12.0 MATERIAL ASSETS

12.1 INTRODUCTION

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.

12.2 EXISTING ENVIRONMENT

According to the Agroclimatic Atlas of Ireland published by AGMET, the Joint Working Group on Applied Agricultural Meteorology, in 1996, the midlands of Ireland are generally unsuited to tillage crops and are generally more suited to grazing and peat harvesting.

The majority of the proposed site for the Yellow River Wind Farm development is covered by improved agricultural grassland and flat cutover peatland. The site of the proposed development has the following characteristics:

- The elevation of the site ranges from 75 to 93 mOD.
- The site is relatively flat and consists of mainly pasture land with a couple of land holdings being used as arable land.
- There are also areas within the development in which a turf cutting operation and quarry are in place.
- A number of residential properties and farm buildings are located within the site boundaries.
- The prevalent weather pattern is wet and windy.

12.3 AGRICULTURAL PROPERTIES

12.3.1 Introduction

This section describes the regional and local agricultural practices as well as those specific to the site. A description of the effects, if any, the proposed development may have on local agricultural practices, along with mitigation measures designed to reduce or remove negative effects, where possible, is also outlined.

12.3.2 Predicted Impact

The total land take of the turbine foundations (255 m^2 x 32 = 8,160 m^2) and hardstands (1,250 m^2 x 32 = 40,000 m^2) is approximately 48,160 m^2 and the upgrading of existing roads (5,916 m x 2 m^{26} = 11,832 m^2) and construction of new trackways (18,275 m x 5.5 m = 100,512.5 m^2) and splays (32,917 m^2) totals 193,421.5 m^2 or 19.34 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.

[26] Assuming average upgrade from 3.5m to 5.5m

A description of the land type at each turbine location is set out in Table 12.1.

Turbine Number	***Land type***
1	Conifer woodland
2	Conifer woodland
3	Improved agricultural grassland
4	Improved agricultural grassland
5	Improved agricultural grassland
6	Improved agricultural grassland
7	Cutover bog
8	Cutover bog
9	Cutover bog / deep peat bogland
10	Cutover bog
11	Woodland/scrub
12	Improved agricultural grassland
13	Improved agricultural grassland
14	Improved agricultural grassland
15	Improved agricultural grassland
16	Improved agricultural grassland
17	Improved agricultural grassland
18	Improved agricultural grassland
19	Improved agricultural grassland
20	Improved agricultural grassland
21	Improved agricultural grassland
22	Improved agricultural grassland
23	Improved agricultural grassland
24	Improved agricultural grassland
25	Conifer plantation
26	Conifer plantation
27	Conifer plantation
28	Improved agricultural grassland
29	Improved agricultural grassland
30	Semi-improved grassland/marginal bogland
31	Improved agricultural grassland
32	Improved agricultural grassland

Table 12.1 – Description of Land Type at each turbine.

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.

12.3.3 Mitigation Measures

No significant impacts are predicted on agricultural practices. Therefore no mitigation measures are required.

12.3.4 Conclusion

No significant impacts are predicted on agricultural practices.

12.4 FORESTRY

12.4.1 Introduction

This chapter describes the potential impacts the proposed Yellow River Wind Farm development could have on forestry, along with mitigation measures designed to reduce or remove negative effects, where possible.

12.4.2 Predicted Impact

There are approximately 275 hectares of forestry in the vicinity of the Yellow River Wind Farm site. Four of the proposed turbines are located within forested areas: T1; T25; T26 and T27, and one turbine, T2, is partially located within forestry.

Felling and thinning will be necessary to accommodate the construction and erection of these four turbines and associated works.

Provision of the construction area at each turbine location will require approximately 1.5 hectares for turbines T1; T25; T26 and T27, and approximately 0.77 hectares for T2, which totals 6.77 hectares. These areas include all hardstanding and assembly areas. The estimated loss of forestry due to access roads is approximately 3.63 hectares based on the requirement for approximately 2,425 metres of new access road. This gives a total area for tree felling as a result of the development of 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.

It is not anticipated that there is any requirement for felling to reduce the wake effect from the trees affecting the turbine performance. Mature trees will not be allowed to exceed a height of 20 metres in the immediate vicinity of the turbine. The forested areas on site could be classified as good yield with good tree heights.

It should be noted that manufacturers have different requirements for wake felling. A detailed wake analysis model will be undertaken prior to turbine procurement at which stage the extent of any felling will be determined.

12.4.3 Mitigation Measures

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.

12.4.4 Conclusion

No significant impacts are predicted on forestry.

12.5 NATURAL RESOURCES OF ECONOMIC VALUE

12.5.1 Introduction

This section evaluates the effect on the natural resources of the site and also the resources, which will be used in the locality during the construction phase. Such resources include quarries, hydrocarbon fuels and precious metals.

12.5.2 Existing Environment

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.

12.5.3 Predicted Impact

By the nature of this project, in that it is relatively non-invasive, no negative affect can be predicted for the site or region. The proposal will take approximately 3 % of the overall site area (990 ha), most of which is under agriculatural use. Overall, no significant negative impact on natural resources of economic value can be predicted as a result of this development. No borrow pits are proposed as part of the development. There will be a small positive on the local economy resulting from the utilisation of resources from local quarries for construction of roads and hardstandings.

12.5.4 Mitigation Measures

As no negative impacts are predicted, no mitigation measures are required.

12.5.5 Conclusion

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

12.6 ROAD NETWORK

12.6.1 Introduction

This section describes the proposed delivery traffic haul route to the site in terms of the national, regional and local road network. A description of the effects from the proposed development is provided along with mitigation measures designed to reduce or remove negative effects where possible.

12.6.2 Proposed Haul Route

It is proposed that all the turbine parts including the tower sections will travel via the Haul Route to the site as shown on **Figure 12.1**. 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 G** for further discussion and photos of the proposed haul route to site.

12.6.3 Predicted Impact

During the construction of site roads, crane hardstands, turbine foundations and substation building, a worst case scenario estimates that the maximum number of

loads to be delivered to site would be approximately **13,989** (total for Civil Works). This includes loads of stone, concrete, reinforcing steel, geo-textiles, electrical cable, switchgear and general building materials. It is proposed to source all imported stone from local quarries.

Due to the underlying ground conditions of the site, there is no possibility that on-site borrow pits will be used to source road making materials. These materials would be delivered to site over a period of 16 months i.e. approximately **876** loads per month or an average of **40** loads per day excluding weekends and bank holidays. All civil construction material would be delivered to site using standard rigid lorries, low-loaders and ready-mix lorries etc.

Turbine parts would be delivered to site over a period of 8 months, after civil works are completed. It is estimated that approximately **304** loads of the various turbine and crane parts would be delivered during this period. The majority of these loads would be classified abnormal loads, and the relevant approvals and permits will be obtained by the developer or appointed haulage contractor in advance of the delivery period.

Following the completion of all construction works, it is estimated that a maximum of **100** loads will be required to remove all temporary on-site equipment and materials e.g. temporary compound, fencing, cabins, storage containers etc.

Therefore, the total number of delivery vehicle visits to the site during the construction phase is estimated to be **14,393**. It is to be noted that this is a 'worst case scenario', based on the assumption that all stone to be used for construction is to be imported. In practice, there may be some localised areas where surplus excavated material (e.g. gravel) can be used for road construction.

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.

12.6.4 Mitigation Measures

Prior to the delivery to site of the turbine components, the Developer would consult with Dublin, Offaly and Westmeath County Council Roads Departments, An Garda Siochana, and the National Roads Authority to discuss the requirement for the provision of a Garda escort and any other requirements the various statutory bodies may have. The Developer would also make known the intended timescale for deliveries, and all efforts would be made to avoid school bus runs, church services, peak traffic times etc. Furthermore, all local residents along the affected route would be notified of the timescale of deliveries.

The developer will be required to lodge a bond with the local authority to pay for the full cost of repair to the public roads used for access to the site. The developer will also be required to repair any damage to the roads that has arisen as part of the development pending more permanent repair after construction is complete. However, due to the high standard of roads on the haul route to the site, there will not be any significant damage to the roads.

Other measures will be undertaken to minimise road impact include:

- Any road works/modifications involving the public roads would be discussed and agreed with the roads section of Offaly County Council prior to the commencement of the development.
- A structural assessment of all bridges on the haul route including the sone arch bridge on the R400 should be carried out prior to commencement of construction. Smaller culverts can be temporarily strengthened by placing steel plates on the road surface to give a better distribution of vehicle loads.
- Section 50 consent will be obtained from The Office of Public Works for any new culvert/bridges.
- The condition of all bridges, culverts and road surfaces should be continuously monitored throughout the construction period. In the event that any

deterioration is observed, appropriate remedial action should be agreed with the roads department of Offaly County Council and completed as soon as practical.

- Prior to delivery of turbine components, any overhanging hedgerows should be cut back.
- Abnormal load permits shall be acquired by the turbine supplier prior to delivery, and where necessary, Garda escorts will be utilised to assist the delivery of the largest loads.
- Warning vehicles will be used for the delivery of all large turbine components.
- A trial run to the site with an empty turbine delivery vehicle should be conducted prior to the construction period. Should the trial run highlight any problematic areas, the additional work required would then be discussed and agreed with Offaly County Council.

12.6.5 Conclusion

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.

12.7 ESB NETWORK

12.7.1 Introduction

This section describes the Local ESB network and the anticipated grid connection option. A description of the effects, if any, that would arise from the Yellow River Wind Farm development is provided along with mitigating measures designed to reduce or remove negative effects, where possible.

A developer must apply to the relevant system operator (i.e. ESB Networks or EirGrid) to connect a wind farm. Initially the application is 'queued', along with all other generator connection applications. The regulator, the Commission for Energy Regulation (CER), sets out the criteria to determine when the application enters the connection offer process. At the end of this process the developer will be issued a connection offer. If the terms of the offer are acceptable the developer can sign the offer. Once the offer is executed it then becomes a connection agreement. The processing method for wind farms is discussed further in Chapter 2.

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

12.7.2 Existing Environment

Local Transmission and Distribution Network

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.

Please refer to Figure 12.2 for an illustration of the transmission network in the area.

Grid 25

In EirGrid's 2025 Grid Development Strategy (GDS) approximately €310M is expected to be spent on upgrading and new transmission infrastructure in the Midlands region. Grid development in the region will include;

- An additional investment of approximately €310m through upgrading 225km of transmission network and new circuit build;
- Tapping into the existing 400kV line to strengthen the 110kV network around Portlaoise providing capacity to supply the continuing strong growth in Kildare and Laois;
- Reinforcement to cater for continued demand growth in the gateway towns of Athlone, Mullingar and Tullamore;

- Upgrading will facilitate power flows from both renewable and conventional sources and maximise the use of existing power corridors.

Each year the Grid 25 Eirgrid targets are updated in an annual Forecast Statement. The following Grid developments for the Midlands area are listed in Eirgrids 2012 - 2018 Transmission Forecast Statement

- 2013: Cushaling –Mount Lucas – Thornsberry 110kV Line .
- 2014: Balgriffin 110kVkV Substation
- Beyond 2015: New 220kV Substation at Finntown and establishment of Inchicore –Finnstown – Maynooth 110kV Circuit
- Beyond 2015: Laois 400kV Substation
- Beyond 2015: Mullingar –Kinnegad 110kV Line

Existing, Gate 3 and Gate 4 generation in Co. Offaly

Mount Lucas Wind Farm is currently under construction and will potentially export 79.2 MW of wind generated power to the Grid. Clashnevin Wind Farm is consented to export 3 MW of wind generated power to the Grid.

12.7.3 Predicted Impact

At this early stage the connection method, cost and timeline should only be viewed as indicative. It is particularly difficult to suggest connection methods for a post Gate 3 Project at a stage when there still are uncertainties on the connection methods for Gate 3 projects. The potential connection methods for Yellow River Wind Farm should be straight forward, however, there are still a number of uncertainties. The Derryiron 110kV substation has the capacity to take the 96 MW that could potentially be generated by Yellow River Wind Farm. This connection option should only be viewed as indicative as there is a risk that it could change after EirGrid completes detailed connection studies.

Once a connection offer is executed the time to get consent, procure and construct the connection will depend on the connection assets required. The connection timeline is based on EirGrid's standard timelines. The connection method proposed for Yellow River Wind Farm, without the requirement of any new High Voltage Assets requiring Planning Permission, should facilitate a relatively fast connection time. It is anticipated that the likely connection date of the wind farm will be 2016 at the earliest.

12.7.4 Mitigation Measures

No mitigation measures are specified at this stage due to the uncertainty of connection methods and routes.

12.7.5 Conclusion

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.

12.8 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.

The written responses from the network operators can be seen in **Appendix F**.

12.8.1 Predicted Impact

No significant impact is predicted in terms of telecommunications.

12.8.2 Mitigation Measures

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.

12.8.3 Conclusion

No significant impact is predicted in terms of telecommunications.

12.9 AIR NAVIGATION

12.9.1 Introduction

Any tall object, particularly on an elevated site has the potential to affect air traffic.

12.9.2 Existing Environment

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.

12.9.3 Predicted Impact

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. Their written response can be seen in **Appendix F**.

12.9.4 Mitigation Measures

Although no significant impacts are predicted, it is standard policy of the IAA Safety Regulation Division to request an Obstruction Survey for wind farms. This survey is designed to collate data on the height, latitude, longitude, elevation and dimensions of any structures or feature that the IAA deems necessary. An Obstruction Survey will be undertaken at the pre-construction phase.

The IAA will be consulted on the lighting and positional data requirements prior to the erection of the turbines and meteorological mast. The IAA will also be issued with the grid co-ordinates of the turbines upon completion of the project.

12.10 HOUSE PRICES

12.10.1 Introduction

Any proposed new development can lead to a temporary fluctuation in house prices. However, there is no evidence that a wind farm has a lasting negative effect on house prices.

12.10.2 Existing Environment

Unfortunately to date there have been no studies carried out in Ireland regarding the relationship between wind farms and house prices, and as there are no operational wind farms in Co Offaly, we can only refer to published studies for information.

Below are brief overviews of the major studies conducted on wind energy facilities and their correlation with property values.

US Office of Energy Efficiency and Renewable Energy

This 2009 study commissioned by the US Office of Energy Efficiency and Renewable Energy, performed by the Ernest Orlando Lawrence Berkeley National Laboratory, found no evidence of negative impact on property values in the communities near wind farms. The study looked at the sales of 7,500 single family homes that were located within ten miles of wind farms in 9 different U.S. states.

Royal Institute of Chartered Surveyers/Oxfords Brookes University

This 2007 study looked at 919 property sales surrounding a 5 mile radius of 3 separate wind farms during the period of 2000 to 2007. This study, controlled for other major factors that could have a potential impact on property values such as large mines, properties that were outliers in terms of price, as well as waterfront properties, found that there was no significant evidence that wind farms had an impact on surrounding communities.

Renewable Energy Policy Project

Another major report on land values and wind turbine development was prepared for the US Government in 2003. Entitled "*The Effect of Wind Development on Local*

Property Values" and prepared by the Renewable Energy Policy Project, the Report looked at land values associated with every US wind farm installation that came on-line between 1989 and 2001, and had an installed capacity of 10MW or greater.

Specifically, the Report examined the values of land from which the turbines were visible (called a "view shed") that extended up to 5 miles (8 kilometers) from the installation. Property values were collected for a 6 year period centered on the opening date of each wind farm. To allow valid comparisons, property values from similar communities without wind farms were also obtained. In all, more than 25,000 records of property sales were subject to statistical analysis.

The study found that, for 80-90% of the wind farms, properties values within the 5 mile radius increased faster than the properties outside of the 5 mile radius of the wind farms.

The report stated:

If property values had been harmed by being within the view-shed of major wind developments, then we expected that to be shown in a majority of the projects analyzed. Instead, to the contrary, we found that for the great majority of projects the property values actually rose more quickly in the view shed than they did in the comparable community.

Moreover, values increased faster in the view shed after the projects came on-line than they did before.

Finally, after projects came on-line, values increased faster in the view shed than they did in the comparable community.

In all, we analyzed ten projects in three cases; we looked at thirty individual analyses and found that in twenty six of those, property values in the affected view shed performed better than the alternative.

The conclusion of the report authors was that:

The statistical evidence does not support a contention that property values within the view shed of wind developments suffer or perform poorer than in a comparable

region. For the great majority of projects in all three of the Cases studied, the property values in the view shed actually go up faster than values in the comparable region.

Wind Farm Proximity And Property Values – Jennifer L. Hinman

This study was published in 2010 by a Masters student with Illinois State University. The study looked at 2,851 home sales from the past decade around the Twin Groves wind farm in Illinois. This study replicated the findings of the REPP study, finding that property values seemed to increase at a greater rate closer to the wind farm. This study also found a correlation between the fears prior to the actual construction of the wind energy project and a temporary reduction in property values.

The Impact of Land Values of the Crookwell Wind Farm

In 2006 Henderson & Horning Pty Ltd conducted a study on the impact of land values of the Crookwell Wind Farm in New South Wales, Australia.

Their study examined the change in values:

- resulting from alterations in agricultural productive capacity of land on which wind turbines were sited
- from the improved viability of the land for agricultural purposes when the income stream derived from the wind turbines was factored into total farm income
- of land on which wind turbines were not sited but were clearly visible

Of the potential change in values resulting from altered productive capacity, the report states:

It is clear that the underlying agricultural productive capacity of the land subject to the wind farm and the surrounding property is not in any measured way affected by the development of the Crookwell Wind Farm meaning there has been no reduction in [land] *values.*

The report goes on:

Indeed the property subject to the [wind turbine] *development enjoys additional revenue and has some added benefits from improved roads, erosion control and passive wind protection for stock from the sub stations and turbine tower structures.*

The report stated that in the fifteen years prior to the study, the Crookwell area had been characterized by a change in land-use from larger grazing properties to smaller, rural residential holdings. However, the presence of the wind farm "*has the potential to slow down the process of productive agricultural land changing to rural residential uses in the short to medium term with the shift caused by the additional income generated from the wind farm making the agricultural use viable*."

But what about land where no income was derived from the wind turbines but from which they were visible?

The report states: "*...we can see no measurable reduction in values for those properties that have a sight line to the [wind turbine] development*".

It goes on to state that: *"...factors such as soils, improvements and access to services are more important drivers in determining value then the visual amenity of the wind farm*".

12.10.3 Predicted Impact

The reports examined show no statistical evidence of a drop in property prices nor do they support the case that proximity to wind farms results in a decline in property values.

12.10.4 Mitigation Measures

No mitigation measures are required as no significant impacts are envisaged on property values.

12.10.5 Conclusion

The reports we have examined show no statistical evidence of a drop in property prices nor do they support the case that proximity to wind farms results in a decline in property values.

12.11 CONCLUSION

No significant impacts are predicted on agricultural practices, forestry, natural resources, ESB Networks, aviation or property prices.

12.12 REFERENCES

1. Central Statistics Office (CSO) Census 2006 www.cso.ie

2. CER Gate 3 Direction issued 16 December 2008, CER/08/260

3. CER, Criteria for Gate 3 Renewable Generation Offers and Related Matters – Proposed Direction to the System Operators, 12 November 2008, CER/08/226

4. EirGrid, June 2010 Connection Offers Disclosure of Applications

5. EirGrid, 2025 Grid Development Strategy

6. EirGrid, Transmission Forecast Statement 2010-2016

7. http://www.windlab.com/landowners/valuesLand values

8. Royal Institution of Chartered Surveyors (2007*) "What is the impact of wind farms on house prices"*