Environmental Impact Statement
for
Proposed Silverbirch Wind Farm
Co. Kerry

Volume 1 of 4
NON-TECHNICAL SUMMARY

March 2017
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1 INTRODUCTION

Silverbirch Renewables Limited propose to develop a wind farm (‘Silverbirch Wind Farm’) consisting of 14 wind turbines and associated infrastructure, with a total installed capacity not to exceed 50 MW, on a site which is located on elevated ground between the villages of Gneeveguilla, Co. Kerry and Ballydesmond, Co. Cork. The site of proposed development is located entirely within the jurisdiction of Kerry County Council; an application for Planning Permission has been prepared for submission to Kerry County Council. The grid connection for the proposed wind farm is included as part of the application for Planning Permission. This consists of a connection by means of underground cable, primarily along public road, to the existing 220 kV substation at Ballynahulla, Co. Kerry. A 10 year Planning Permission is sought.

An Environmental Impact Statement and a Natura Impact Statement has been prepared in respect of the proposed development which forms part of the documentation to be submitted to Kerry County Council with the application for Planning Permission.

This Non-Technical Summary (NTS) comprises the first volume of the EIS for the proposed Wind Farm development. The other three volumes which comprise the EIS are:

- Volume 2: Main Environmental Impact Statement
- Volume 3: Appendices
- Volume 4: Photomontages

1.1 THE APPLICANT

Silverbirch Renewables Ltd is an Irish company which has been incorporated to develop and operate the wind farm. The directors of Silverbirch Renewables Ltd each have 25 years’ experience of developing, owning and operating wind farms in Ireland, having developed over 280 MW of Wind Farms to date. They continue to own and operate three existing wind farms in Co. Kerry.

1.2 EIA STUDY TEAM

This EIS has been compiled by Malachy Walsh & Partners (MWP), Engineering and Environmental Consultants, Reen Point, Blennerville, Tralee, Co. Kerry. The document has been informed by environmental studies and technical reports by experts in their field and contains input provided by Malone O Regan McGillicuddy (MRG) Consulting Engineers. The wind farm was designed by MRG and MWP.
2 POLICY AND PLANNING CONTEXT

The Silverbirch Wind Farm development site is located within an area designated as ‘Open to Consideration’ for Wind Energy Development in Kerry County Council’s Renewable Energy Strategy 2012.

The objectives of Kerry County Council with respect to Renewable Energy, as identified in the Kerry County Development Plan 2015-2021 are to:

- **EP-12**: Not to permit the development of wind farms in areas designated “open to consideration” in the Tralee and Listowel Municipal Districts until 80% of the turbines with permissions in those areas, on the date of adoption of the Plan, have either been erected or the relevant permission has expired or a combination of both and the cumulative effect of all permitted turbines in the vicinity of the proposal has been fully assessed and monitored.

The site is located in the Killarney Municipal District, and is therefore not subject to the restrictions imposed by Objective EP-12 of the current Development Plan.

3 NEED FOR THE DEVELOPMENT

There are many significant benefits that would arise from the proposed Silverbirch Wind Farm development. In addition to the economic benefits, there are significant environmental benefits in moving away from imported fossil fuels. Electricity generation by wind turbines reduces the need for production by fossil fuel sources. These sources, such as coal and gas, produce greenhouse gases. Therefore, electricity generated by wind turbines reduces the amount of electricity and hence greenhouse gases, produced by fossil fuel generation sources.

In their latest assessment of Ireland’s environment (Ireland’s Environment – An Assessment, 2016), the Environmental Protection Agency state that ‘we need to adopt a much greater sense of urgency about reducing our dependence on fossil fuels for energy, heating and transport, radically improving energy efficiency and preparing for the inevitable consequences of climate change such as flooding. Greenhouse gas (GHG) data for the Emissions Trading Sector show that the sector has increased its emissions whereas the trends across Europe are for decreasing emissions. For wider sectors of the economy and society not covered by ETS, which includes transport and agriculture, for the period 2014-2020 GHG emissions are projected to increase. Overall, total emissions are projected to be between 6% and 11% below 2005 levels in 2020. The target is a 20% reduction. This increasing trend does not look encouraging for meeting our national goal to transition to a carbon neutral society and economy.’

To date, the most significant contribution to renewable energy in Ireland has come from onshore wind energy, which is a proven technology. The EPA report further states that a move to a low-
carbon, energy-efficient society will require large-scale public as well as private investment in the necessary energy infrastructure and grid distribution systems. Over the last five years, very significant public investment has been made to develop the electricity transmission grid infrastructure in the southwest of Ireland as part of a national programme to facilitate further integration of renewable energy projects. This has resulted in the construction and commissioning of four new 220 kV substations and associated transmission lines and cables in the southwest region. One of reasons for selection of the site of the proposed Silverbirch Wind Farm project was because of its proximity to one of these newly commissioned 220 kV substations at Ballynahulla.

4 THE PROPOSED DEVELOPMENT

The proposed Silverbirch Wind Farm consists of 14 wind turbines with a total installed capacity not to exceed 50 MW. The proposed development will include the following elements:

- Upgrading of c.2,060m of existing access tracks, including associated drainage and sediment control infrastructure;
- Construction of c.7,700m of new site access tracks, including associated drainage and sediment control infrastructure;
- Construction of 14 no. turbine foundations and crane hardstanding areas, including associated drainage and sediment control infrastructure;
- Formation of 3 no. borrow pits and repositories, including associated drainage and sediment control infrastructure, to provide a source of crushed stone aggregate for use in the upgrading of existing site access tracks, construction of new site access tracks and hardstanding areas and the backfilling of turbine foundation excavations. Repository areas will be provided adjacent to each borrow pit to facilitate the temporary stockpiling of any overburden material removed from the borrow-pit and any surplus excavated material from the turbine foundations, access tracks and crane hardstanding areas. These materials will be used for the subsequent re-instatement of the borrow-pits;
- Construction of entrances to the wind farm site off the public road, comprising of 7 no. new and 6 no. upgraded site entrances;
- Construction of alterations to the public road network to facilitate access for the delivery of turbine components;
- Construction of 2 no. medium voltage (MV) wind farm substations including control buildings, external electrical equipment, compound fencing, etc.;
- Construction of 110kV grid connection substation including control buildings, external electrical equipment, foul effluent treatment system and treated effluent holding tank, compound fencing, etc.;
- Excavation, medium voltage cable installation and backfilling of cable trenches between turbines and MV substations including sections along existing public road;
• Construction of cable jointing bays, and temporary passing bays, as appropriate, along the route of the above cable;
• Excavation, 110kV cable installation and backfilling of cable trenches between the 110 kV substation and the Eirgrid 220kV substation at Ballynahulla, including section along the L11128 Third Class Road;
• Construction of temporary construction compounds to facilitate safe storage of equipment and materials during construction of the wind farm;
• Delivery, installation and commissioning of 14 no. wind turbines with a rotor diameter of up to 120m and a blade tip height of up to 150m above ground level;
• Erection of 2 no. meteorological masts with a height of up to 100m;
• Landscaping/ reinstatement works.

4.1 CONSTRUCTION OF THE WIND FARM
The overall construction of the wind farm can be split into two distinct phases, the first of which will comprise the civil engineering elements of the works including drainage, borrow pit, site access roads, crane hardstanding areas, turbine foundations, cable trenches, substation compounds/buildings and landscaping/reinstatement works. The second element of the works will comprise the electrical infrastructure, turbine installation and commissioning. There will be some overlap between the two elements.

The proposed wind farm will be developed in one phase with construction activities being sequenced over a period of approximately 24 months.

4.2 OPERATION AND MAINTENANCE
The operation of each turbine is controlled automatically by means of a controller located in the nacelle and on a platform at the base of each tower. These controllers also monitor the operation and energy production of each turbine which can be accessed remotely from the site by an operator.

The main on-site activity associated with the operation of the wind turbines involves visits by service technicians to correct faults on the turbines, carry-out routine servicing/preventative maintenance and inspect roads and drainage.

4.3 DECOMMISSIONING
The intended design life of the wind farm project is approximately 25 years. At that stage the site will either, subject to the necessary statutory approvals either be refitted with newer equipment or will be decommissioned and reinstated to its condition pre-development. In the event of decommissioning the following arrangements will be put in place:
The turbine components will be dismantled and removed from site for re-use/recycling using similar methods used for the erection and delivery of the turbine components.

- All lubricants, etc. will be drained down and removed from site in an environmentally safe manner for reprocessing/disposal by a licensed contractor off-site.
- All other equipment will be removed for recycling/disposal in an environmentally safe manner.
- The foundations and roads will likely be left in situ and landscaped.

### 4.4 ALTERNATIVES CONSIDERED

Silverbirch Renewables, as an active wind energy developer, has identified and evaluated many sites in different counties throughout Ireland for their suitability for wind energy development.

When the wind farm site selection criteria are applied, Silverbirch is one of a very limited number of sites in County Kerry which satisfies the criteria and, in particular, satisfies the site area/extent criterion in combination with the others.

Silverbirch emerges as the most suitable site for wind energy development in the areas considered. The following is a summary of the positive attributes that renders Silverbirch suitable for the proposed development:

- Good wind speeds;
- Lies outside environmentally designated sites;
- Ability to connect to the nearby Electrical Grid infrastructure;
- Ability to use existing site trackway and infrastructure;
- Ability to use nearby national road network for haulage;
- Rural area, national guidelines separation distances achievable;
- Located in an area designated as open to consideration for Wind Farms in the Kerry Renewable Energy Strategy.

### 4.4.1 Alternative Turbine Dimensions

The maximum rotor diameter (120m) and blade tip height (150m) specified in the planning application will permit the developer to select the most appropriate turbine based on the latest available technology when the wind farm is being developed. Turbines with smaller dimensions would require more machines to meet the same capacity, thereby increasing the potential for environmental impact.
4.4.2 Alternative Cabling Connections
The proposed cabling connection method is underground as opposed to the alternative overhead connection. There is no visual impact resulting from the proposed underground cabling.
5 SITE DESCRIPTION

5.1 SITE LOCATION

The proposed development will be located between the villages of Gneeveguilla, Co. Kerry and Ballydesmond, Co. Cork. It extends across fifteen individual landholdings in the townlands of Tooreenagarriv, Ballynahulla, Barna, Knocknageeha, Lisheen, Reanasup and Reaboy, Co. Kerry and includes sections of public road connecting the individual landholdings on which the Wind Farm will be constructed.

![Figure 5-1 Turbine Layout and Site Location](image-url)
5.2 EXISTING LANDUSE
Much of the surrounding lands, including those comprising the rest of the individual landholdings within which the proposed wind farm development is located, also comprise wet grassland, cut-over bog and commercial forestry. There are also several private dwellings within the overall study area, and the closest settlements comprise the village of Ballydesmond, Co. Cork located 2 km to the north east of the northern boundary of the site, and the village of Gneevegullia, c. 2 km to the south (See also Figure 2-1 above).

5.3 GRID CONNECTION
The proposed Grid Connection Substation for the wind farm is the existing Eirgrid 220kV Substation at Ballynahulla. This will facilitate the connection of the proposed wind farm to the National Grid, via an underground cable connection along the short length of unsurfaced tertiary county road between the wind farm substation and the Ballynahulla substations. This grid connection is included within the scope of the proposed development considered in the Environmental Impact Statement. The proximity to the National Grid was a significant element in selecting this area for the proposed Silverbirch Wind Farm development.
Figure 5-2  Route of Underground Cables and Grid Connection
5.4 SITE ACCESS
The R577 Regional Road, which extends from the town of Castleisland, Co. Kerry via the villages of Scartaglin, Co. Kerry and Ballydesmond, Kisskeam and Boherbue, Co. Cork to its junction with the N72 National Primary Route at Clonbanin Cross, passes to the north of the site. Primary access to the site for the delivery of construction materials, turbine components, etc. will be via the L-2032 Primary Local Road, from its junction with the R577 at Knocknaboul Cross, and then via a number of other Primary and Tertiary Class Local Roads which connect the individual landholdings. The delivery route for the main turbine components will be from Foynes Port via the National Primary Road network to Castleisland, and then along the L-3032 Primary County Road via Cordal Village to Knocknaboul Cross. Access to the northern construction compounds and initial access to Borrow Pit No.3 will be directly off the R577 Regional Road via an existing entrance c. 1km east of Knocknaboul Cross.
Figure 5-3 Site Access Locations and Local Road Network
5.5 PLANNING DEVELOPMENT AREA
The site location and position of turbines are shown Figure 2-1 above. The red line planning boundary is shown in Figure 2-4 below. It is important to note that an area much wider than the red line planning boundary was environmentally assessed as part the process, which ultimately informed the final turbine layout. Additionally environmentally designated sites up to 15 kilometres from the proposed wind farm were also considered (see also Section 6 Environmental Designations).
6 ENVIRONMENTAL DESIGNATIONS

Designated sites, containing habitats or species of national or international conservation importance, include Special Areas of Conservation (SAC) and Special Protection Areas (SPA) designated within the Natura 2000 network, and Natural Heritage Areas (NHA). Enforcement of the protection of SPA’s and SAC’s in Ireland is provided by the transposition of the EU ‘Birds Directive’ (79/409/EEC) and the EU ‘Habitats Directive’ (92/43/EEC) into Irish Law as the EC(Birds and Natural Habitats) Regulations 2011. NHAs and proposed NHAs (pNHA) are protected under the Wildlife Act 1976 (as amended).

The development site does not form part of any site designated for conservation purposes. However, there are a number of Natura 2000 sites located within a 15km radius of the subject development. These include:

- **Stack’s to Mullaghareirk Mountains, West Limerick Hills and Eagle Mountains SPA (Site Code 004161):** This SPA site bounds the northern most component of the proposed development site but the proposed development site does not overlap the SPA site (at its closest point, it lies approximately 0.3km from the southern extremity of the SPA).

- **Blackwater (Cork/Waterford) River SAC (Site Code 002170):** The proposed Wind Farm site will be drained by 1st/2nd Order tributaries of the River Blackwater including the Tooreengarriv/Carhoonoe, Mountinfant, and Reansup Streams.

- **Lower River Shannon SAC (Site Code 002165):** This SAC is located approximately 7km north of the proposed development, and is not hydrologically connected to the proposed development site.

- **Killarney National Park, MacGillycuddy’s Reeks and Caragh River Catchment SAC (Site Code 000365).** The western boundary and south western extent of the proposed development site lies close to the watershed between the Blackwater and Laune catchments, and a small extent of the site in these areas are currently drained by tributaries of the Quagmire River which is in the Laune catchment. The Laune catchment forms part of the Killarney National Park, MacGillycuddy’s Reek and Caragh River Catchment SAC.

- **Castlemaine Harbour SAC (Site Code 000343):** This SAC is located approximately 13.5km west of the proposed development, and is not hydrologically connected to the proposed development site.
Figure 6-1  Special Areas of Conservation within 15 km of the proposed wind farm
As noted above for the SAC, the western boundary and south western extent of the proposed development site lies close to the nominal watershed between the Blackwater and Laune catchments, and a small extent of the site in these areas are currently drained by tributaries of the Quagmire River which is in the Laune catchment. The Laune catchment forms part of the Killarney National Park, McGillycuddy’s Reeks and Caragh River Catchment SAC, and while the catchment does not form part of the pNHA, it provides a hydrological connection between the pNHA and small parts of the subject site.

Figure 6-2 Special Protection Areas within 15km of the proposed Wind Farm.
There are also a number of NHA and pNHA sites within a 15km radius of the proposed development site. These are:

- **Dooneen Wood NHA (Site Code 001349):** This site lies 14km to the northwest of the site and has no connection to the proposed development.
- **Mount Eagle Bogs NHA (Site Code 002449):** At 5km to the north, this is the closest to the proposed development site but has no connection to same.
- **Anna More Bog NHA (Site Code 000333):** This site lies 12km to the west of the site and has no connection to the proposed site.
- **Killarney National Park, McGillycuddy’s Reeks and Caragh River Catchment pNHA (Site Code 000365):** This site lies 11km to the south of the site and shares a largely common boundary with the SAC of the same name.

![Natural Heritage Areas and proposed Natural Heritage Areas within 15km of the proposed wind farm](image-url)
7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 REQUIREMENT FOR AN EIS
Environmental Impact Assessment (EIA) requirements derive from European Communities Directive 85/337/EEC (as amended) on the assessment of the effects of certain public and private projects on the environment. The primary objective of the EIA Directive is to ensure that projects which are likely to have significant effects on the environment are subject to an assessment of their likely impacts.

The requirement for an Environmental Impact Statement (EIS) to accompany a planning application is principally determined by the Planning and Development Act 2000 (as amended) and Planning and Development Regulations 2001 (as amended).

The proposed development works fall within the classes of development types requiring an EIS under Schedule 5 Part 2 subsection 3(i) of Planning and Development Regulations 2001 which provides for the requirement of an Environmental Impact Statement (EIS) for “Installations for the harnessing of wind power for energy production (Wind Farms) with more than 5 turbines or having a total output greater than 5 megawatts”.

7.2 PURPOSE OF THIS EIS
The intended purpose of the EIS is to:

- inform decision makers and the public of the potential environmental impacts (effects) associated with implementation of the proposed project,
- determine whether these impacts could be significant,
- suggest mitigation measures for potential impacts,
- identify any residual impacts.

An overview and summary of the impacts and mitigations of the environmental assessment topics is provided in the following sections.

7.3 POPULATION AND HUMAN HEALTH

7.3.1 Baseline
The proposed development will be located between the villages of Gneeveguilla, Co. Kerry and Ballydesmond, Co. Cork, but is situated in Co Kerry. It extends across fifteen individual landholdings in the townlands of Tooreenagarriv, Ballynahulla, Barna, Knocknageeha, Lisheen, Reanasup and Reaboy. There are several one off houses along local roads in the area. The closest settlements comprise the village of Ballydesmond, Co. Cork which is located 2 km to the north east of the northern boundary of the site, and the village of Gneeveguilla, c. 2 km to the south.
7.3.2 Impact
Throughout construction and operation, it is expected that the development will have a neutral impact on population.

It is envisioned that the construction phase will take approximately 24 months and will employ approximately 50-60 people, which will have a positive, if temporary, impact on employment. It is envisaged that the development will generate full-time employment for approximately 8 full time equivalent personnel involved in electrical and turbine maintenance and operations, professional services, environmental monitoring and support roles.

Residential amenity has the potential to be impacted through noise and dust during the construction phase and from noise and shadow flicker once operational. Through effective mitigation measures residential amenity will be protected. These are discussed further in 7.7, 7.8 and 7.12.

7.3.2.1 Community Benefit Fund
Silverbirch Wind Farm will set up a community benefit fund which will make financial contributions to a selected group of charities and / or organisations in the area around the Wind Farm. The community benefit fund will consider applications in the first year of operation of the project and applications will be invited on the project’s website.

7.3.3 Mitigation and Residual Impact
No significant negative residual impacts are envisaged in relation to the human environment. There will be a positive impact associated with the employment opportunities resulting from the construction, operation and maintenance. Rates generated by the development will also assist the locality through improved services. The Community Benefit fund will support local projects.

Noise and shadow flicker will be controlled by technology at source ensuring acceptable levels are not exceeded (see relevant section below for further details). Monitoring during the construction phase will ensure dust and noise levels are kept within the relevant limit thresholds.

A detailed Human Population Impact Assessment is presented in Chapter 4 of Volume 2 of this EIS.
7.4 BIODIVERSITY

7.4.1 Baseline
The proposed Silverbirch wind farm development is in an upland area where the underlying peaty and gley soils dictate the habitats. Habitats at the proposed site are dominated by commercial coniferous forestry, improved agricultural grassland, wet grassland; all altered habitats, and of are of relatively low conservation value. Bogland habitats also occur at the proposed site, including cutover bog, sections of blanket bog, and wet heath. Most of the peat land habitats at the site are degraded as a result of peat harvesting, commercial forestry, and surrounding agriculture.

An Ecological Impact Assessment was carried out to identify, assess and mitigate any potential ecological impacts caused by the proposed Silverbirch wind farm development. Information was collected using a combination of desktop research, consultations and field surveys.

To inform baseline conditions at the site, extensive ecological surveys were completed, including habitat surveys, mammal surveys, ornithological surveys, and aquatic surveys (see Chapter 5 and associated Appendices).

The proposed development is situated approximately 0.3km to the south of the southern extremity of the Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, which is designated for Hen Harrier. A number of minor streams that drain the site ultimately form the Blackwater River SAC (002170). This SAC site is designated for a number of sensitive freshwater receptors, namely the Annex I habitat Ranunculion fluitantis and Callitricho-Batrachion (3260), and the Annex II species Brook lamprey (1096), Atlantic Salmon (1106), Otter (1355) and Freshwater Pearl Mussel (1029).

In total, five Natura 2000 sites are located within fifteen kilometres of the subject site. A Natura Impact was prepared for the proposal, and concluded that the proposed development will not result in significant impacts to any Natura 2000 site.

Irish hare, Deer and Pipistrelle bats were found to be using the proposed development site but not in significant numbers. This is due to the wet nature of the site and suboptimal supporting open habitats occurring. Impacts to mammals (possibly badger, hedgehogs, pine martens and squirrel) could include the direct loss of habitat and temporary disturbance impacts as a result of construction activities, and the fragmentation of existing habitat due to access road construction and increased human activity on the site.
7.4.2 Impacts
The following lists the main potential impacts the proposed Silverbirch development will pose;

- Poor water quality impacts as a result of sedimentation (indirect impacts on aquatic/semi-aquatic habitats and species, particularly Freshwater Pearl Mussel, and Salmonids);
- Poor water quality as a result of accidental fuel/oil/concrete spills (indirect impacts on aquatic/semi-aquatic habitats and species);
- Habitat Loss/Alteration;
- Disturbance of fauna, including, impacts to bird species (particularly Hen Harrier).

Similar habitats are abundant in the greater area, as to those present at the Silverbirch site. Therefore the habitat loss as a result of the proposed development is not considered significant. No rare or protected plant species were detected within the proposed development site.

For the Silverbirch wind farm development, the construction phase is likely to have the most significant effect. Impacts include surface run-off from roads and excavations, and accidental fuel/oil/concrete spills. The sensitivity of the water-dependant Annex II species potentially occurring downstream of the proposal, will require stringent mitigation measures to protect water quality downslope/downstream of the subject site. In addition there is also the potential for disturbance to breeding hen harrier during the construction phase.

During the operational phase of the proposed development the potential for significant impacts reduces considerably. Once the site starts to re-vegetate the potential for sedimentation impacts decrease.

7.4.3 Mitigation and Residual Impact
With appropriate mitigations in place, during the construction and operational phases of the development, it is considered that no significant impacts will occur on the key Ecological Receptors identified.

In summary the main potential impacts identified relate to the potential for pollution of the streams within and downstream of the proposed site and disturbance impacts to breeding hen harrier during the construction phase of the proposal.

Stringent mitigation measures to protect water quality measures are proposed, with particular attention given to the presence of critically endangered Freshwater Pearl Mussel populations potentially downstream of the proposed development site. As part of a Construction Environmental Management Plan (CEMP), a Planning Stage Surface Water Management Plan (SWMP) including drainage design, has been prepared specifically for this project, which documents all mitigation measures intended to protect the quality of receiving watercourses (see appendix 7-B of Volume 3).

To ensure water quality in the receiving watercourses is protected, particularly the River Blackwater, during the operational stage of the proposed Silverbirch Wind Farm, maintenance of the site will include activities associated with keeping the drainage system operating effectively.
Both pre-construction and post-construction monitoring will be undertaken for birds and water quality will be monitored during the construction phase and during the early years of the operational phase.

No significant ecological residual impacts are expected as a result of the construction and operational phase of the proposed Silverbirch wind farm.

A detailed Ecological Impact Assessment is presented in Chapter 5 of Volume 2 and associated appendices in Volume 3 of this EIS.

7.5 SOILS AND GEOLOGY

7.5.1 Baseline
Extensive geophysical investigations were conducted across the site, comprising ground penetrating radar surveys for peat thickness, peat probing and trial pits. The soil map and these site investigations for the area indicate that the overburden across the wind farm site comprises peat ranging from 0.1 to 4.0 metres in depth. When siting wind farm infrastructure, areas of deep peat, as identified from these surveys, have been avoided. The peat is underlain by boulder clay. The bedrock underlying the site comprises Shales and Sandstones. The shale will be utilised during construction and will be extracted from dedicated on site borrow pits.

7.5.2 Impacts
Potential Construction Stage impacts of the proposed Silverbirch wind farm development on the underlying soils and geology may include impacts arising from earthworks associated with the construction of the access tracks, crane hardstanding areas, turbine foundations, drainage infrastructure, cable trenches, substations, temporary construction compounds, borrow pits and peat repositories. Potential impacts on soils and geology include:

- Removal of topsoil, subsoil and bedrock during the construction and upgrading of access tracks, turbine foundations, crane hardstanding areas, substations, construction compounds, cable trenches, borrow pits, temporary repositories and associated drainage infrastructure;
- Risk of a landslide associated with the construction of the wind farm;
- Potential contamination of groundwater in the underlying aquifer from construction related pollutants such as uncontrolled and untreated fuel leaks and spills, concrete wash-out;
- Tree felling to accommodate the development will disturb the soil but will not cause any significant impact. With regards to disturbance from felling, the soil has previously been disturbed by afforestation and conifer growth;
- Vehicular movement of all traffic and machinery mobilised on site has the potential to impact on soil and ground stability.
Potential Operational Stage impacts are associated with the maintenance of the wind farm. Impacts during Decommissioning of the wind farm may arise due to the removal of the relevant wind farm infrastructure and reinstatement of the site and will be similar to the construction stage impacts.

Good Site Practice and operating to a Construction and Environmental Management Plan will limit the impact on the geological aspects of the site.

- The removal of geological resources (soil, subsoil and bedrock) is an unavoidable impact of the development but can be kept to a minimum through management and good site practice.
- Typical geological resources required for the construction of the development, including crushed stone aggregate, limestone capping for roads and hardstands and concrete and concrete blocks, can be kept to a minimum through management and good site practice.

A Peat Stability Risk Assessment has been undertaken for the proposed development which concludes that works can safely proceed at all locations required to construct the wind farm (see Appendix 6B Volume 2) provided the mitigation measures outlined in the EIS are implemented.

### 7.5.3 Mitigations and Residual Impacts

The amount of earth materials excavated will be kept to the minimum necessary in order to limit the impact on the geological aspects of the site.

Peat and other subsoil excavated to facilitate the construction of the Wind Farm will be transferred to the excavated borrow pits and bunded peat repositories on the site in order to limit any risk of a peat slide that could otherwise be associated with the uncontrolled storage of peat on the site.

A smaller proportion of the excavated peat will be side cast on the site up to a maximum height of 1m in areas where safe and appropriate to do so.

The Peat Stability Risk Assessments completed for each element of the Wind Farm infrastructure on the proposed Silverbirch Wind Farm project have confirmed that the Wind Farm can be safely constructed subject to the appropriate mitigation measures being put in place and the project can be safely constructed and will not have any significant impacts on soils and geology.

**A detailed Soils and Geology Impact Assessment is presented in Chapter 6 of Volume 2 and associated appendices in Volume 3 of this EIS.**
7.6 WATER

7.6.1 Baseline
The Silverbirch wind farm site is located on elevated ground close to the nominal watershed divide of the Blackwater and Laune River catchments. A detailed Surface Water Management Plan has been prepared for the site.

The site is drained by a number of streams. Carhoonoe Stream (also known as the Yellow River) rises near the watershed of the Maine and Blackwater catchments, flows roughly in an easterly direction across the proposed development site, joins the Tooreengarriv Stream and an unnamed stream to the south, and subsequently flows south east to join the River Blackwater. To the south of this, the Mountinfant Stream flows in an easterly direction before it is joined from the south by another stream at Tooreencahill before flowing into the River Blackwater. Further south, the Reanasup Stream flows south east and it is met from the east by another stream before joining the River Blackwater. The water quality of the streams associated with the site ranges from moderate to high.

Figure 7-1. Catchment map showing turbine locations
7.6.2 Impact
The Preliminary Flood Risk Assessment Maps for the area show that none of the turbine sites or masts are located in areas liable to flooding.

Wind Farms can have negative effects on surface water quality and thus can potentially affect the aquatic ecology of streams and rivers. These effects would mainly occur during the construction phase as a result of excavations and earthworks associated with the construction of foundations and access roads. Although there will be no significant impacts on surface water or ground water associated with the proposed development, mitigation measures are recommended to reduce any negative effects on water quality.

Sediment, including any soils, sand, mud and silt, can arise from the erosion of exposed soils and construction materials associated with the construction of the different elements of the Wind Farm such as access roads, turbine foundations and crane hardstanding areas. Sediment can become suspended in surface water runoff and transported over land to nearby streams. This is the single main source of pollution that has the potential to have a negative impact on water quality in the streams downhill of the site. Therefore, measures will be required to reduce or mitigate the impact to surface water quality.

In the vicinity of the borrow pits where stone will be extracted for the wind farm, there is potential for negative effects on groundwater quality in the event of a minor accidental spill of fuel.

7.6.3 Mitigation and Residual Impact
A Planning Stage Surface Water Management and drainage design has been prepared and forms of the application for planning permission.

The most important mitigation measure to reduce potential negative effects on the water quality of nearby streams will be the implementation of the Surface Water Management Plan (see Appendix 7-B of Volume 2), which will control sediment run-off during wind farm construction. The adoption of this plan and other water quality protection measures, such as fuel management measures, during wind farm construction will ensure the protection of the water quality of nearby streams and rivers.

Once recommended mitigation measures are appropriately implemented, any negative effects on surface water and groundwater quality will be avoided.

A detailed Hydrology and Hydrogeological Impact Assessment is presented in Chapter 7 of Volume 2 and associated appendices in Volume 3 of this EIS.
7.7 AIR QUALITY

7.7.1 Baseline
The ambient air quality at the proposed Silverbirch wind farm is very good. There are no significant sources of pollution in the area. Minor contributions of atmospheric pollutants in the area arise through smoke from open fires, domestic boilers and vehicle exhausts.

7.7.2 Impacts
The main potential impact of the proposed Silverbirch wind farm development on air quality will arise during the construction stage of the Wind Farm in the guise of fugitive dust and vehicle emissions associated with the construction of the Wind Farm.

Once operational there will be no emissions to atmosphere. Energy generation without greenhouse gas contributes positively to national and international policy on reducing potential climate change effects.

7.7.3 Mitigation and Residual Impacts
Dust emissions will be controlled during the construction stage of the development including use of a water bowser to spray access tracks and crane hardstanding areas during any extended dry periods. Wheel wash facilities will be provided at entrances to site off public roads to facilitate removal of any material collected by vehicles passing through the site and preventing its deposition on public roads. Trucks will be covered appropriately for delivery of materials along the public road. Dust emissions from the site will be monitored throughout the construction phase to ensure there continues to be no significant impact during the construction.

A detailed Air Quality Impact Assessment is presented in Chapter 8 of Volume 2 of this EIS.

7.8 NOISE

7.8.1 Baseline
The main sources of noise in the area and the existing noise environment include traffic on the local and regional road network, agricultural activity, forestry related activity and other noise typically associated with a rural location. There are no major sources of noise in the area.

Noise monitoring was undertaken at 11 locations around the wind farm in order to establish the existing noise levels in the area (See Chapter 9 and Appendix 9-A and 9-B). At each location, a representative dwelling, as the nearest to each turbine was selected.
7.8.2 Impact
The results of the noise impact assessment show that the relevant noise limit thresholds set out in the wind farm planning guidelines will be achieved at all locations. Construction noise limit thresholds will also be met. Noise monitoring during both the construction and operational phases will demonstrate that the noise limits are achieved. In the unlikely event noise limits are exceeded the developer commits to undertaking the necessary measures to reduce noise levels.

7.8.3 Mitigation and Residual Impact
Although mitigation measures are not required modern wind turbines can be controlled remotely and operated in noise reduced modes to ensure noise limits are not exceeded.

A detailed Noise Impact Assessment is presented in Chapter 9 of Volume 2 and associated appendices in Volume 3 of this EIS.

7.9 LANDSCAPE AND VISUAL IMPACT

7.9.1 Baseline
The local landscape of the proposed development site can generally be described as an agricultural landscape sub-divided into a patchwork of small to medium size fields of grasslands, with areas of coniferous forestry. There are no designated scenic views or prospects directly associated with the development lands. The lands within and adjoining the site of the proposed development are classed as ‘Open to Consideration’ for wind farm development.

7.9.2 Impact
The wind farm will introduce readily recognisable new features. This change is not considered a significant one that would constitute unacceptable detrimental effects on either the local or wider landscape character or values. The key elements of the landscape character would remain intact and the existing rural character of the area in which the wind farm is proposed to be located will prevail.

The visual assessment identified the areas of the surrounding landscape from which the proposed development would be theoretically visible. The Silverbirch wind turbines will be prominent in some views from very close to the site and will be visible from certain long distance viewpoints. Overall the development will have a moderate visual effect in that the proposed turbines would be recognisable as new elements within the landscape.

Overall the design and layout of the proposed Silverbirch wind farm is considered appropriate for the landscape and the proposal is not considered to significantly affect the overall landscape sensitivity and values of the area.
7.9.3 Mitigation and Visual Impact

No additional mitigation can be recommended to further reduce the effect of this proposed scheme on the landscape. The visual impacts of Wind Farm developments cannot be totally eliminated, as discussed fully in the main report (See Chapter 10 and accompanying Photomontages in Volume 4). The following measures included in the design of the scheme will help reduce visual impacts to a reasonably acceptable level from most sensitive receptors:

- All turbines will be of identical tower heights and rotor diameter, resulting in visual uniformity.
- Due to their highly visible nature in clear weather conditions, the colour of the turbines is a very important consideration. Turbines will be off-white or grey in colour. When viewed during overcast conditions turbines of these colours are rarely visible.
- Turbines will be geared such that blades will rotate in the same direction.

A detailed Landscape and Visual Impact Assessment is presented in Chapter 10 of Volume 2 and photomontages which provide a visual representation of the Wind Farm from selected near and far viewpoints are presented in Volume 4 of this EIS.

7.10 MATERIAL ASSETS

7.10.1 Baseline

Material assets are defined as ‘resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons’. They can be economic assets of natural or human origin, or cultural assets. The impact on roads and traffic, tourism, major utilities, aviation, geological assets and archaeological and cultural heritage were considered in the preparation of the EIS.

7.10.2 Impact

A Traffic Management Plan will be developed in agreement with Kerry County Council and will include all measures necessary to ensure that disturbance to the local population is minimised and the impact to local roads is minimal.

Given its remoteness from the county’s main scenic attractions for visitors, the proposed Silverbirch Wind Farm will not have a significant impact on these primary attractions for visitors to the county.

An Aviation Impact Assessment was carried out for the proposed development, specifically regarding Kerry Airport. The assessment concluded that the Wind Farm will not impact upon the operation of Kerry Airport.
Consultation was carried out with telecommunications providers with services in the area. On the basis of the responses received from the consultees, and the Protocol Agreement which was signed with 2rn, it is not envisaged that the proposed Silverbirch Wind Farm development will have an impact on telecommunications signals.

The proposed project will greatly compliment the national grid development strategy and help in contributing to the South West region’s expected overall wind generation. The proposal will assist in meeting increases in electricity demand nationally by exporting electricity into the electricity market. It will contribute to ensuring that adequate electricity supplies are available to support economic activity and growth in a manner fully compatible with Government energy and environmental policies.

The amount of forestry that will be lost as a result of the development is minimal and will be insignificant relative to the size of the forestry resource nationally, regionally and locally.

While the losses of the forestry resource to the Wind Farm represent a minor economic loss in terms of wood production, this will be offset by replanting an equivalent area of forestry to that removed.

7.10.3 Mitigation and Residual Impact
There is no evidence to suggest that the proposed wind farm will have significant negative impacts on valued resources in the area. The operational Wind Farm will not cause any material damage and does not pose any polluting or hazardous threat that would result in the devaluation or damage to valued material assets of the region.

The operation of the turbines will make a positive contribution to the supply of renewable energy. In terms of material assets, the proposal presents an opportunity for a positive effect in the use of renewables as it will lead to a reduction in the use of fossil fuels. It will help ensure that adequate electricity supplies are available to support economic activity and growth in a manner fully compatible with planned utility development and Government energy and environmental policies.

A detailed Material Assets Impact Assessment is presented in Chapter 11 of Volume 2 and associated appendices in Volume 3 of this EIS.

7.11 ARCHAEOLOGY AND CULTURAL HERITAGE

7.11.1 Baseline
While there are archaeological monuments in the general area, there are no previously recorded monuments within the extent of the proposed development site. This area in which the wind farm is proposed, is not rich in archaeological remains.
A single archaeological feature was discovered during the extensive archaeological test trenching work that was undertaken for the site (see Chapter 12 Volume 2). This was a burnt spread mound, a likely *fulacht fiadh*.

The proposed development is within the region historically identified as Sliabh Luachra. The word Sliabh means ‘mountain’ or ‘moor’ and *Luachra* means ‘rushy place’ (loganim.ie). While this area does not have a legally defined border or boundary, it is generally accepted as the mountainous uplands between Athea at the north (Co. Limerick) to Barraduff in the south (Co. Kerry), and extending from Boherbue in Co. Cork to as far west as Scartaglin in Co. Kerry.

**7.11.2 Impact**

The burnt spread mound referred to above has been registered on the Record of Monuments and Places map (KE050-016----) and is now no longer impacted by the development. The development area is surrounded by existing Wind Farm developments and there are no significantly negative visual impacts on or between upstanding archaeology sites in the area.

**7.11.3 Mitigation and Residual Impact**

The following mitigation strategies aim to address any negative impacts and will be agreed with the National Monuments Service and the Kerry County Council Archaeologist.

- A buffer zone, the extent of which shall be determined by the National Monuments Service, will be maintained around the burnt mound at Ballynahulla (ITM 514468, 603508), where no development will be permitted.

- All ground-works associated with the construction phase of the proposed development will be archaeologically monitored by a suitably qualified archaeologist licensed under the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Once all recommended mitigation measures are undertaken, there will be no impact on the cultural heritage resource during the operational phase of the proposed development.

*A detailed Archaeological and Cultural Heritage Impact Assessment is presented in Chapter 12 of Volume 2 and associated appendices in Volume 3 of this EIS.*
7.12 SHADOW FLICKER

7.12.1 Baseline
Shadow flicker is defined as the alternating light intensity produced by a wind turbine as the rotating blade casts shadows on the ground and stationary objects, such as the window of a residence. The Wind Energy Development Guidelines (DoEHLG 2006) provides a description of the shadow flicker effect as follows:

“The effect known as shadow flicker occurs where the blades of a wind turbine cast a shadow over a window in a nearby house and the rotation of the blades causes the shadow to flick on and off. This effect lasts only for a short period and happens only in certain specific combined circumstances.”

There are several houses within the potential zone of shadow cast of the turbines. However Shadow Flicker Control Measures will be installed on the individual turbines to ensure it does not cause nuisance at any residence.

7.12.2 Impact
Shadow Flicker Control Measures (SFCM) are a standard element of commercial wind turbine packages which require the positions of dwellings within the shadow area to be inserted into the SFCM computer programme. The software, taking into account factors such as the time of day, the time of year and weather conditions, will then automatically stop any wind turbine at times when shadow flicker would otherwise be caused at a house by the turbine. Once the conditions for shadow flicker to occur at the house no longer apply (e.g. when the sun has passed the relevant position in the sky or once it has been clouded over), the wind turbine is restarted.

7.12.3 Mitigation and Residual Impact
Such mitigation measures are recognised as successful. A report published by the UK Department of Energy and Climate Change on Shadow Flicker states:

*Mitigation measures adopted by developers have been successful ... with mitigation measures such as turbine shut down systems being used regularly. These systems are acceptable for all parties, and by virtue of their success, the issue of shadow flicker appears to be minor. Mitigation measures are often put into planning conditions.*

There will be no significant impact from Shadow Flicker.

*A detailed Shadow Flicker Impact Assessment is presented in Chapter 12 of Volume 2 and associated appendices in Volume 3 of this EIS.*
7.13 INTERACTION OF THE FOREGOING

While all environmental aspects can be inter-related to some extent, the Interaction of the Foregoing highlights the prominent interactions. The significance of the impacts and the relevant interactions of the environmental aspects along with any proposed mitigation or compensation are discussed within each of the chapters in Volume 2 of the EIS.

During the construction phase, the proposed Wind Farm development has the potential to impact on the local environment. These potential impacts have been identified and either eliminated or reduced to ensure no significant impact.

Full details of the significance of the impacts and the relevant interactions of the environmental aspects along with any proposed mitigation are discussed within each of the individual Chapters in Volume 2 of the EIS.

A matrix of the interactions can be seen in Chapter 14 of Volume 2 of the EIS.
8 CUMULATIVE IMPACTS

Cumulative impacts are the potential combined impacts from other developments in conjunction with this proposal. Cumulative impacts are considered throughout this EIS process. Once the relevant mitigation measures are implemented no significant cumulative effects will occur.

9 CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

The CEMP will be prepared prior to construction of the wind farm, to collate and manage the proposed and agreed mitigation measures, monitoring and follow-up arrangements and management of impacts. A CEMP provides a commitment to mitigation and follow-up monitoring. The CEMP will mainly address the construction phase however, it will also be continued through to the commissioning, operation and decommissioning stages. It will be developed through consultation between the design team and competent authorities and appointed project contractor.

An Environmental Manager with appropriate experience and expertise will be employed for the duration of the construction phase to ensure that the CEMP is fully developed and effectively implemented. This manager will be awarded a high level of authority and will have particular responsibility in the event of any emergency.

The CEMP will be a live document, which will be updated, as appropriate, following completion of any further studies and consultations relevant to and prior to commencement of construction of the Wind Farm project.

9.1 SURFACE WATER MANAGEMENT PLAN

A detailed site specific surface water management plan has been prepared for this wind farm (See Appendix 7-B of Volume 3). This will form part of the contractors requirements unless otherwise agreed with Kerry County Council or An Bord Pleanála.
10 CONCLUSION

All power generation has environmental effects; those created by wind farms are minimal. The long term impacts of the project will be the provision of a renewable energy source which will help Ireland meet targets for reductions in greenhouse gas emissions. The effect of the project will be clearly positive as wind energy does not defer the environmental costs of non-renewable electricity production to future generations.

Assuming the recommended mitigation measures are applied in the construction and operation of the Silverbirch wind farm, no significant residual impacts are expected to Traffic and Transport, Human Beings, Ecology, Ornithology, Hydrology and Hydrogeology, Soils and Geology, Air and Climate, Noise and Vibration, Shadow Flicker, Cultural and Archaeological Heritage and Material Assets. Overall the design and layout of the proposed Silverbirch wind farm is considered appropriate for the landscape and the proposal is not considered to significantly affect the overall landscape sensitivity and values of the area.

11 FURTHER INFORMATION

An Environmental Impact Statement (EIS) and a Natura Impact Statement (NIS) have been prepared in respect of the proposed development. The application, EIS and NIS may be inspected free of charge or purchased on payment of a specified fee during public opening hours at the following locations:

- The Offices of Kerry County Council, County Buildings, Rathass, Tralee, County Kerry.

The EIS and NIS may also be viewed at the following website: www.silverbirchwindfarm.com.