.2MW	South	10
Leabeg	Consented	4.25MW	West	36
Cloghan	Consented	25MW	South West	42
Carrig / Skehanagh	Operational	6.8MW	South West	65

NTS Table 1 - Operational/ Consented wind farms in the vicinity of the proposed site.

2.0 ENVIRONMENTAL IMPACT STATEMENT

The EIS reflects the Guidelines on the Information to be contained in Environmental Impact Statements (2002) and the Advice Notes on Current Practice in the preparation of Environmental Impact Statements (2003), issued by the Environmental Protection Agency (EPA).

Potential impacts to the environment resulting from the proposed project are examined under the following topics:

- Human Beings
- Flora and Fauna
- Soils and Geology, including Slope Stability
- Hydrology
- Air and Climate
- Noise
- Shadow Flicker
- Landscape and Visual Assessment
- Material Assets
- Cultural Heritage
- The Interaction of the Foregoing

Each of these topics are discussed, with sections detailing:

- The existing environment.
- Potential impacts of the proposed development.
- Mitigation measures.
- Monitoring.

When considering the characteristics of the proposed development, reference is made to layout, design, size and scale so that projections of the likely levels of impact on any particular environmental sector can be made.

The potential impact of the proposed development allows for a description of the specific, direct and indirect impacts, which the proposed development may have. This is achieved by reference to the existing environment, the characteristics of the proposed development together with the magnitude, duration, consequences and significance of the development.

Where potential impacts are envisaged, remedial and/or mitigation measures that are practical and reasonable are recommended. Where there is a requirement for environmental monitoring during the construction and/or operational phases, such requirements are described together with the proposed methods for carrying out such monitoring.

All prescribed topics have been covered. The level of treatment for some of the topics differs depending on the likelihood of impacts when assessed in the context of the nature of the proposed development and the site.

A consultation letter and scoping document/feasibility report were sent to all relevant statutory and non-statutory consultees during the scoping process. A full list of the bodies consulted, the consultation letters sent and the corresponding responses can be found in **Appendix F**. Of the 31 bodies consulted, 12 responses were received.

During the initial stages of the EIA process, a public consultation was held in Rhode Community Centre between 12pm and 7.30pm on December 10th 2012. Notification of this event was given in the local press and in the parish notes. Invitations were issued to Offaly County Council, Meath County Council, Kildare County Council, An Bord Pleanála, An Táisce and National Parks and Wildlife Service. The evening was attended by those interested in the project including: the local community, elected members and the press. A total of 66 people signed in at the consultation evening, and a number of others attended but did not sign in. Four representatives from Jennings O'Donovan & Partners Ltd and three directors from Green Wind Energy were present. In addition, GWE adopted a policy of providing information at private meetings held at the request of interested parties.

Pre-application consultations meetings were held with An Bord Pleanála; Offaly County Council and the National Parks and Wildlife Service.

3.0 NATIONAL POLICY

In the light of Ireland's commitment to reduce emissions from energy and in the context of increasing national demand for electricity, the Government introduced a number of measures. These include the efficient use of electricity and the production of electricity from non-fossil renewable sources, in particular wind energy.

On March 12th 2007, the White Paper entitled "Delivering a Sustainable Energy Future for Ireland" was launched by the Department of Communications, Marine and Natural Resources. This policy document describes the actions and targets for the energy policy framework up to 2020. The Paper sets a clear path for meeting the Government's goals of ensuring safe and secure energy supplies, promoting a sustainable energy future, and supporting competitiveness. Section 3.9.5 of the Paper states that 33% of all electrical consumption will be generated from renewable energy sources by 2020 with a 15% target for 2010. The bulk is expected to come from wind energy.

Furthermore, in the 2009 Budget announced on October 15th 2008, the Minister for the Environment, Heritage and Local Government stated *'Today I can confirm that the Government has now agreed, on the recommendation of my colleague, the Minister for Communications, Energy and Natural Resources, to increase this target to 40%'* (Dáil Statement, Budget 2009). The bulk is expected to come from wind energy.

The amount of wind farm capacity connected to the Irish power system now totals 1,763 MW as of March 2013[1]. The peak amount of electricity generated by wind power reached 1,506 MW for the first time on December 18th 2012[2]. However, it is estimated that approximately 6,000 MW of installed renewable capacity will be required to meet the 2020 target.

4.0 OFFALY COUNTY COUNCIL POLICY

Offaly County Council Wind Energy Strategy

[1] (IWEA http://www.iwea.com/index.cfm/page/windenergyfacts)
[2] (EirGrid, http://www.eirgrid.com/operations/systemperformancedata/systemrecords/)

The County Offaly Wind Strategy accompanies the Offaly County Development Plan and was adopted on 19th January 2009. A Strategic Environmental Assessment was carried out for the County Development Plan 2009 – 2015 and associated strategies, including the Wind Energy Strategy.

The objective of the strategy is *to evaluate and analyse the potential wind energy resource in the county, to define environmental and planning considerations for wind energy development and to make recommendations on Wind Energy Resource Policy and Practice.* It clarifies the council's policy towards wind energy in Co. Offaly and forms the basis of assessment methodology for planning applications.

There are currently no operational wind power developments in the County Offaly. The Wind Energy Strategy identified 12 main areas within the county as having wind energy development potential. These areas were further examined and of the 12 areas found to have development potential, 6 were designated as suitable for wind energy development. The Yellow River site is located within the "*North of Rhode*" Suitable Area and this location has been designated for large scale wind farms, having sufficient wind speeds and access to grid network.

5.0 ALTERNATIVES CONSIDERED

The Environmental Protection Agency, in its guidance documents on EIS preparation, stipulates that alternatives, which were assessed prior to beginning the project design, be explained in the EIS. The alternatives can include:

- Alternative Electricity Generation
- Alternative locations
- Alternative designs
- Alternative processes

The criteria under which a site is examined are:

Availability of Wind

To operate a wind farm efficiently an average annual mean wind speed in excess of ≈ 8 m/s (metres per second) is generally considered to be required.

Environment

It is preferable that a wind farm is not located in an area designated as a Special Protection Area (SPA), Special Area of Conservation (SAC) or proposed Natural Heritage Area (NHA) or where the visual aspect of the wind farm would be overly obtrusive. Preferably the site under consideration should hold no historical, archaeological or ecological interest.

Development Control

County Offaly Wind Energy Strategy identifies 12 potential sites for wind energy development, 6 of which are deemed to be suitable areas for wind energy development within the county. The Yellow River site is located in an area designated as suitable for large scale wind farms.

Dwellings

Locations with low housing density are preferable so as to minimise any disturbance, which may be caused to people as a consequence of construction activities, visual impact, shadow flicker and noise.

Grid Connection

Close proximity to a suitable connection point with the electricity grid is desirable in order to minimise the impact of any overhead lines. The ESB network must be capable of absorbing the power without adverse effects on existing ESB installations or customers.

Accessibility

The site needs to have reasonable access to facilitate construction and the subsequent operation, maintenance and monitoring of the site. Alternative access may be provided but this should not involve excessive construction.

Terrain

The geological features and the topography of the region should be suitable to facilitate construction on site. The site should not be overly difficult to develop, and should not exhibit excessive peat depths and should not show signs of peat instability.

Electromagnetic Interference

Preferably the development should be sited in an area where there is a low potential for electromagnetic interference with telecommunications, television and radio signals etc.

Aviation Interference

Wind farm development represents a potential navigational hazard to air transport. It is the policy of the IAA to request an obstruction / radar survey for all developments within 20km of a national or international airport. Wind energy developments can have an impact at distances up to 40km depending on their altitude and orientation relative to the wind farm.

Site Selection Criteria

Green Wind Energy (Wexford) Ltd., was established in 2003. The aim of the company was to establish a sustainable wind farm in the midlands region. At an early stage in the assessment Green Wind Energy Ltd. identified the County of Offaly as a key location for potential large wind farm development for the following reasons:

- The publication of the Offaly Wind Energy Strategy in 2009 which includes progressively identified strategic wind development zones and clear policy guidance in respect of these zones.

- The history of conventional power generation in Offaly and the resulting excellent electrical grid infrastructure to which a potential wind farm could connect.

- The low concentration of existing wind energy development in Offaly resulting in the availability of large undeveloped suitable spatial area and uncongested grid infrastructure.

- The strong road infrastructure network throughout the County.

- The infrequency of environmental designations within the County resulting in lower potential for environmental effects.

Selected Site

The Yellow River site was deemed the most suitable for advancement to development at this juncture.

Area 1 **– Yellow River Wind Farm, Rhode, Co. Offaly**

Availability of Wind

The site is at an elevation of between 75 mOD and 93 mOD (Malin Head).

According to the Irish Wind Atlas published by Sustainable Energy Ireland, 2003, the site sustains winds in excess of 8.00m/s at an elevation of 100m above ground level. This would be considered good in terms of wind energy development.

Environment

The site itself is not designated at any level.

The closest designated site is Black Castle Bog NHA, 2.4km East of the Yellow River site.

Black Castle Bog NHA is a site of considerable conservation significance, comprising as it does, a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. It is especially important because of its eastern location. There are a number of habitat types found on the cutover areas of the bog. Irish Hare, a Red Data Book species, has also been recorded at the site

It is unlikely that the development would have any negative effect on the habitat of the bog vegetation at this designated site, as there is no hydrological connection between the proposed wind farm site and Black Castle Bog.

Development Control

According to the County Offaly Wind Strategy, the site is located in an area deemed as Suitable for Large-Scale Wind Farms. Applications for wind turbines within this area are acceptable in principle, subject to conformance with all other requirements of this plan.

There are two large areas of the county designated as "Wind Energy Development Area", one to the west of the county, around Ferbane, and one to the east of the county, north and west of Rhode. There are currently no wind farms within this designation.

Distance from dwellings

The nearest population centre is Rhode, located approximately 1.6 km south of the site. There is one regional road and one local road traversing the site splitting the site into three different sections. The local road, known as 'the Garr Road', has several houses dotted along sections of the road. When 500 metre buffers are applied to these houses, the majority of the site remains available for turbine development.

Grid Connection

The Derryiron 110kV station is located less than 0.5km south of the site area. A 110kV high voltage grid network runs through the southern part of the site.

Accessibility

The site has good access from the M6 motorway and reasonable internal road network to all sections of the site.

Terrain

The terrain is sloping with gradients between 1:40 and 1:100. This would make construction feasible at all areas of the site.

Electromagnetic Interference

There are no telecommunications masts within the site, however, there are several masts within 5km of the site. Telecoms operators were consulted and it was found that there were few links passing through the site.

Aviation Interference

The site is located over 60km from Dublin International Airport, Baldonnel Airfield is approximately 50km from the proposed development and Clonbulloge Airfield (The Irish Parachute Club) is approximately 13 km from the proposed wind farm site.

Yellow River Wind Farm has been designed in accordance with County Offaly Wind Energy Strategy, Wind Farm Planning Guidelines (2006) and IWEA best practice documents.

Turbine Selection

Turbines considered for the site were required to have:

- A wind class rating (IEC) of class IIa / IIIa due to estimated wind speeds and topography.
- Low noise output.
- Three blades, which have a greater aesthetic quality than two bladed or single bladed machines.
- Cylindrical type towers, which have a greater aesthetic quality than pylon or lattice type towers.
- Good financial security by manufacturer (such that operation and maintenance support and spares, are available through the full operational life of the turbine).

- Proven track record by manufacturer.

A range of turbine models which have demonstrated their effectiveness at other locations throughout Europe and are proven to be of the highest international standard were examined. Turbines from well-established manufacturers meeting the above criteria were considered. The following are examples of the options that were considered:

Turbine Type	Rotor Diameter (m)	Hub Height (m)	Individual Output (MW)	Expected Capacity Factor based on Wind Resource	Number of WTGs required to achieve approximately 95MW .
Siemens SWT 113	101, 108, 113	75, 108, 145	3	35	32
Vestas V112	112	84, 94, 119, 140	3 / 3.3	35	32
Enercon E82	82	98, 108	2 / 3	30	48
Alstom ECO 100/122	100, 110, 122	110, 119	2.7 / 3	35	35

NTS Table 2 – Turbine comparison Matrix

For purposes of the EIS, a turbine type with rotor diameter no greater than 113 metres, hub height no greater than 110 metres and overall height no greater than 166m is used. These dimensions are essential to maintain good operational turbine efficiencies at the Class IIa / IIIa site and for the overall site's financial viability. For the purposes of Noise & Shadow Flicker, the technical characteristics of the Siemens

SWT 113, rotor diameter 113m and maximum hub height of 122.5m, is used. For the purposes of demonstrating the impact on the landscape, a turbine with maximum hub height of 110m and maximum rotor diameter of 112m giving the overall maximum height of 166m is used.

Alternative Internal Layouts

The site layout evolved during the course of the Environmental Impact Assessment. Variables, which affected the design of the site layout, included:

- Hydrology
- Ecology
- Soils & Geology, including Slope Stability
- Landscape and Visual Impact
- Noise
- Shadow Flicker
- Planning Constraints

During the EIA process, the site was examined in terms of environmental constraints and potential impacts by specialist sub-consultants. 'No-go' areas were requested following site visits from sub-consultants in the form of exclusion zones.

At an early stage in the Environmental Impact Assessment, it was decided in consultation with specialists and statutory bodies, including National Parks and Wildlife Service, that turbines, roads and the substation would not be sited within these zones, where possible.

1. Hydrological exclusion zones were identified by Hydro Environmental Services Ltd. These consisted of buffer zones around the Yellow River, it's tributaries and drains to prevent sediment migration. A number of mitigation measures were proposed to preserve the water quality in all watercourses and to reduce the potential for flooding at and around the site including 12 / 24

hour rainfall retention at the turbine bases and free span reinforced concrete bridges over all river crossings.

2. One geotechnical exclusion zone was identified by Whiteford Geoservices Ltd corresponding to the area of degraded raised bog south of the current T9 locations.

3. Ecological exclusion zones were identified by Biosphere Environmental Services including areas of degraded raised bog. A number of turbines were relocated outside of degraded raised bog areas. Demesne boundaries adjacent to T13 and T14 presented potential bat feeding areas therefore a 50m turbine siting exclusion zone buffer was applied.

4. Irish Archaeological Consultancy Ltd. identified archaeologically and architecturally sensitive sites; the avoidance of these sites was incorporated into the design of the wind farm.

A number of iterations of the layout took place over the course of planning the wind farm, taking into account the various environmental and technical studies carried out and the mitigating measures proposed. The final site layout, which incorporates all the recommendations from the specialist sub-consultants, is set out in **Figure NTS 2** – Outline Final Site Layout.

6.0 DESCRIPTION OF FINALISED PROJECT

The finalised proposed Yellow River Wind Farm development will comprise thirty-two (32) electricity generating wind turbines with a hub height of up to 110 metres and a rotor diameter of up to 113 metres giving an overall height of up to 166 m, hardstandings, a 110 kV substation containing two (2) control buildings, an electrical compound and a wastewater holding tank, ten (10) watercourse crossings, temporary construction compound, a permanent meteorological mast, associated site roads, drainage and site works.

The wind turbines will be upwind, horizontal axis turbines. The visible components include a cylindrical tower, nacelle and blades. The towers will be up to 110 m high. The nacelle comprises the hub where the blades meet, and housing for a gearbox,

generator and various ancillary items of equipment. The blades will rotate in a clockwise direction when facing into the wind, and the resultant disc described in space will have a diameter of up to 112 m.

Crane hardstand areas are to be placed near each turbine location to facilitate erection by mobile cranes. Each turbine will be connected via an underground cable to the site substation. The 110 kV substation will be immediately north of the Derryiron ESB/EirGrid substation. The proposed substation site will consist of two adjacent control building / substations required to service the project, one controlled and operated by EirGrid and the other by the developer.

It is proposed to use the internal road network as much as possible. These roads will need widening from approximately 3.5 m to approximately 5.5 m. A large proportion of these roads have a sealed surface however resurfacing will be required along the majority of the roads. Approximately 5,916 m of existing site roads will require upgrading to provide suitable access to the wind turbines and site control buildings.

It is to be noted that there is a section of approximately 2,500 m of existing track which will be utilised for internal haulage which is deemed not to require any upgrading works. The majority of this section is along the existing access to the Kilmurray quarry.

It is proposed that approximately 18,275m of new site road will be constructed to provide suitable access to the wind turbines and site control buildings. It is proposed to source all stone material from local quarries for the construction of roads and hardstanding areas.

There is approximately 275ha of commercial forestry in the vicinity of the site. Four of the proposed turbines are located within forested areas. Felling and thinning will be necessary to accommodate the construction and erection of the wind farm and associated works. Provision of the construction area at each turbine location will require approximately 1.5 hectares per turbine.

7.0 ENVIRONMENTAL IMPACTS AND MITIGATION

The potential impacts of the development were examined by assessing the environment in terms of the existing conditions, the potential impacts of the proposed development and the measures taken to mitigate these impacts.

The potential impacts on the environment from the proposed development were identified as being most significant on Human Beings, Ecology and Water Quality. All aspects of each environmental topic have been examined. Some aspects of the environment are judged to be significantly positively affected by this development, while other potential impacts on the environment are judged to be unaffected or affected to a minor degree. The interaction between all the various impacts has also been assessed and no negative interactions can be foreseen.

The following is a summary of each of the environmental topics discussed in the EIS.

7.1 Human Beings

The effect of a development on Human Beings is also known as the Socio-Economic Impact and as such includes the following broad areas of investigation:

- Population
- Employment
- Settlement Patterns
- Health and Safety
- Land Use
- Tourism

Ireland's current wind capacity of 1,763MW accounted for payment of approximately €11.5 million in Local Authority Rates in 2012 alone. With local economy benefits including employment opportunities, the certainty of land rents over the lifetime of wind farm projects for associated landowners and a more stable, indigenous energy source reducing Ireland's reliance on imported fossil fuels, the wind energy industry plays an important role in Ireland's economic renewal.

Overall, this development can be said to have a positive impact in terms of employment generation and benefits to the local economy, and a minor negative impact in terms of land take.

7.2 Flora, Fauna & Fisheries

Biosphere Environmental Services was contracted by Jennings O'Donovan & Partners (JOD), to carry out the terrestrial ecological component of an Environmental Impact Assessment relating to the proposed wind farm development. Conservation Services - Ecological & Environmental Consultants carried out a freshwater ecological assessment for the proposed wind farm.

Despite the large area over which the proposed wind farm extends, the area is characterised by a relatively low diversity of habitats. Of note is that apart from one area of raised bog none of the habitats correspond to any of the Annex I habitats of the EU Habitats Directive. The Yellow River is a main ecological feature of the area and is a fairly typical example of a depositing river. The river, however, has been heavily modified over time and has lost a lot of its naturalness.

Improved agricultural grassland is the dominant habitat within the site. A narrow strip of raised bog occurs at Derryiron to the south of turbines 8, 9 and 10. This extends from an active cut face to the Bord na Móna railway line to the south. While still uncut and retaining a fairly typical surface vegetation, this strip of raised bog is hydrologically compromised due to the very active turbary along its northern margin and the surface drains across the western sector. Nevertheless, as raised bog is listed as an EU Habitats Directive Annex I habitat with priority status, this minor example is rated as Local importance (higher value). Coniferous plantations occur in the north-western part of the Derryarkin sector and more extensively in the Carrick-Corbetstown area. Hedgerows or treelines occur throughout the study area and provide the principal field boundary type (other than on the reclaimed bog at Derryarkin).

Signs of otter, badger, hare and fox were recorded during site visits. Other ubiquitous mammal species such as pygmy shrew, long-tailed field mouse and hedgehog would be certain to occur. Of the ten recorded bat species in Ireland, seven have been recorded within a 10 km radius of the study site. The common frog is widespread

throughout much of the site and the common lizard, a species often found on peatlands and open areas, was not recorded, however, it may occur on the strip of remnant bog at Derryiron.

A total of 42 bird species was recorded within the site during the breeding surveys. The improved grassland fields at Derryarkin farm provide suitable feeding habitat for Whooper Swans and grassland feeding waders (Lapwing, Golden Plover, Curlew).

The proposed development site has relatively low ecological interests, with the presence of wintering Whooper Swans and Golden Plover, Otters and various bat species considered the most important features of the area.

The careful planning and design of the wind farm layout, along with appropriate mitigation as required, will minimise ecological impacts and all species of conservation importance will continue to have a presence in the area after the works are complete. In particular, it can be objectively shown that none of the designated sites within the wider area of the site will be affected in any way.

The freshwater ecological assessment assessed the present fishery value, invertebrate fauna, aquatic flora, water quality, habitat value and general ecological condition of streams and rivers in the vicinity of the proposed development and provides baseline data against which any future changes can be assessed.

The area of the proposed wind farm in the Yellow River catchment is c. 5km upstream of the River Boyne confluence. The confluence with the River Boyne is c.14km upstream of the section of the River Boyne designated as a Special Area of Conservation. The River Boyne is a designated salmonid water under the European Communities (Quality of Salmonid Waters) Regulations of 1988 (S.I. No. 293, 1988). The Yellow River and Mongagh River have good stocks of Brown Trout, and the Rochfortbridge tributary of the Mongagh River contains good stocks of Salmon.

Three Habitats Directive Annex II species are known to occur in the main channels of the Yellow and Castlejordan Rivers: these are River/Brook Lamprey, Crayfish and Atlantic Salmon. No crayfish were recorded at any of the sites assessed for invertebrate fauna in the present survey. Fair quality lamprey nursery habitat was

widespread in the main channels assessed; however habitat suitable for lamprey spawning was found to be scarce.

Eight small tributary streams are potentially affected by the proposed wind farm. On the basis of the present survey four of these are classified as of low ecological value having poor habitat quality; one, the Srah Stream, is classified as of moderate local value (on the basis of having fair–good lamprey nursery habitat); and three streams are classified as of high local ecological value: the Coolcor stream (on the basis of significant crayfish, lamprey and adult trout habitat), and the Corbetstown Bridge Stream and Killowen Stream (both on the basis of significant lamprey, crayfish and salmonid nursery and spawning habitat).

An EPA water quality assessment reported in 2012 that the Yellow River was in a satisfactory ecological condition in the upper and lower reaches in September 2012, however, the dominance of pollution tolerant macroinvertebrate species indicated continuing unsatisfactory ecological conditions at Garr Bridge.

A comprehensive suite of mitigation measures will be applied during construction to prevent any deterioration in water quality within all watercourses flowing through the site. The careful planning and design of the wind farm layout, along with appropriate mitigation as required, will minimise ecological impacts and all species of conservation importance will continue to have a presence in the area after the works are complete. In particular, it can be objectively shown that none of the designated sites within the wider area of the site will be affected in any way.

It is concluded that, if all recommended mitigation measures are implemented in full, the proposed project will not result in any residual significant impacts on the terrestrial or freshwater ecology of the area.

7.3 Soils & Geology

Whitefords Geoservices Ltd was contracted by Jennings O'Donovan & Partners in November 2010 to undertake an impact assessment on the geological aspects of the environment at the proposed Yellow River Wind Farm development. This study involved field investigations and desk assessment of all relevant data available on the

study site. The methodologies used are according with best practise procedures and are outlined in detail in the technical report prepared and issued by Whitefords.

Installation of the turbines will necessitate excavation for and the construction of reinforced concrete gravity foundation bases to which wind turbines will be anchored. Bases will be designed so as to minimise settlement and negate the affects of storm force winds. The proposed turbine locations are in areas that coincide with shallow to moderate peat depths and slopes less than 5 degrees.

Where new roads are constructed the full width of proposed roadway will be cleared of peat until a stable firm foundation is obtained. Stone will be placed and compacted to provide a stable running surface. A floating road construction technique shall be employed where peat depths exceed 1.5m, or wherever required by the geotechnical engineer.

Analysis of ground conditions on site suggests that peat overlies glacial sand and gravel, although this will be confirmed by site investigation works prior to construction. The thickness of peat ranges from 0m up to 3.6m across the survey area. Proposed turbines on the development site will not be placed in locations closer than 50m distance to existing designated watercourses.

A brief analysis of local hydrology indicates a relatively low risk of suspended solid and pollution entering streams during the construction phase. However, complying with strict mitigation measures during construction will maintain this risk at a low level at which significant effects are not anticipated.

To reduce this risk, construction mitigation measures as outlined in Chapter 6 of the EIS, must be strictly complied with. In this case the risk of failure would be low. Peat slide monitoring and management will be carried out during the construction of the projects and in the months following the completion of construction.

Appraisal of the Hazard Rankings for each proposed turbine location provides the following findings:-

Turbine locations and Substation carry **INSIGNIFICANT** Hazard Rankings.

Access roads also carry **INSIGNIFICANT** Hazard Rankings, but only as long as strict mitigation measures are undertaken. Particularly sensitive locations are likely in areas of deep peat of low strength.

The Peat Slide Risk Assessment Report (Report 1343A/12), contained here in full under Appendix M, offers an appraisal of ground conditions at each of the structural locations and a breakdown of Hazard Rankings. This report also provides a clear explanation of the mitigation measures alluded to above.

These Hazard Rankings have been determined by analysis of ground conditions at the proposed Yellow River Wind Farm site in accordance with the guidelines outlined by The Scottish Executive & Halcrow Group Ltd in "*Peat Slide Hazard and Risk Assessment - Best Practice Guide for Proposed Electricity Generation Developments*", December 2006.

7.4 Water

Hydro-Environmental Services (HES) was engaged by Jennings O'Donovan & Partners Ltd to undertake an assessment of the potential impacts of the proposed wind farm at Yellow River, Co. Offaly on water aspects (hydrology and hydrogeology) of the receiving environment.

The primary objectives of the assessment include:

- Produce a baseline study of the existing water environment (surface and groundwater) in the area of the proposed wind farm development;
- Identify likely positive and negative impacts of the proposed development on surface and groundwater during construction and operational phases of the development; and,
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts.

The proposed development site is characterised by elevations between 75m OD and 93m OD at Malin Head and a spatial area of approximately 1,002.234 hectares. The

proposed development consists of thirty-two turbines. Regionally the proposed development is located in the Yellow River and the Castlejordan River surface water catchments which are sub-catchments of the River Boyne surface water catchment within Hydrometric Area (HA) 07 of the Eastern River Basin District. The River Boyne flows in a northerly direction approximately 2km downstream of the confluence of the Yellow River and the Castlejordan River (i.e. approximately 5km downstream of the eastern extremity of the proposed development). Proposed turbines T1 to T25 are located in the Yellow River surface water catchment while proposed turbines T26 to T32 are located in the Castlejordan River surface water catchment.

The result of the hydrological and hydrogeological assessment indicates the following impacts of the proposed development:

Construction Phase

Approximately 10.4ha of existing plantation forestry will be felled to allow for development of the proposed wind farm infrastructure. Potential impacts during tree felling occurs mainly from; Exposure of soil and subsoils resulting in a source of suspended sediment which can become entrained in surface water runoff and enter surface water courses; and Nutrient release.

Earthworks (removal of vegetation cover, excavations and stock piling) resulting in suspended solids entrainment in surface waters.

The River Boyne and Blackwater SAC exist approximately 17km downstream of the proposed wind farm development. Significant hydrological or water quality impacts on the Yellow River and the Castlejordan River (which are both tributaries) could potentially have an impact on the water quality flowing towards the SAC.

There is a risk of pollution from introduced hydrocarbons for plant equipment during the construction stage. These potentially significant severe negative impacts can be mitigated by appropriate practical measures.

Release of effluent from domestic wastewater treatment systems have the potential to impact on groundwater and surface waters if site conditions are not suitable for an on-site percolation unit.

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills.

Excavation seepage will likely occur in turbine base excavations and can potentially result in a localised flow of groundwater into the excavation. This can create additional volumes of water to be treated by the runoff management system. The proposed turbine base excavations will be dug to approximately 2 metres below ground level (mbgl) and therefore may intercept the saturated gravels (estimated to be moderate/high permeability from field observations) that underlie the peat deposits in places. Groundwater inflows may require management and treatment to reduce suspended sediments.

Operation Phase

There is potential during the lifetime of the project that the mitigation measures put in place to control surface water runoff and discharge can be damaged, blocked or under-perform to required specification.

There is no risk of suspended solids entering the surface water network provided that the constructed drainage design is adequately maintained.

The mitigation measures recommended in this report to prevent and reduce the potentially significant negative impacts identified are as follows:

Constraints Zoning

A process of "mitigation by avoidance" was undertaken by the EIA team, where possible, during the design of the turbine and associated infrastructure layout in order to avoid direct impact on drainage crossings and apply 50m buffer zones around site drainage.

Construction Phase Mitigation

Mitigation measures which will reduce the risk of entrainment of suspended solids and nutrient release in surface watercourses during clear felling operations comprise best practise, set out as follows: Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance; Use of buffer zones for aquatic zones; Silt traps will be strategically placed down-gradient within mound drains or collector drains as required; Checking and maintenance of roads and culverts will be on-going through any felling operation; Timber should be stacked in dry areas, and outside a local 50m stream buffer zone; Works should be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water run-off.

A 50m wide watercourse buffer zone will be in place during the construction phase where possible. Exceptions to this self imposed 50m buffer include stream/river crossings or where existing roads adjacent to streams require upgrade. Interceptor drains will be installed up-gradient of works areas to collect surface runoff. Swales will be used to intercept and collect runoff from works areas of the site, likely to have entrained suspended sediment, and channel it to stilling ponds for sediment settling; A series of recommendations / remedial measures have been outlined to resolve the issue of peat erosion at the site the purpose of which is to reduce surface water runoff and suspended solids loading from source.

The proposed mitigation measures, which will safe guard the water quality and conservation interests of the River Boyne and Blackwater SAC, include buffer zones and drainage control measures (*i.e.* interceptor drains, swales, temporary stilling ponds). These proposed mitigation measures would ensure that the quality of runoff from proposed development areas would be very high.

It is strongly recommended that hydrocarbons are not stored or transferred on the development site. All refuelling for plant equipment during the construction phase of the project should be undertaken off-site at a controlled (bunded) transfer station. Risk of leakage on site from plant equipment requires regular checks and audits as part of the construction phase environmental monitoring plan (EMP).

Temporary, self contained port-a-loos with integrated waste holding tanks will be used on site for sanitation facilities. No water supply or sanitation structures will be introduced that will source, interact or potentially discharge to the site's hydrology.

No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used. No washing out of any plant used in concrete transport or concreting operations will be allowed on-site. Where concrete is delivered on site, only the chute need be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be tanked and removed from the site to a suitable, non-polluting, discharge location.

The presence of saturated gravels with a high water table (<1.5m) beneath the peat deposits in the western areas (*i.e.* turbines T1 to T12) will mean that dewatering of turbine base excavation will likely be required. Management of groundwater inflows and subsequent treatment prior to discharge into the drainage network will be required as follows; Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; If required, pumping of excavation seepage will prevent build up of seepage water in the excavation; A mobile 'Siltbuster' or similar equivalent specialist treatment system will be available on-site for emergencies in order to treat sediment polluted waters from settlement ponds or excavations should they occur.

A site specific discharge and water chemistry monitoring programme is required during the construction stage so that waters discharged from the site are below regulatory limits, particularly under high rainfall / storm events.

An environmental management plan is required for the construction stage, which will include regular checking and maintenance of pollution control measures tied in with water quality monitoring. Trigger-response action plans will be drafted up for repair or backup if any breaches in pollution control design (physical evidence) or water quality discharge limits (indirect evidence) occur.

Operation Phase Mitigation

An environmental monitoring and audit programme is required for the operation phase of the project. This will include clear schedules and response measures for checking, auditing and maintenance of surface water flow / discharge and pollution control structures at the site to confirm continued effective performance to regulatory standards for the life time of the project.

Conclusion

Following implementation of the mitigation measures outlined for the surface water and groundwater aspects of the site, the resultant predicted impact of the development is that there will be some local changes to how water flows at the site. There is also likely to be some short-term deterioration of the quality of runoff waters within the site. In order that the mitigation and control structures operate to stated purpose and comply with licence requirements, monitoring of water discharge and water quality during the construction phase and regular monitoring at an agreed frequency during the operation phase is recommended. It is anticipated that the hydrological impacts of the development will be slightly negative and temporary overall, with increased runoff being a slightly negative permanent impact.

7.5 Air & Climate

Jennings O'Donovan & Partners undertook a desk study of the potential impacts on air and climate from the proposed development. The closest monitoring station with validated air quality data is located in Ferbane approximately 37km West of the proposed site. Ferbane is in Zone D, one of the four air quality zones in Ireland. Zone D consists of small towns and rural areas of the country. Concentrations of carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and lead were below their respective lower assessment thresholds. Levels of PM_{10} exceeded the upper assessment threshold for this parameter. Therefore levels of PM_{10} need to be monitored continuously while levels of CO, SO_2, NO_2 and lead can be assessed using modelling or objective estimation techniques.

The proposed project aims to generate approximately 252,000 MWhr of electricity per year operating at 30% average capacity. This would be enough to supply up to 50,400 households. This is the equivalent energy production from 53,760 tonnes of oil or 797 tonnes of coal each year. The approximate emissions savings that can be

achieved each year through the use of a wind farm equivalent in size to the proposed 96 MW Yellow River Wind Farm, instead of the equivalent output from the current mix of generating fuel in Ireland are as follows:

- 144,000 tonnes of Carbon Dioxide (CO_2)
- 4,704 tonnes of Sulphur Dioxide (SO_2)
- 528 tonnes of Nitrous Oxide (NO_x)
- 16,800 tonnes of ash

The global warming potential of 1 tonne of NO_x is equivalent to 310 tonnes of CO_2. As such this proposed wind farm will achieve the removal of approximately 307,680 tonnes of CO_2 equivalent.

No appreciable effect on the air quality in the immediate environs of the site is expected from the construction and operation of the proposed development. However, the relative reductions in greenhouse gas emissions in the energy sector will serve to reduce the effects of climate change on a national and global level, albeit at a small scale.

There are other potential impacts associated with the construction phase of the project including dust generation from excavation. These impacts are short term and of a low intensity and are not considered significant.

7.6 Noise

Noise and Vibration Consultants Limited were contracted by Jennings O'Donovan & Partners to undertake a Noise Impact Assessment of the proposed development on the surrounding dwellings. The impact of the proposed wind farm on the local environment has been assessed in line with the recommendations documented in the Department of the Environment, Heritage and Local Government recently published 'Wind Energy Development Guidelines'- Guidelines for Planning Authorities June, 2006. The document states that, "In general, noise is unlikely to be an issue where the distance from the nearest turbine to any noise sensitive property is more than 500 metres". All non-associated dwellings are located at a distance greater than 500 metres from turbine locations. Noise levels have been predicted at the nearest residences and, at all of these, the predicted noise levels are below the derived limits

as specified in the 2006 document. The effect of the wind farm on local residences should be no more than a marginal impact.

The low frequency noise and vibration from the proposed wind farm operation is predicted to have a negligible impact on residents and on local properties.

7.7 Shadow Flicker & Electromagnetic Interference

Wind turbines, like other tall structures will cast a shadow on the neighbouring area when the sun is visible. Shadow flicker occurs under a special set of conditions when the sun passes behind the hub of a wind turbine and casts a shadow over neighbouring properties. When the blades rotate, shadows pass over the same point causing an effect called 'shadow flicker'. Shadow flicker effects occur in various situations: travelling by road through a tunnel or under overhanging trees (dappled shadow effects), or standing within the shadowed area of wind turbine blades.

Although there is no agreed standard for shadow flicker impact in Ireland, the Department of Environment, Community and Local Government in its Wind Energy Development Guidelines for Local Authorities considers that the potential for shadow flicker is very low beyond ten rotor diameters, in this case 1.13km, from a property. It should be noted that 194 houses are located within 1.13km of the proposed Yellow River wind farm development.

Shadow flicker within a house occurs if a wind turbine is close enough and of a specific orientation with the house and the sun. It will not happen where there is vegetation or other obstructions between the turbines and the house. It will not happen if windows facing a turbine are fitted with blinds or shutters. It will not happen if the sun is not shining brightly enough to cause shadows from a turbine. Shadow flicker is more often experienced as a minor short-term nuisance than as a health and safety issue.

The Shadow Flicker analysis presented is an indicative computer analysis that provides a measure of potential shadow flicker for the proposed Yellow River wind farm development. If the proposed Yellow River wind farm development is constructed and shadow flicker occurs in such a way that it is deemed to have an impact on the health and safety of nearby residents, mitigation measures will be put in

place. To limit these effects, the developer will be responsible for implementing such mitigation measures, upon agreement with the house occupiers. This could involve the installation of appropriately designed blinds or screens to prevent any flicker nuisance. Furthermore vegetative screening could also be employed including treelines or hedgerows to limit or prevent shadow flicker occurrence.

In the unlikely event of validated records indicating a significant shadow flicker impact, the developer will implement further mitigation measures in the form of pre-programming of selected turbines to prevent their operation on the dates and times when shadow flicker could cause a nuisance.

Conclusion

Shadow Flicker is unlikely to cause a nuisance to nearby inhabited dwellings as there are only 2 houses located within 500 metres and these houses are located in areas where the levels of shadow flicker experience is below the limit of 30 hours per year. If it does become a nuisance appropriate mitigation measures can be implemented by the developer.

There are no significant shadow flicker impacts on dwellings in the vicinity of the proposed Yellow River Wind Farm development.

7.8 Landscape

The Landscape and Visual Assessment for Yellow River Wind Farm is based on the Landscape Institute and the Institute of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment – Third Addition (2013). This guidance document makes a distinction between landscape and visual effects and thus, they are addressed separately. **Landscape Impact Assessment (LIA)** relates to changes in the physical landscape, brought about by the proposed development, which may alter its character and how this is experienced. **Visual Impact Assessment (VIA)** relates to changes in the composition of views as a result of changes to the landscape, how these are perceived and the effects on visual amenity. In both cases the significance of impact is a function of the sensitivity of the receptor weighed against the magnitude of the predicted effect. In accordance with

the DoEHLG Wind Energy Development Guidelines, the study area for this assessment is a 20km radius from the site.

Existing Environment

This is generally a very flat landscape that is occasionally punctuated by small, but prominent hills. The vegetation and land use within the study area is largely dictated by soil type. Substantial parts of the central and southern portions of the study area are contained in peat bog with poorly drained peaty soils at the fringes. In such areas the principle land use in evidence is that of commercial scale peat extraction which was used to fuel the peat fired power station at Rhode. The bog fringes tend to be in a combination of marginal pasture, unmanaged scrubland and extensive commercial conifer plantations. Surrounding the bogs in areas with better drainage, pastoral farmland and cropping become the predominant land uses.

The two most significant settlements within the study area are Mullingar in County Westmeath and Tullamore in County Offaly. The nearest settlements to the proposal site are Rhode which is approximately 2km to the southeast and the crossroad settlement of Castlejordan, which is a similar distance to the east. There are numerous small villages and crossroad settlements serving the dispersed rural communities throughout the wider study area. Farmsteads are spread relatively evenly throughout the arable portions of the landscape with slightly higher concentrations in the vicinity of settlements.

The principle transport routes in the study area are the M6 motorway, which runs a short distance to the north of the site, the N52 national secondary road lies to the west and the R400 regional road dissects the site. The key public recreational facility within the study area is the network of canals and tow path walks. The most notable landscape heritage feature within the study area is Croghan Hill, which is an extinct volcano that lies a short distance to the southwest of the proposal site. It is a prominent hill in the context of the vast midland bogs and thus, it has been a focus of settlement in this area since the bronze age.

A Wind Energy Strategy has been prepared for County Offaly, which takes cognisance of a number of factors including sensitive landscapes. The Yellow River

Wind Farm site is contained within an area identified as being suitable for large scale wind farms.

Summary of Assessment and Conclusions

In this study, landscape sensitivity is deemed to be 'Low' on the basis that, although there are some specific landscape features of high sensitivity within the study area, its overriding landscape character is a robust and anthropogenic one. This is based on the variety of strategic land uses and values associated with productivity.

Landscape Impacts

In terms of the magnitude of landscape impacts, there will be physical impacts on the land cover of the site as a result of this development. These will be very minor in the context of the already highly modified landscape and the fact that impacts will be of a scale that is typical of other land uses in the vicinity. With regard to landscape character, the scale and nature of the development is well assimilated into this open landscape with broad land use patterns. There is also an aesthetic and functional link between the cutaway peatlands and the wind turbines with respect to energy production. For these reasons the magnitude of landscape impact is also deemed to be low.

Visual Impacts

A range of 30 viewpoints were used to assess visual impacts. These were assessed on the basis of visual receptor sensitivity versus the magnitude of the visual impact. For clarity, visual receptors are people and relative sensitivity depends on the context of the viewing location. The visual impact magnitude is a function of the visual presence of the proposal (how noticeable it is within the scene) and its effect on visual amenity (the aesthetic attributes of the scene).

Visual receptor sensitivity ranges considerably across the 30 VRP's from Very High to Negligible, but with the vast majority (26 of the 30) in the range of medium to low. This reflects the considerable degree of human influence on the study area generally as well as the rarity of iconic visual receptor locations or vast elevated views. The main exception being the view from Croghan Hill (LC3), which is deemed to be of high sensitivity. This level of sensitivity relates mostly to the vast nature of the view

and the cultural heritage values associated with this feature rather than any sense of the naturalistic.

The visual presence of the development is strongly dictated by distance from the development, but not in the traditional sense. For most wind farms in upland areas scale in relation to distance has a more linear relationship with visual presence. In this instance a third factor comes into play and this is how the perceived scale of the turbines is affected by the relative distance of screening elements, particularly hedgerows. The emerging pattern is that within the flat rural landscape (the majority of the study area) the proposed turbines become almost completely screened from view beyond approximately 3-5km. The visual presence judgments from viewpoints within this range tend to be in the order of highly dominant to co-dominant, whereas, immediately beyond this threshold the visual presence falls away abruptly.

In many cases the effect of the proposal on visual amenity has an inverse relationship to its visual presence and is also related to screening. From close or elevated locations where the full height of the turbines and the spatial characteristics of the layout are revealed to the viewer, there is a high degree of visual legibility. The complimentary relationship between the turbines and the cutaway bog in terms of both scale and function is also most apparent from these locations. The best example of this is the view from Croghan Hill (LC3). Conversely, from VRP locations where substantial portions of the turbines are screened by vegetation, visual ambiguity arises in relation to the relative scale of turbines and the undulating profile of the scheme within the flat landscape. Instances of turbine blades rotating in an irritant manner against intervening tree tops also become much more frequent within such views. These effects are typified by the view from LC1, but such views are limited to a fairly narrow concentric band before the turbines become fully screened.

Overall, the magnitude of visual impacts ranges between High and Negligible, but with all of the high level impacts occurring within 3km of the site.

Cumulative Impacts

There is currently only one other wind energy development within the study area and this is the 28 turbine Mount Lucas development that is currently under construction 10km to the south of the proposal site within a similar landscape context. The

potential for these two developments to be present within the same vista is very limited and where this might occur they will be seen in opposite directions. Therefore, the cumulative effect is deemed to be Low.

Overall Significance of Impact

The highest significance of visual impact is judged to be Major-moderate and this occurs at two locations in close proximity to the proposal development. This is not considered to be a critical level of impact in this instance as the value of the views in question relates to their vastness, whereas the context of the views is largely cutaway bog and productive rural landscape. The proposed wind farm is, therefore, well assimilated in the vista in regards to its scale and function. There are a number of locations where a high visual impact magnitude is attributed as would be expected for a commercial scale wind energy development placed into almost any landscape. In the majority of these cases the overall significance is diminished by the low level of receptor sensitivity. Likewise, at the only visual receptor within the study area considered to have a high level of sensitivity (LC3 at Croghan Hill), the low order magnitude of impact balances the overall significance. This is due to the remarkable assimilation of the proposed wind farm within the view and the landscape context.

The overall significance of impact for the proposed Yellow River Wind Farm is considered to be consistent with a Moderate impact as defined in the EPA Guidelines. That is; *"An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends"*.

7.9 Material Assets

This chapter describes the potential impacts the proposed Yellow River Wind Farm development could have on physical material assets. The potential impact of the proposal on the lands within the site and the surrounds is discussed under the following headings:

- Agriculture and Forestry
- Natural Resources of Economic Value

The impact of the construction of the proposed wind farm on access roads and local community is discussed under the following heading:

- Road Network
- Local Tourism Amenity

This chapter also describes the potential impacts the proposed development could have on other physical material assets in the area, including the following:

- ESB Network
- Telecommunications
- Air Traffic

For each topic a description of the existing environment is provided along with an analysis of what, if any, impact could be predicted and the mitigation measures that can be implemented to reduce or remove the impact.

Agriculture

The total land take of the turbine foundations, hardstands and site roads is approximately 19.39 hectares. The electrical compound will occupy an area of 0.18 hectares of lands located in an industrial business park. The existing internal road infrastructure has been utilised as much as possible so as to minimise the construction of new access roads. The overall effect of the proposed wind farm will be to remove from availability for agricultural use approximately 2 % of the total site area (1,002.234 ha) under the control of the developer.

Twenty-one turbines are located in improved agricultural grasslands, four turbines are located in cutover bog, six turbines are located within conifer plantation/woodland/scrub, one turbine is located in semi-improved/marginal bogland and three turbines are located in arable land.

The grassland areas are used predominantly as pastureland. Grazing practices can continue unimpeded at these locations. A small are of arable land and conifer plantation will be lost to the development footprint, although these practices can also continue during the operational phase of the wind farm. Therefore, minimal impact is

predicted on agricultural practices at the lands in and around the proposed Yellow River Wind Farm development area.

Forestry

The total area for tree felling as a result of the development is approximately 10.4 hectares of the total forested area of approximately 275 hectares. The total area of tree felling required for the proposed development represents approximately 3.8% of the total forested area.

All felling works will be subject to the grant of a felling license from the Forest Service.

Areas totalling 100% of the areas clearfelled will be acquired (10.4 ha) for forestry reinstatement, in accordance with the Forest Service Policy on the Granting of Felling Licenses for Wind Farm Development.

No significant impacts are predicted on forestry.

Natural Resources of Economic Value

There are three active quarries within a 15km radius of the site boundary. The closest quarry, Kilmurrays Quarry, is located adjacent to the proposed site, close to turbine 6 in the townland of Derryarkin. Roadstone quarry is located immediately north of Kilmurrays quarry in the townlands of Derryarkin and Derrygreenagh. Lagan cement plant is located in Killaskillen, Kinnegad, Co. Meath, approximately 5km north of the proposed site. Peat cutting has taken place in the past, and is currently in progress to the south of turbines 8, 9 and 10.

No significant impacts are predicted on the natural resources in the area.

Road Network

It is proposed that all the turbine parts including the tower sections will travel via the Haul Route to the site. On this route, the delivery traffic will travel from Dublin Port via the Port Tunnel, M50, M4, M6 and R400 to the site. Much of this route is

motorway. Please refer to **Appendix L** for further discussion and photos of the proposed haul route to site.

The majority of the haul route will follow National and Regional Roads therefore it is not anticipated that any significant widening or strengthening of roads will be required along these sections for delivery vehicles along the haul route.

Works will be required to create a new exit off the Garr Road roundabout.

Road widening to local roads will be carried out in the following locations;

- Widening of approximately 720m of the Greenhills road (L-50112-1) will be required.

- Widening of approximately 535m of Carrick Lane (L-10081-1) will be required.

It is concluded that the proposed route offers the least amount of disruption to local road users. The proposed haul route and any associated works and traffic management plans shall be discussed and agreed with Offaly County Council prior to the commencement of construction.

Grid Infrastrucutre Network

A connection application has been submitted for Yellow River Wind Farm.

The proposed Yellow River Wind Farm is located approximately 1.6 km north of Rhode, Co. Offaly. North Offaly is well serviced with transmission infrastructure with Thornsberry 110kV substation in Tullamore, Cushaling 110kV substation 3km North of Clonbullogue and Derryiron 110kV substation in Rhode. Kinnegad 110kV substation in Westmeath is also located approximately 15km North of Rhode. The Oldstreeet –Woodland 400kV line runs approximately 2km South of Rhode while the Shannonbridge –Maynooth 220kV line runs approximately 10km North of Rhode.

Two other 110kV Circuits from Derryiron also traverse the area.

The distribution network in the area consists of a 38kV substation in Edenderry and 2 38kV substations in Tullamore. A 10/20kV network supplies the residential properties in the area.

At this stage in the connection process there is a level of uncertainty regarding the connection method, costs and timelines for Yellow River Wind Farm. However, there is an extensive, strong and growing transmission network in North Offaly, with 110kV, 220kV and 400kV transmission assets in the immediate vicinity.

Telecommunications

Early consultation with Vodafone, Meteor and O2 established that there was no impact on the networks as a result of the wind farm development.

2RN (formerly RTE NL) were consulted during the initial scoping phase of the project. The standard protocol agreement was signed between both 2RN and Green Wind Energy (Wexford) Ltd, should any interference arise during the operational phase of the wind farm.

UPC Communications Ltd. confirmed that they do not have any record of underground services in the locations indicated in the Yellow River Wind Farm drawings and that they have no issue with the turbine locations.

No significant impact is predicted in terms of telecommunications.

Air Navigation

The closest commercial airport to the site is Dublin airport, situated approximately 60 km east of the site. The Irish Parachute Club are based in Clonbulloge Airfield, Edenderry, Co Offaly, approximately 13 km southeast of the site.

A consultation exercise was undertaken with the Irish Aviation Authority (IAA). No impact to aviation was predicted provided the development complies with aeronautical lighting and positional data requirements.

Property Value

Any proposed new development can lead to a temporary fluctuation in property value. However, there is no evidence that a wind farm development has a lasting negative effect on house prices. No studies have been carried out in Ireland regarding the relationship between wind farms and house prices. A report, carried out in the UK in 2007, from the Royal Institute of Chartered Surveyors (RICS) and Oxford Brookes University regarding wind farms and their impact on house prices, found no clear relationship between the proximity of wind farms and property prices. The report suggested that this may be an 'urban myth' with apparent changes in value disappearing when examined closely.

The property market is currently in decline as a result of the economic downturn and therefore no true reflection of value can be made in relation to the proposed wind farm development. A study carried out by the Royal Institute of Chartered Surveyors (RICS) and Oxford Brookes University, in 2007, regarding wind farms and their impact on house prices, found no clear relationship between the proximity of wind farms and property prices.

7.10 Cultural Heritage

On behalf of Jennings O' Donovan & Partners Ltd, for Green Wind Energy Ltd, Irish Archaeological Consultancy Ltd prepared an assessment of the impact, if any, on the archaeological, architectural and cultural heritage resource, of the proposed Yellow River Wind Farm development, which is located within the townlands of Bunsallagh, Derryarkin, Derryiron, Coolville, Ballyburly, Greenhills, Wood, Killowen, Garr, Corbetstown and Carrick, County Offaly (OS Sheets 3, 4 and 11).

A total of 86 sites or groups of sites are included in the RMP within *c*. 2km of the proposed wind farm area. There are no sites listed as National Monuments located within the vicinity of the development. Of these 31 are located within a *c*. 500m radius and 42 within a 1km radius. A large number of wetland sites, including wooden trackways/ toghers, were recorded in 2002 within *c*. 130-400m of the proposed development; however the majority of these have either been excavated or removed during milling of the peatland. The closest site to the proposed wind farm consists of moated site and associated features (RMP OF004-009), which are located immediately adjacent to the proposed haulage route in Wood townland.

A total of 24 structures located within *c*. 2km of the proposed wind farm are recorded in the NIAH survey as having architectural merit. Of these structures 15 are also listed on the Record of Protected Structures for County Westmeath. None of these structures are located within 500m of a proposed turbine site; however five are located within *c*. 1km radius. The proposed haulage route passes within close proximity to three sites – Coolville House, Greenhills stables and a cottage; all of which are recorded in the NIAH and RPS. A total of 15 structures are situated in proximity to Rhode village, located *c*. 1.3km south-west of the proposed wind farm. A number of isolated structures, such as bridges, post-boxes and water pumps, are also recorded in the general area.

Of the 22 previously unrecorded built heritage structures (BH sites) that were identified during the baseline assessment and field inspection, all represent vernacular architecture dating to the 18th and 19th centuries. The proposed haulage route passes in close proximity to two of these structures – Garr School (BH 11) and a ruined cottage (BH18).

Three features of cultural heritage were identified during the field inspection in addition to the above sites. The proposed haulage route will cross a mill race (CH 1) in Derryiron and a narrow gauge rail track (CH 2) in Derrygreenagh. A handball alley (CH 3) was also identified at Grovesend or Mooneysland townland*c*. 1.9km south-east of the proposed wind farm.

The landscape is characterised by partially eroded / extracted peatland and reclaimed boggy pasture divided by a partially canalised Yellow River. While the area has been significantly altered due to generations of peat cutting and land reclamation the potential for discovery of *in situ* archaeological remains still exists and as such has been designated as an area of archaeological potential (AAP 1). Three further sites of archaeological potential were identified during field inspection within the immediate vicinity of proposed Turbines 16 and 17. Two potential enclosures (AAP 2 and 3) and a possible burnt mound (AAP 4) were identified in Wood townland.

A range of mitigation measures are recommended including archaeological monitoring of ground disturbance and topsoil stripping, archaeological testing at three locations (AAP 2-4 and possibly adjacent to OF004-009) and written and photographic records of demesnes that will be impacted upon (Coolville, Greenhills

and Ballyburly). A licence eligible archaeologist in consultation with the National Monuments Service of the DoAHG should undertake archaeological testing. Full provision should be made for the resolution of any archaeological features/deposits that may be discovered during archaeological monitoring or testing, should that be deemed the appropriate way to proceed. With the exception of monitoring, all mitigation measures should be carried out prior to any construction activity.

No significant adverse impacts are anticipated upon the settings of the archaeological, architectural and cultural heritage resource as a result of the proposed wind farm.

7.11 Interactions of the Foregoing

None of the foregoing topics exists in isolation from the others and, because of this; any impact on one element of the environment may also impact on another. The cumulative slight impact on a number of topics may result in a significant impact on another topic.

The interrelationship of Flora and Fauna with the topics Soils and Geology and Water is very close. A negative affect on one topic has the potential to affect the other two and vice versa. This is particularly true where vegetation removal decreases soil stability, which can result in surface water runoff with high suspended solids content. Conversely, reduced water quality or the removal of large areas of soil would result in negative effects on plant and animal species.

It is anticipated that this complex interrelationship will be dealt with by minimising the vegetated area to be affected and by carefully controlling the movement of vehicles during construction. Any surface water runoff, which originates at, or passes over exposed soil or peat, particularly at road construction, will be drained into settling ponds to allow the suspended solids to be removed before joining natural watercourses.

These potentially negative affects are only expected to occur at construction stage and are considered to be adequately mitigated by the measures outlined in the respective chapters.

Following the assessment of the interactions of the foregoing topics it can be concluded that no significant negative effects from the proposed Yellow River Wind Farm are predicted.