

MONEYPPOINT WIND FARM

Moneypoint Generating Station,
County Clare

ENVIRONMENTAL IMPACT STATEMENT

Report QR-320174-11 R1

November 2011

**ESB Wind
Development**

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NON-TECHNICAL SUMMARY

INTRODUCTION

Scope

A wind farm development is planned at ESB's Moneypoint Generating Station, which is in Co. Clare, approximately 3 km west of Killimer and 6 km south-east of Kilrush.

The wind farm will comprise five wind turbines which will be used to harness the natural energy of the wind to generate electricity.

Planning permission (Reference Number PL03.130164) was granted by An Bord Pleanála in October 2002 for a similar wind farm development comprising nine turbines on this site. This followed a third-party appeal of Clare County Council's decision (Ref. P01/1538) to grant permission.

This application differs from the currently permitted development in terms of the turbines, there being fewer but larger turbines in this proposal.

An examination of the likely significant impacts of the project on the environment was carried out and the results are presented in this Environmental Impact Statement (EIS). The conclusions of the EIS are contained in this Non-Technical Summary.

Background

Ireland has one of the best wind resources in the world but its exploitation has lagged developments elsewhere in Europe.

As of July 2010, approximately 1,750 megawatts (MW) of wind energy capacity had been connected to the Grid. The Government's target for gross electricity from renewable sources is 40% by 2020. This national target is estimated to be equivalent to about 5,800 MW of installed renewable capacity, indicating that significant further development of renewables is required, with the majority of this being accounted for by wind energy.

It is clear that there is strong support at multiple levels for the development of renewable sources of energy, such as will result from the proposed development at Moneypoint.

Renewable sources of energy, such as will result from the wind farm at Moneypoint, offer sustainable alternatives to our dependency on fossil fuels, a means of reducing harmful greenhouse emissions and opportunities to reduce our reliance on imported fuels. For these reasons, Irish and European policy supports the increased use of renewable energy.

Delays in advancing the permitted development at Moneypoint Wind Farm arose principally from the power station's need to focus its efforts and resources on completing its Environmental Retrofit Project and the uncertainties attached thereto regarding the changes in the land profile within the station.

THE PROJECT

The Site

Moneypoint is located on the northern shore of the Shannon Estuary in Co. Clare, approximately 3 km west of Killimer and 6 km south-east of Kilrush. The site was

acquired by ESB in the late-1970s to develop a coal fired power plant as part of its strategy to diversify from oil dependent electricity generation. The power station's three 305 MW rated units went into service in 1985, 1986 and 1987 and Moneypoint is the largest electricity generating station in Ireland. It has played a vital role in the Irish economy for more than 20 years.

The area of the site is approximately 180 hectares (ha) and comprises lands on either side of the Kilrush-Killimer road (N67). The two areas are inter-connected by a service road running beneath the N67. The main station site (130 ha) is located on the south side and the ash storage area (50 ha) is located to the north-west on the landward side of the N67 where it adjoins the shoreline of Ballymacrinan Bay.

The general surrounding area is gently rolling agricultural countryside with almost all land under grass. In the immediately surrounding area there are numerous scattered dwellings. These are either solitary dwellings or farms, or minor collections of 3-4 dwellings distributed around minor crossroads.

The site has a solid rock foundation with successive beds of mudstone, siltstone and sandstone overlain by stiff glacial till of variable thickness, adjacent to the deep sheltered water of the estuary.

Project Output and Design

The proposed development comprises five wind turbines.

The proposal includes wind turbine transformers and turbine hardstands at each turbine location, underground electrical cables linking the turbines to an existing high-voltage Electrical Transformer Station within the power station site that will contain an additional single-storey Control Building, underground communication cables, two anemometer masts and all related site works and ancillary development.

The electricity generated will be fed into the national Electricity Network via the existing high-voltage Electrical Transformer Station. No additional connection will be necessary.

The wind turbines will have a maximum overall dimension of 152 m from ground level to the tip of the turbine blade in the upright position.

One turbine will be located north of the N67 in the ash storage area where three turbines are located in the approved Moneypoint Wind Farm. Four turbines will be located within the main station area south of the N67 with one turbine to the east of the station main building near the station's coal store and three turbines in an open area west of the station main building. Six turbines are located south of the N67 in the approved Moneypoint Wind Farm.

In line with current recognised best practice, all turbines will be located a minimum of 500 m from dwellings outside the site, providing an additional separation of approximately 150 m compared to the currently approved arrangement.

The basis of wind turbine operation is as follows:

- A yaw mechanism turns the turbines so that they face the wind
- The blades of the turbine rotate at a rate of once every 2 – 3 seconds.
- The rotation of the blades rotates a generator within a nacelle (housing) located at the turbine hub to produce the electrical power output.

- The electricity generated is fed via underground cables to electrical transformers where it is transformed to a higher voltage for export from the site into the national Electricity Network.

Sensors are used to monitor wind direction and the tower head is turned to line up with the wind. Power is controlled automatically as wind speed varies and the turbines are stopped at very high wind speeds to protect them from damage.

The wind turbines will be selected from a range of models that have been demonstrated successfully throughout Europe and certified to the highest standard. The contract to supply and construct the wind farm will be open to international competition. The tendering process will follow a grant of planning permission. Because sizes of wind turbines are particular to the design of individual manufacturers, the exact rating of the turbines cannot be specified at this stage without prejudice or favour to a particular manufacturer. However, the rated electrical output is expected to be about 15 MW. The result of the tendering process will be the award of a contract for a particular model of wind turbine. The choice of turbine model will not affect the assessment of impacts outlined herein.

Construction will principally involve the following:

- Excavation and construction of reinforced concrete bases with cast-in steel foundation section for towers.
- The erection by crane of the pre-fabricated turbine towers and the installation of turbines and rotor blades.
- Modification to the existing high-voltage Electrical Transformer Station by constructing an additional Control Building and installation of underground ducts and cabling from each turbine to it.

It is expected that the project will generate about 45,000,000 kWh (units) of electricity per annum.

Alternatives

In the short - medium term at least, current and future demand for electricity generation capacity in Ireland will remain predominantly supplied by fossil fuel plants. However, renewable and alternative sources of power will play an increasingly important role in meeting power needs in the future and in Ireland wind energy currently represents by far the most significant viable option for electricity generation from renewables.

The extent to which alternative sites have been examined is evident in the site at Moneypoint being one of more than 20 sites nationally for which planning applications for wind farm development have been made by ESB's wind power companies.

A wind farm development at Moneypoint has been determined as being viable. Amongst the factors that determine the suitability of this site are favourable ground conditions for civil engineering construction, minimum interference with established land uses and possibility of power export without the need for additional grid connection lines.

The grant of permission for the currently approved Moneypoint Wind Farm, initially by Clare County Council and subsequently by An Bord Pleanála, indicates that from a planning perspective the site is suitable for a wind farm development.

The layout of the proposal was developed taking on board the various constraints in the

technical, planning, commercial and environmental aspects of the proposal. Most notably, a minimum separation of more than 500 m is provided between each turbine and the nearest residence. This and separation from property boundaries and setback from public roads reflect a more systematic and uniform approach to wind farm design that has evolved since the arrangement of the approved Moneypoint Wind Farm was devised.

Larger turbines are proposed than previously and this reflects trends both nationally and internationally where advances in technology have led to larger but fewer turbines being recognised as the preferred arrangement. Furthermore, the impetus for larger turbines at Moneypoint arises principally from the changed land profile at the station that will result from deposition within station lands of by-product from the Flue Gas Desulphurisation (FGD) process, pending development of commercial outlets for its beneficial reuse.

The presence of these landfill areas reduces the effective height of the towers of any turbines that may be installed.

There is a significant development infrastructure already in place at Moneypoint and the proportional visual impact over and above the existing industrial landscape with its two 225 m high chimneys and other tall structures due to the additional turbines is small compared with a similar number of turbines located on a completely new site.

Policy Context

Over the past decade energy and environment policies have been adopted and realigned to reflect new concerns at national and international levels, to address the new realities in these areas and provide a focus for future actions.

There is strong support for renewable energy development at European and national levels.

The development of renewable energy, including energy from wind, is a central aim of energy policy at European level. The 2009 EU directive on renewable energies requires the share of renewable energies in the bloc's energy mix to reach 20% by 2020. Ireland's 2005 share of renewables at 3.1% is required to increase to 16% by 2020.

Ireland's target under Kyoto is to limit a group of six greenhouse gases to 13% above 1990 levels in the period 2008 – 2012. The Government's commitment to develop renewable sources of energy is a core element of Ireland's Climate Change Strategy.

Sustainability is at the heart of Government's energy policy objectives and the Energy White Paper in 2007 outlined the challenge of creating a sustainable energy future for Ireland. The underpinning Strategic Goals include accelerating the growth of renewable energy sources. The following key targets with regard to renewable electricity were set:

- 15% of Ireland's gross electricity consumption from renewable sources to be achieved by 2010.
- 40% of Ireland's gross electricity from renewable sources to be achieved by 2020.

The latter renewable penetration target for 2020 is estimated to be equivalent to about 5,800 MW of installed renewable capacity, with about 1,750 MW of wind energy capacity having been connected in Ireland as of July 2010.

The Clare County Development Plan 2011 – 2017 indicates policy areas in connection with wind energy development. Areas within the county are categorised as being strategic, acceptable in principle, open for consideration and not normally permissible.

The Moneypoint site is categorised as Acceptable in Principle and this reinforces the view taken by both Clare County Council and An Bord Pleanála with respect of the currently approved Moneypoint Wind Farm.

SIGNIFICANT IMPACTS OF THE DEVELOPMENT

The possible impacts of the development were examined. This was done by assessing the environment in terms of the existing conditions, the impact of the proposed development and the measures taken to mitigate these impacts.

Human Beings

The wind farm development will have no impact on the operation of Moneypoint Generating Station or levels of employment there. The development will lead to employment during the construction stage.

Use of the various locations within the site to install wind turbines will have no impact on the viability of ongoing operations and the installations will not preclude other future electricity generation developments at the site.

The project will involve a capital investment of about €30M and positive impacts are expected as regards input to the local economy. During the construction phase there will be requirements for plant and machinery and for construction materials. In the longer term there will be an ongoing requirement for maintenance support, services and equipment.

The project doesn't alter the power station's status in relation to the main potential hazards arising at the site.

All relevant health and safety legislation will be adhered to during all stages of the project from construction through to decommissioning. Extensive operational experience has shown that the health and safety record of wind turbines is exceptionally high, being better in most instances than other forms of electricity production. The basic technology to be employed in the project is well understood and is in an advanced state of development. It has been used successfully in many equivalent projects both nationally and internationally. There are no implications for health and safety.

Surveys both in Ireland and elsewhere of public attitudes show consistent, strong support for renewable energy in general and for wind power in particular.

Noise

Construction works that could give rise to off-site noise will effectively be limited to a small amount of earth moving, excavating and concreting. Noise levels resulting from construction of the wind farm were calculated for various distances from the site and it was concluded that noise levels will be well within the limits commonly imposed for construction sites.

In its licensing of operations at Moneypoint Generating Station, the Environmental Protection Agency (EPA) requires that activities on site should not give rise to noise levels off site at noise sensitive locations that exceed separate fixed noise limits for daytime and night-time. The station is in full compliance with these limit values.

Monitoring of noise was undertaken at a neighbouring residence to establish background condition against which the impact of the wind farm could be assessed. The results indicated that noise associated with operation of the power station is predominantly a steady state noise source.

Variations over the steady state background condition are accounted for partly by power station operations and by a significant contribution from traffic on the N67. Apart from local traffic, the N67 is an important national route, linking Co. Clare and Co. Kerry. Due to the cyclical nature of the Killimer - Tarbert car ferry, traffic tends to peak coinciding with ferry times. This results in peaks and valleys in traffic noise.

Because wind turbine noise is directly related to wind speed, the DoEHLG Wind Energy Planning Guidelines suggest that applicable noise limits should be related to background noise conditions. This guidance on noise impacts indicates that, in general, noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property is more than 500 m, as is the case at Moneypoint.

However, the EPA considers that, other than in specific cases where noise limits in line with the DoEHLG Wind Energy Planning Guidelines may be appropriate, where wind turbines are within sites licensed by it, the noise conditions in the operational licence should apply to the cumulative turbine and site noise.

Noise at all neighbouring residences resulting from the operation of the wind turbines was predicted for a range of wind speeds using computerised modelling. It was calculated that noise levels attributable to the turbines in combination with that from power station activities will be below the cumulative site and turbine noise limits suggested by the EPA.

Shadow Flicker

Wind turbines, as with trees or any other tall structure, can cast long shadows when the sun is shining and is low in the sky. If the sun is behind the rotor of a turbine a shadow that flicks on and off may be created through a window of a nearby house as the blades rotate.

This phenomenon, which is known as the shadow flicker effect and is generally only observed in the period after dawn and before sunset as the sun is rising and setting, lasts for just a short period and depends for its occurrence on a combination of many circumstances, including there being a suitable window to be affected and the absence of any screening.

A shadow flicker analysis, which was based on data reflecting local conditions in respect of wind speed, wind direction and sunshine hours, was undertaken using specialised computer software. The results showed a theoretical potential for shadow flicker effect at a number of residences. However, the worst case predicted hours of occurrence is approximately half of the recommended limit value.

In any case, the probability of the actual simultaneous occurrence of all the required circumstances for shadow flicker and other factors of which no account at all has been taken is very low and it is considered highly unlikely that shadow flicker could cause a nuisance.

Flora & Mammals

The site is not part of any site designated for nature conservation. Nearby designated sites include the Lower River Shannon Special Area of Conservation (SAC).

Most of the Moneypoint site that fronts onto the Shannon Estuary is rock armoured reclaimed land. The site includes a range of habitat types from the almost entirely un-vegetated coal store and gravelled yard areas, to landscaped and regularly mown grassed areas, an ash storage area, much of which have been levelled and sown with

grass, and new and established mixed woodland. The wind farm will cause direct habitat loss of small insignificant amounts of habitats that are of low-moderate ecological value and the minor losses arising are not significant.

Several old derelict buildings with bat roost potential exist on or near the site. Surveys indicated a level of bat activity within the locality that would be expected for the habitats present, with activity concentrated around the areas of habitat providing suitable foraging areas and commuting routes for bats. No turbines are proposed in these areas and no significant impacts will arise.

There will be no significant impact on the various mammal species that inhabit the site and surrounding areas. All the species recorded, or considered likely to occur, would be expected to continue to be found in the area after the wind farm is completed.

There is no particular amphibian biodiversity of conservation status at the site and the wind farm will constitute an insignificant impact on amphibians.

The site has no natural drainage ditches or watercourses and pollution of watercourses is not a potentially significant issue due to the nature of the development. Normal precautions that are adopted in the design and construction of wind farms will ensure that no siltation or negative impact on the Lower River Shannon will arise.

The Shannon Estuary is one of the most important sites for the conservation of cetacean species (whales, dolphins and porpoises) in Ireland. It is home to the only known resident group of bottlenose dolphins, who breed there every year, with one of the two preferred critical areas within the Shannon being the area between Moneypoint and Killimer on the north shore and Tarbert on the south.

Potential impacts on whales and dolphins in the Shannon Estuary are related to potential acoustic disturbance arising from construction activities. However, the extent of construction activity is very modest. Furthermore, the very significant developments that have taken place at Moneypoint, including the development of the power station and most recently Moneypoint Environmental Retrofit Project, evidently have all been completed without significant impacts.

Avifauna

Selected intertidal areas in the locality have been designated as Special Protection Areas (SPA) under the EU Birds Directive because of their importance for wintering waterfowl. Although none of the species recorded at intertidal areas within 10 km of Moneypoint occur in nationally important numbers, the Lower Shannon River is the most important site for wintering waterfowl in Ireland.

A comprehensive survey of bird movements at the site that considered waterfowl and birds of prey was undertaken in November / December 2001 in relation to the approved Moneypoint Wind Farm. The Wind Farm was assessed as not presenting a significant hazard to waterfowl, the nearest site holding wintering concentrations being more than 5 km away. It was considered as not having significant adverse impacts in relation to loss or deterioration of feeding / breeding habitats, general disturbance during construction or mortality through collision during operation.

Historical surveys were augmented by further surveys in 2010 / 2011. In general, all of the species recorded are typical of the habitats found at or near the site.

While most of the species recorded in spring are currently of low conservation concern in

Ireland, eight species are of medium conservation concern. The species of primary concern in springtime at Moneypoint are migrating Whimbrel which is a passing migrant to the Irish coastline that is seen in autumn (August / September) and spring (April / May). This Green-listed species was the most abundant species recorded in spring during both line transects and vantage point watches, and the most frequently observed during the latter. Birds were primarily recorded on the shoreline at Ballymacrinan Bay but also foraging in and transiting through farmland to the north. However, numbers are generally small with just 77 birds recorded in September (0.1% of total wading birds) during the 2006 / 2007 I-WeBS survey. Whimbrel was not recorded at Moneypoint during the autumn survey.

The 2010 / 2011 winter survey recorded a total of 55 species utilising the site. Overall numbers were still relatively low within the context of the site and its proximity to nearby SPAs.

For breeding species, the loss of relatively small amounts of habitat due to the development would not be expected to have any significant impacts on the populations of any of the common bird species that currently frequent the site and all would be expected to retain a presence in the immediate area.

Some alteration in flight lines and feeding areas may occur for Cormorant, Lapwing, Snipe and Curlew. However, none of these species is expected to be displaced from the immediate locality of Moneypoint and may continue to use the site as they become habituated to new structures, in the way that existing power station structures are accommodated in the existing patterns of use.

The numbers of waterfowl potentially impacted at Moneypoint are small. As previously, it is concluded that the proposed development will not impact adversely on waterfowl numbers either in the immediate area of Moneypoint, or in the bays subject to SPA designation at Clonderalaw, Poulnasherry, Ballylongford and Tarbert. No significant negative impacts on any local population of birds is anticipated as a result of either construction, operation or decommissioning of the proposed wind farm development.

Landscape

The former rural character of the immediate area has been modified to a predominantly industrial one by the existing power station, which includes 225 m high chimneys, 90 m coal unloaders on the jetty and 60 m high buildings. The presence of the wind turbines will reinforce rather than extend this character within the wider landscape setting.

The surrounding area is characterised by three main forms of topography, namely the undulating lowlands to the north, east and west and south descending towards the River Shannon Estuary, the flat open River Shannon Estuary in the centre and the foothills of Sugar Hill and Knockanore Mountain in the southeast and southwest. The nature of the landscape allows many open views from low hill summits, from the slopes of the foothills and across the Estuary. Intermittent and prolonged open views may also be experienced when travelling along roads in the lower lying areas near the Estuary. Thus, the landscape has an open scale when viewed from hill summits in the lowlands and a wide open scale at the River Shannon Estuary, allowing for long distance panoramic views.

The main near-distance views of the wind farm occur mostly within a 7 km radius around the site. Its visual impact is considered to range from slight to moderate adverse with higher potential visual impact on views from locations close to the development. The wind farm will not be visible from all locations within this area, as some screening is provided

by existing vegetation and the undulating land profile.

Middle-distance views occur mostly within 6–11 km of Moneypoint, with the visual impact ranging from slight to moderate. The undulating landscape and intervening vegetation limit visibility in some areas. The visual impact associated with long-distance views, from 11–15 km distance, ranges from none to moderate. Due to the distance of these views, visibility would greatly depend on the weather conditions. In rainy or misty conditions, which prevail for a considerable amount of the time, the wind farm may be largely indistinguishable from the general backdrop.

There are no or very few views from low-lying inland areas mainly to the north, northeast and southeast of the site with topography and vegetation providing screening within the landscape.

There will be views of the wind farm from elevated areas on the outskirts of Kilrush but no views from the town centre. Open views towards the wind farm can also be experienced from the outskirts of and from the shore road in Glin. No views were identified from Labasheeda, Tarbert, Kilkee, Cooraclare and Creegh, although there may be views from the upper floors of buildings facing in the direction of the site. Very long distance views of the wind farm could be experienced from the outskirts of Doonbeg and from Doonaha. Potential intermittent views of the wind farm would be experienced from the outskirts of Ballylongford.

The presence of wind turbines in the landscape will inevitably modify the existing character, but, given the already industrial character of the landscape surrounding Moneypoint Generating Station, the wind farm is not uncharacteristic when set within the attributes of the receiving landscape.

Air Quality and Climate

Significant reductions in annual atmospheric emissions have been achieved at Moneypoint with the completion of the station's Environmental Retrofit Project. The wind farm at Moneypoint will allow additional generation of electricity at the station without further air emissions.

Operation of the turbines will not lead to any alteration in the pattern of dispersion of emissions from the station's chimneys at Moneypoint. Ambient conditions with respect to SO₂ and NO_x, which currently satisfy legislative requirements by a wide margin, will be unaffected.

A wind turbine does not operate in the manner of a fan and create strong wind currents. On the contrary, the operation of a wind turbine extracts energy from the wind, leading to a reduced wind speed downwind of the turbines. Thus, operation of the turbines will not lead to airborne dust being created from either the coal stockpiles in the coal yard, the ash deposited in the ash storage area or landfilled FGD by-product on station lands.

Soils & Drainage

The excavations involved in the wind farm will have no impact on the geology of the areas in which the turbines will be placed.

The nature and extent of the development is such that no additional surface water run-off will be created. The wind farm development will not alter the nature, composition, volume or location of existing discharges from the site.

Roads & Traffic

Access to the site will be via the existing entrance to Moneypoint Generating Station from the N67. Due to the cyclical nature of the Killimer - Tarbert car ferry service, traffic on the N67 close to the power station tends to peak coinciding with ferry times.

The combined effect of all existing traffic at the power station during weekdays is a daily traffic of approximately 365 vehicles, assuming that peaks in all categories of station related traffic coincide.

Short-term effects on traffic will arise during the wind farm construction period, but there will be no significant effects thereafter.

The total traffic engaged in materials deliveries during construction involving heavy commercial vehicles (HCVs) is estimated as being approximately 700. For a 6-month construction period, this is equivalent to an average daily traffic of less than 6 HCVs or 12 HCV movements when account is taken of the return of empty trucks. This volume of additional traffic is very low and it will be indistinguishable from existing traffic on the N67.

However, rather than occurring uniformly throughout the construction period, traffic movements will peak on the five non-consecutive days on which concrete for turbine foundations will be delivered. Each foundation will be will involve 35-40 deliveries of concrete. For the remainder of the construction period the additional traffic is likely to be indiscernible.

It is expected that wind turbine components will be delivered to the station's barge landing facility, either by direct delivery to the site or by delivery to a convenient port with transshipment from there by barge.

However, should delivery of wind turbine components by road occur the total number of loads involved would be approximately 65. A delivery route drive-over survey has been conducted for the potential route with topographical surveys following to review potential constraints and obstacles associated with access. This enabled the undertaking of a Swept Path Analysis (SPA) of these constraints using Autotrack software to determine the actual extent of any widening / junction improvements that may be required. Any minor road widening that may be required in the event of turbine delivery by road will ultimately improve the local road infrastructure.

Traffic arising during operation will be limited to occasional visits by light vehicles used during routine inspection and preventive maintenance. This will be indistinguishable from other traffic and there will be no significant impact in the long term.

Material Assets

The Wind Farm is not anticipated to have any negative impacts on tourism. Based on experience with wind farms elsewhere, a substantial numbers of additional visitors may be attracted to the area.

The proposal will assist in meeting increases in electricity demand nationally by exporting electricity into the deregulated 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 production of electricity by the Wind Farm will result in savings in fossil fuel resources.

There are no implications for air navigation and there will be no impact on the safety of air traffic.

Cultural Heritage

There are no known archaeological assets in the area of the development, nor are there geological features of conservation value. No impact will thus arise.

Interaction of Impacts

Interaction of impacts does occur to some extent, but the level of such interaction does not significantly magnify the primary impacts as described.

CONCLUSION

The main benefit from this project will be an increase in the national electricity supply without additional environmental emissions.

The equipment used will be of the most advanced technological design available. The most significant environmental impacts from the project have been examined and the best available control technologies have been applied in an integrated approach. As a consequence, there will be no significant adverse impacts on the environment arising from the development.

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1. INTRODUCTION

1.1 SCOPE

This Environmental Impact Statement (EIS) has been prepared to accompany an application by ESB Wind Development Limited to Clare County Council for full planning permission to develop a wind farm on the site of Moneypoint Generating Station, Killimer, Kilrush, Co. Clare, as shown in Figure 1.1.

Planning permission (Reference Number PL03.130164) was granted for a similar wind farm development on this site by An Bord Pleanála in October 2002 following a third-party appeal of Clare County Council's decision (Ref. P01/1538) to grant permission.

While permission for the approved development remains in place, for various reasons, its construction has not been undertaken to date. The subject of this proposal is generally equivalent to the development for which permission was granted and differs in respect of turbine numbers (fewer – reduced from nine to five) and turbine dimensions (larger – increased from 108 m to 152 m).

The proposed development will comprise five wind turbines. The proposal includes wind turbine transformers and turbine hardstands at each turbine, underground electrical cables linking the turbines with an existing high-voltage Electrical Transformer Station at the site, underground communication cables, two anemometer masts and all related site works and ancillary development.

The EIS has been prepared in accordance with the provisions of the European Communities (Environmental Impact Assessment) Regulations. These give effect to Council Directive 85/337/EEC and Council Directive 97/11/EC amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

The provisions of the above Regulations stipulate those projects that must be subject to an Environmental Impact Assessment (EIA). The project falls within the scope of Article 24, First Schedule, Part II, Clause 3 (i), both being a wind farm with more than 5 turbines or being a wind farm having a total output greater than 5 MW.

The proposal does not fall within the scope of the Planning and Development (Strategic Infrastructure) Act 2006. The threshold for developments of this type is a wind farm with more than 50 turbines or having a total output greater than 100 MW.

1.2 METHODOLOGY & FORMAT

The EIA has been conducted in the grouped-format structure with each category (Human Beings, Noise, etc.) being considered under the separate headings: Description of Existing Environment; Impact of the Development; Mitigation (where appropriate); and Conclusions (where appropriate).

It reflects the Advice Note on Current Practice (in the preparation of Environmental Impact Statements) and the Guidelines on the Information to be Contained in Environmental Impact Statements issued by the Environmental Protection Agency (EPA). The order of presentation has been adjusted to aid comprehension.

This EIA draws upon material prepared in connection with the permitted Moneypoint Wind Farm development, as follows:

- Report P04E102A - R2 (July 2001): Environmental Impact Statement that accompanied the planning application to Clare County Council
- Response to Clare County Council's Request for Additional Information (December 2001)
- Response to Clare County Council's Request for Clarification of Additional Information (February 2002)

Information and data from the above has been adapted as appropriate to reflect developments in the interim.

The EIA process anticipates the effect on the environment caused by the development. The procedure commences by establishing the scope of the study by reference to the nature of the project and its location. On completion of this stage, an Environmental Impact Statement (EIS) is prepared as part of the application for development consent. The competent authority (Clare County Council) examines the EIS and consults with authorities likely to be concerned by a particular proposal by reason of their specific environmental responsibilities.

Using this approach, the EIA provides the competent authorities and the public with a comprehensive understanding of the project, the existing environment, the impacts and the mitigation measures proposed.

Attention has been paid throughout the EIA to the Wind Energy Planning Guidelines for planning authorities issued by the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006. These are designed to ensure consistency of approach to wind energy developments throughout the country and to provide clarity to prospective developers and local communities.

Where the EIS uses applicable information and data from the EIS that accompanied the previous application for planning permission for a wind farm at the site, such information and data has been adapted to reflect developments in the interim, notably the DoEHLG's Wind Energy Planning Guidelines.

The rated electrical output of the Wind Farm will be up to about 15 MW. The exact output cannot be specified at this stage. Outputs of wind turbines are particular to the design of individual manufacturers and it is thus not possible in an open international competition, which is required by EU competition rules, to specify the exact output without prejudice or favour to one manufacturer. The tendering process will follow a grant of planning permission. The overall rating may thus ultimately be marginally more or less than cited. However, throughout the EIA, consideration of significant environmental impacts of the proposed development is based on the largest size of development foreseen. The choice of turbine model will not affect the assessment of impacts outlined herein.

The EIA considers the construction, operation and decommissioning of the wind farm.

Every effort has been made in the preparation of the document to keep it as concise as possible while also ensuring that relevant material is adequately covered. The method of presentation can be summarised as follows:

- Section 1 provides an introduction to the project, describing the method of preparation and identifying those responsible.

- Section 2 provides a description of the proposed development in terms of the site and the construction, operation and decommissioning of the scheme.
- Section 3 considers alternatives to the proposed development in terms of electricity generation, site selection and the proposed arrangement.
- Section 4 outlines the energy policy context at international and national levels and the planning policy context in which the proposed development will take place.
- Sections 5 – 14 consider the environmental impacts of the proposed development with detailed focus on the issues considered to be of potential significance.
- Section 15 considers the possible interaction of impacts outlined in Sections 5 – 14.

Appropriate methodologies have been used to assess the effects relating to each of the environmental topics that have been investigated as part of the EIA. These methodologies are based on recognised good practice and guidelines specific to each subject area, details of which are provided within each individual technical section.

The EIA was prepared by ESBI Engineering & Facility Management Limited, Stephen Court, 18-21 St. Stephen's Green, Dublin 2, Ireland and the following companies contributed to the preparation:

- ESB Wind Development
- Biospheric Engineering (Noise)
- Scott Wilson (Landscape)
- Bird Survey Ireland (Ecology)
- O'Neill Transport in conjunction with Wind Prospect Ireland Ltd (Roads & Traffic)

No significant difficulties arising from lack of information were encountered in the EIA process.

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2. DESCRIPTION OF PROJECT

2.1 THE DEVELOPER

Moneypoint Wind Farm will be developed by ESB Wind Development Limited, which is the part of the ESB organisation that is dedicated to implementing ESB's policy in relation to developing wind energy projects.

History

ESB has been to the fore in the development of renewable energy in Ireland and has developed all the major hydropower schemes in Ireland. As a company ESB contributed €2.2 billion to the Irish economy in 2010 through purchases from Irish suppliers, taxes, rates, wages and dividends.

In relation to wind energy, it has carried out development programmes in the 1950s, 1980s and 1990s, but it is only in the past decade that wind generating technology has matured world-wide.

ESB is Ireland's largest generator of green electricity with a total of 330 MW of renewable generation owned or contracted. The company's commercial wind portfolio has expanded to include a number of developments on its own and in partnership with others. In this context, 60 MW of renewable wind generation was commissioned in Ireland by ESB in 2006. Mountain Lodge Wind Farm in Co. Cavan comprising 23 turbines added a further 35 MW in 2008. A number of developments with a combined capacity of approximately 60 MW were commissioned in 2010, bringing the company's wind generation capacity to 235 MW.

The company has also been developing its renewables business in Northern Ireland and Britain where it is the owner of projects with a combined generating capacity of more than 100 MW.

ESB has had a long history of responsible operation of power plants in the Shannon Estuary and is mindful of its obligations in regard to environmental protection.

Policy

In March 2008 ESB announced that the company is to embark on an unprecedented capital investment programme of €22 billion. The company made capital investments of €0.819 billion in 2010.

The Board of ESB has approved a Strategic Framework to 2020 that will see major company investment in renewable energy, the halving of its carbon emissions within 12 years and the achievement of carbon net-zero by 2035. Approximately 50% of the overall investment package is geared towards investments in the renewable future, with €4 billion of this being directly invested in renewable energy projects and €6.5 billion being spent facilitating renewables including smart metering and smart networks.

The plan, which will establish ESB as a world class renewables company, makes emissions reduction and energy efficiency central to its ambitious targets.

By 2020, ESB will be delivering one-third of its electricity from renewable generation. This will include over 1,400 MW of wind generation, in addition to wave, tidal and biomass. To promote this, the company will invest in emerging green technologies.

The €11 billion to be invested by ESB in its Networks will ensure continued efficient delivery of the vital infrastructure needed to support the Irish economy. It will also facilitate the development of up to 6,000 MW of wind power throughout Ireland.

2.2 LOCATION OF DEVELOPMENT

The Site

Moneypoint is located on the northern shore of the Shannon Estuary in Co. Clare, approximately 3 km west of Killimer and 6 km south-east of Kilrush.

The Estuary area is a multi-functional zone, with the waters and adjoining lands supporting a range of functions, uses and activities. These include: port functions, aquaculture / fishing, marine tourism, recreation / leisure activities, industry / business, energy generation, fuel storage, aviation, agriculture, valuable habitats / landscape and architectural heritage.

The Moneypoint site was acquired by ESB in the late-1970s to develop a coal fired power plant as part of its strategy to diversify from oil dependent electricity generation. The station's three 305 MW rated units went into service in 1985, 1986 and 1987.

The area of the site is approximately 180 hectares (ha) and comprises lands on either side of the Kilrush-Killimer road (N67). The two areas are inter-connected by a service road running beneath the N67. The main station site (130 ha) is located on the south side and the ash storage area (50 ha) is located to the north-west on the landward side of the N67 where it adjoins the shoreline of Ballymacrinan Bay. Approximately 24 ha of the lands to the south of the N67 were created by reclamation from the Estuary during site development.

The layout of the power station arises from the functional relationship of the main elements of the plant to associated ancillary plant and buildings, adjacent to the deep sheltered water of the estuary.

The main features of the site include: Station main building up to 64.5 m high housing boiler and turbo-alternator units; Jetty for coal unloading having two 90 m high ship unloaders and a capacity to accept vessels up to 250,000 dwt and; Coalyard with capacity for storage of approximately 600,000 t of coal; Oil storage comprising two 25,000 t capacity tanks; Coal handling system comprising coal unloaders, covered conveyors, transfer towers and stacker / reclaimers; Cooling water system comprising pumphouse, culverts and outfall; Reservoir for holding domestic quality water and water treatment plant; Electrostatic precipitators; Ash handling system comprising silos, dewatering tanks and settling ponds; Two 225 m high reinforced concrete chimneys tapering from 17 m at their base to approximately 8 m at their top; Barge landing facility; Generator transformers and 400 kV switchgear building; Ash storage area; and FGD by-product landfill areas to the east and west of the station main building.

Supporting facilities include fire protection pumphouse, fuel oil pumphouses, auxiliary boilers, diesel generators, compressor building, electrochlorination plant, chemicals storage tanks, chemical laboratory, stores, administration block and canteen.

Power Station Operations

Moneypoint Generating Station is one of the most efficient generating stations of its kind in the world, with all its operations computerised and automated. Its current complement of full-time staff is approximately 235.

Environmental management is fully integrated into all aspects of management at the station. In 1998 it was the first generating station in Ireland to be awarded the prestigious ISO 14001 certification for its environmental management system and has been re-accredited since then.

The station operates in accordance with the conditions of an Integrated Pollution Prevention and Control (IPPC) Licence (Register No. 605-02) issued by the Environmental Protection Agency (EPA). The licence regulated the station's environment emissions.

The station also holds a Greenhouse Gas Emissions Permit (Register No. IE-GHG070-04)

Moneypoint Generating Station has continually strived to operate the plant to the highest of environmental standards. Its most recent project brought the station into compliance with the EU Large Combustion Plant Directive, which required that atmospheric emissions be reduced to below previously licensed limits.

In addition to simultaneously replacing and upgrading numerous components and systems within the plant, Moneypoint Environmental Retrofit Project (MERP) included the following main elements:

- Installation of Flue Gas Desulphurisation (FGD) equipment on each boiler to reduce emissions of sulphur dioxide (SO₂).
- Installation of Selective Catalytic Reduction (SCR) equipment to reduce nitrous oxides (NO_x) emissions.
- Construction of engineered landfill areas, within the boundaries of the Moneypoint site, for disposal of the solid by-product produced by the FGD process.

Construction works associated with the above are now completed. This project extended over a five year period, and significant resources were used in the construction and installation of the equipment. The station now operates to stricter emission limits with air emissions of SO_x and NO_x reduced by more than 85%.

MERP generates approximately 100,000 t of FGD by-product annually. This is stabilised by mixing with water and pulverised fuel ash (PFA), which is generated at Moneypoint in the removal of particulates from the coal combustion flue gases by electrostatic precipitators. Pending development of commercial outlets for beneficial reuse, this material is currently landfilled at the station, with Landfill A currently in operation and Landfill B awaiting development until filling of Landfill A is completed.

Landfill A, which comprise three cells and cover an area of approximately 14 ha, is in the unused strategic coal store to the east of the station and Landfill B, which will comprise eight cells and cover approximately 27 ha, will be in the unused area to the west of the station. As part of development of the latter, the current main access road within the site from the public road to the station main building will be realigned to run parallel to the shoreline.

Surrounding Area

The general surrounding area is gently rolling agricultural countryside with almost all land under grass. The landscape is predominantly rural, with small residential farms creating a relatively uniform pattern of low hedgerows and bank-enclosed fields. Additional

residences, predominantly single-storey, are also dispersed throughout the area either clustered around original farms or as roadside ribbon development.

Labasheeda lies 12 km to the east of the site, Kilmihil 14 km to the northeast and Doonbeg 15 km to the northwest. Tarbert, Co. Kerry lies approximately 5 km to the southeast at Tarbert Bay on the southern shore of the River Shannon Estuary and Ballylongford 7.5 km to the southwest. Glin lies approximately 10 km to the southeast in Co. Limerick and the village of Loghill 15 km lies to the southeast.

The Shannon Ferry between Killimer Ferry Terminal and Tarbert Island links the N67 north and south of the River Shannon Estuary. The route continues south of the estuary on Tarbert Island and joins the N69 at Tarbert. Killimer village and the ferry landing are the only more concentrated settlements within the district around the site. A currently disused small concrete mixing and products plant just off the N67 at the west corner of the ash storage area and a caravan park at Moyne Bay 3 km west of the station are the only other obvious significant non-farming land uses, in addition to the generating station itself.

The Kilrush-Ennis road (N68) runs approximately 5km to the northwest and there is a network of regional roads comprising the R473, R483, R484, R485 and R486 at the north of the site. The R551 runs approximately 5km from the site towards the southwest. The R524 starts at Glin approximately 10km from the site and continues south. The R552 starts at Ballylongford approximately 7km from the site and continues south.

2.3 PLANNING HISTORY AT MONEYPPOINT

The planning history at Moneypoint that is relevant to wind farm development at the site is as follows:

- An application for Planning Permission (Ref. No. 99/1390) was made in July 1999 in respect of an anemometer mast at the site. Permission was granted by Clare County Council in October 1999 subject to a schedule of two conditions.
- An application for Planning Permission (Ref. No. 01/1538) was made in August 2001 in respect of a wind farm development comprising nine wind turbines at the site.
 - Following a request from Clare County Council, additional information was submitted in December 2001.
 - Following a request from Clare County Council, the additional information that was submitted was clarified in March 2002.
 - Clare County Council indicated its intention to grant permission by in May 2002.
 - An appeal by a third party of Clare County Council's decision to grant permission was made to An Bord Pleanála, which granted planning permission (Ref. PL 04.205173) in October 2002 subject to a schedule of 11 conditions.

Condition No. 6 in An Bord Pleanála's grant of permission provides a limit of 20 years on the duration of permission. Section 40 Subsection (2) of the Planning and Development Act 2000 provides that the appropriate period normally applying in respect of commencement of a development and completion of substantial works does not apply to a permission granted for a limited period. Thus, permission Ref. PL 04.205173 remains in place.

Other significant Planning Permissions at Moneypoint are as shown in Table 2.1. Clare

County Council references only are cited.

Table 2.1: Planning Permissions at Moneypoint

Ref.	Description
P8/13759	To erect an electricity generating station & ancillary works.
P8/23179	To retain the construction quay and change of use of part of the coal store to allow screening and grading of coal and transport of coal by water
P8/22368	To change use of part of the coal store to allow screening and grading of coal and transport of coal from the site by road.
P8/24408	To construct a reception building, security building and carpark.
P8/27018	To change use of part of the ash handling facility to allow transport of ash from the site by road for sale in bulk.
91/1102	To construct single storey security building and stores
92/777	To construct single storey extension to existing administration building
P93/860	To construction of an extension to the administration block
93/659	To construct a Conveyor Housing and Vehicle Building
99/797	To construct an Ash Beneficiation Process Plant, ash storage silos, compressor building, access roadway
03/625	To construct an Environmental Retrofit Project
06/935	To construct a new canteen building
07/2701	To erect a chain link fence at Mechanical and Electrical Workshop Building
08/1849	To erect a 30 m high free standing lattice type communication structure
11/457	To develop the electrical transmission infrastructure at and adjacent to the 400kV substation

2.4 DESCRIPTION OF SCHEME

The development will generate electricity by harnessing the wind and will supply the power to the Electricity Network. The development will consist of five wind turbines, each of up to approximately 3,000 kW rated capacity. It is anticipated that the project will generate approximately 45,000,000 kWh (units) of electricity per annum.

The capital costs for installation of the proposed wind farm are projected to be in the order of up to €30M.

The main components of the scheme are wind turbines, a minor modification to the existing high-voltage Electrical Transformer Station with the construction of an additional Control Building to house electrical equipment, and two anemometer masts – see Figure 2.1.

No modification to the station entrance from the public road is associated with the wind farm project.

2.4.1 Wind Turbines

Five wind turbines will be installed and they will have a maximum base to blade tip dimension of 152 m.

The currently permitted development had an overall dimension of 108 m and this larger size of turbine is reflective of the significant technical developments that have taken place in wind turbine design since preparation in 2001 of the scheme for the approved Moneypoint Wind Farm. The application of these greater overall dimensions in design of turbines allows for greater sustainable capture and development of Ireland's prime renewable energy source, thereby reducing the number of turbines proposed from nine to five.

The larger turbines also take into account the approved changes in land profile that will occur at the station as a result of landfilling of FGD by-product, pending development of commercial outlets for beneficial reuse, and the classification of the site at Moneypoint as a IEC Class II site in terms of wind energy resources, based on the results of a long-term wind speed monitoring campaign.

The wind turbines, a typical view of which is shown in Figure 2.2, will be selected from a range of models that have been demonstrated successfully throughout Europe and certified to the highest international standard. The contract to supply and construct the wind farm will be open to international competition. While the choice of make and model has not yet been finalised, the wind turbines under consideration for installation are three bladed, horizontal axis machines.

There are a number of candidate machines, with those indicated in Table 2.2 being typical. The largest of these turbines has been used to define the envelope for the visual assessment.

Table 2.2: Candidate Wind Turbines

Model	Hub Height (m)	Rotor Diameter (m)	Overall Dimension (m)
Vestas V112 - 3 MW	94	112	150.0
Siemens SWT 101	100	101	150.5

These represent the largest size of wind turbine potentially under consideration and the dimensions of the turbines actually selected for installation may be less than the maximum cited.

One turbine (T1) will be located in the ash storage area to the north of the N67 where three turbines are located in the approved Moneypoint Wind Farm. The remaining four turbines will be within the main station area, there being three (T2-T4) to the west of the station main building and the other (T5) to the east station main building at the edge of the coal store. Six turbines are located south of the N67 in the approved development. Access to all of the above locations is available for construction purposes without significant modification to existing surface conditions.

The wind turbines will be located at elevations corresponding with existing ground level within the site. Details are as follows:

Table 2.3 Locations of Turbines

Turbine	Grid Coordinates	ITM Coordinates	Elevation
T1	E102891 / N152234	E502863 / N652279	15.6 m OD

Turbine	Grid Coordinates	ITM Coordinates	Elevation
T2	E103036 / N151939	E503007 / N651984	10.3 m OD
T3	E102735 / N151617	E502707 / N651662	5.2 m OD
T4	E103118 / N151511	E503089 / N651556	5.2 m OD
T5	E104176 / N151321	E504147 / N651366	12.7 m OD

All turbines will be located at a minimum separation of 500 m from the nearest neighbouring residence.

Many developments and improvements have taken place since the commercialisation of wind technology in the early 1980s, but the basic architecture of the mainstream design has changed very little. The basis of wind turbine operation is as follows:

- A yaw mechanism turns the turbines so that they face the wind.
- The blades of the turbine rotate at a rate of once every 2 – 3 seconds.
- The rotation of the blades rotates a generator within a nacelle (housing) located at the turbine hub to produce the electrical power output.
- The electricity generated is fed via underground cables to electrical transformers where it is transformed to a higher voltage for supply to the National Grid

The turbine towers will be of tubular steel design tapering from about 4.2 m diameter at the base to about 2.5 m diameter at the top where the nacelle will be mounted. Access to the nacelle is via a staircase located outside on the hardstand and a secure hinged door into the tower. A three blade rotor of fibreglass-reinforced polyester or wood-epoxy material will be attached to the nacelle. Sensors will be used to monitor wind direction and the nacelle will rotate to keep the blades facing into the wind.

The turbine blades will rotate at about one revolution every 3 – 5 seconds, depending on wind speed. The turbines will have active pitch regulation whereby the angle of the rotor blades can be adjusted by the machine control system. This system has built-in braking, as the blades become stationary when they are fully 'feathered'.

The turbines will commence operation at a wind speed of about 4 metres per second (m/s), will attain maximum output at about 15 m/s and will shut down when the wind speed reaches about 25 m/s. Power will be controlled automatically as wind speed varies.

The nacelle will contain the generator and control unit, which will be designed for computer controlled monitoring of all major functions of the turbine. It will have effective sound insulation and smooth performance of moving parts will ensure minimal noise. The components of a typical nacelle are shown in Figure 2.3.

The steel tube towers with high specification, factory applied, paint finish will be fixed to concrete bases, the exact depth and structural design of which will depend on site conditions and may vary slightly from one turbine to another. Detailed geotechnical investigations will be undertaken at the site prior to commencement of construction to enable structural design of foundations.

Personnel access in the turbine towers and nacelles will meet all safety regulations. The equipment will be protected from lightning strike by deep earthing and from corrosion by

multiple coatings.

2.4.2 Transformers

A separate transformer will be associated with each wind turbine to uprate the generation voltage of the turbines from 380 – 660 V to a higher voltage for connection to the Electrical Transformer Station via underground cables.

The transformer is likely to be located within the nacelle or turbine tower. However, depending on the turbine manufacturer, for safety reasons, it may be located outside of the tower close to the base. Where not accommodated within the wind turbine, it is not feasible to locate the transformer underground. Rather, it will within a compact glass-reinforced plastic or steel enclosure measuring approximately 2.5 m x 2.5 m in plan and approximately 2.2 m high. The enclosure will also contain a ring main unit (RMU) switchgear complete with feeder circuit-breaker and close overcurrent / earthfault protection.

2.4.3 Electrical Transformer Station

There is already a high-voltage Electrical Transformer Station at Moneypoint that comprises 110kV and 400kV equipment. Here the voltage will be further stepped-up for transmission via the existing 110kV overhead line. Electrical equipment will consist of a transformer, circuit breaker, over-current and other protection devices, metering equipment and other small items of switchgear.

An additional Control Building will be provided and will designed to the standard required to accommodate the equipment housed within. It will comprise a relay room and switchgear room. It will be single storey, approximately 8 m x 12 m in plan. It will have flat roof and the exterior walls will have a brick finish similar to existing buildings at Moneypoint.

There will be no other additional permanent buildings on the site.

2.4.4 Anemometers

Permanent anemometer masts with a height corresponding to that of the turbines will be required at the site to monitor wind speeds and validate operation of the wind turbines. Each will comprise a free-standing lattice steel tower with an anemometer and wind vane mounted on it. They will be located as follows:

Table 2.4 Locations of Anemometer Masts

Mast	Grid Coordinates	ITM Coordinates	Elevation
M1	E102830 / N152390	E502802 / N652435	5.2 m OD
M2	E102861 / N151529	E502833 / N651574	10.3 m OD

The overall height will correspond with the tower height of the turbines and thus will be up to 100 m high.

Further to the above, power curve testing will be carried out at one of the turbine locations within the site. Power curve testing comprises site calibration and reference, and entails temporary installation of anemometer masts at two locations, a calibration mast corresponding to the location of a turbine and the reference mast elsewhere within the site. The data generated is used subsequently to validate the contracted performance of

the wind turbines

Evidently, the mast at the location of the turbine will be removed to allow construction of that turbine in the wind farm development and the other mast will also be removed prior to completion of the development.

2.5 PROJECT CONSTRUCTION

2.5.1 Scope

The wind farm installation will require about 6 months to complete, provided that conditions are not unfavourable. Distinct or separate phases of the project are not planned since it is intended that all turbines will be installed in one phase.

Nominal time scales for construction works are as follows:

- Civil engineering works will take approximately 2-3 months.
- Electrical works will take approximately 2 months and will be largely carried out in conjunction with the civil works.
- Turbine erection will take 1-2 months and will commence when the bulk of the civil works are complete.

Construction will principally involve the following:

- Excavation and construction of reinforced concrete bases with cast-in steel foundation section for the tower and the provision of turbine access and craneage area.
- The erection by crane of the pre-fabricated turbine towers and the installation of turbines and rotor blades.
- Construction of a new Control Building within the existing 110 kV compound.
- Installation of underground ducts and cabling from each turbine to the station's existing 110 kV compound.

All this work will be undertaken without any significant and permanent alteration to the existing landform and there will be no difference to the site's appearance as viewed from outside the station.

All construction works will be carried out under appropriate supervision. Works will be carried out by experienced contractors using appropriate and established safe methods of construction. All requirements arising from statutory obligations including the Safety, Health and Welfare at Work Act and associated regulations will be met in full.

2.5.2 Construction Methodology

A Construction Method Statement will be prepared once planning consent has been gained and prior to any construction works taking place. It will describe the detailed methods of construction and working practices, work to reinstate the site following completion of construction activities and methods to reinstate the site post operation.

2.5.3 Temporary Site Facilities

Office and toilet facilities for use during the construction period are already available at the Moneypoint site and the provision of temporary facilities for storage of materials and construction machinery is not envisaged

2.5.4 Turbine Access and Cranepads

Access to all turbine locations is readily available. Pending completion of the approved realignment of the station access from the public road to the station main building during development of Landfill B, at turbines T3 and T4 access will necessitate removal of a shallow depth of topsoil / vegetation to reach to underlying stone fill surface.

Craneage areas, which comprise level hard-standings of approximately 20 m x 40 m, are required adjacent to each turbine base for the operation of a heavy lifting capacity crane used for assembly of the turbine components. Ground conditions over most of the Moneypoint site, other than the ash storage area in the main, comprise stone fill material that was placed during the site development works associated with construction of the power station.

For turbine T1 in the ash storage area where stone fill material is not already in place, construction will consist of excavating the existing overburden and placing a layer of coarse granular fill followed by a 300 mm layer of fine gravel. An overall thickness of up to 900 mm is envisaged.

Coarse granular fill is already in place at other turbines and construction here will entail excavating the existing fill and placing a 300 mm layer of fine gravel to achieve a uniform surface suitable operation of the cranes.

2.5.5 Turbine Bases and Installation

While sizes will depend on site conditions, it is envisaged that turbine bases will consist of reinforced concrete pad footings measuring approximately 15 m diameter x 1 m deep, similar to those shown in Figure 2.4. They will be founded about 1.5 m – 2.5 m below existing ground level and will incorporate an upstand / plinth into which a tower insert or fixing bolts will be embedded. At each turbine base the completed foundation will be covered with soil leaving only the concrete upstand / plinth outstanding. The upstand / plinth will be approximately 4.5 m in diameter, depending on the final choice of turbine supplier.

On the basis of considering the worst-case impact, it is assumed herein that foundations for turbines T3 and T4 will be constructed by piling. The exact nature and dimensions of foundations will be determined by structural design calculations.

The foundation conditions at Moneypoint are neither unusual nor problematic. In design terms, neither the ground conditions at the site nor the structural loads arising from wind turbines are particularly unique, particularly in the context of the complexity of the existing power station structures. Design of foundations will be undertaken by qualified structural engineers who have successfully designed foundations for the power station at Moneypoint and for other wind farm developments.

An earthing mat or electrode will be installed at each turbine base. It will comprise earthing rods and up to three concentric rings of bare stranded copper conductor, approximately 0.5 m below the final ground level. The extent of the earthing will be determined by testing of electrical resistivity.

Depending on the choice of turbine manufacturer, the turbine transformer will most likely be contained within the nacelle. In the unlikely event of a requirement to install the transformer outdoors, its foundation base will be about 2.5 m x 2.5 m x 0.3 m deep and will be constructed of lightly reinforced concrete and situated adjacent to the turbine on backfill material.

2.5.6 Turbine Installation

It is expected that turbine components will be delivered to the site for unloading at the station's barge landing facility. There is adequate laydown area available at the site to accommodate components of all turbines.

Each turbine will be constructed by in-situ assembly of components carried out with the aid of a heavy lifting capacity main crane and a smaller capacity crane working in tandem.

Use of cranes will generally be as follows:

- A regular or crawler type crane of approximately 50 t capacity will be used for rotor builds and unloading hubs and stacking of parts.
- A 100 t capacity crane will be used for rotor builds when extra boom length required due to terrain / location problems. It will be used as a tail crane for tower sections and rotor lifts.
- A main lift crane of approximately 300 t capacity will be used for nacelle, bottom and top tower sections and rotor lift.

Each turbine will be erected over a 2 – 3 day period.

2.5.7 Electrical Transformer Station

The Electrical Transformer Station in which the additional Control Building will be located will include plinths to support the additional electrical equipment including a transformer. The compound is already enclosed with security fencing on which warning signage is attached.

Power and control cables will run from all turbines to the substation. Cabling will be contained in PVC ducts and will be laid underground in cable trenches that will typically be 0.5 – 1.0 m wide and 0.75 – 1.00 m deep. Trenches will be backfilled with excavated materials.

The Control Building will consist of a flat roof supported on blockwork cavity walls on reinforced concrete strip footings.

2.5.8 Commissioning

All individual wind turbine components and all electrical equipment will be the subject of factory testing prior to delivery to site. Following assembly of turbines and installation of all equipment, a period of commissioning and testing will follow.

The full duration for commissioning is expected to be approximately eight weeks and this will be followed by fine tuning during the first three months of operation.

2.6 OPERATION, MAINTENANCE AND DECOMMISSIONING

Project Lifetime

It is envisaged that the project will remain in operation for about 25 years following its commissioning, although depending on circumstances it may be viable to continue the project for another phase thereafter.

Condition 6 in the grant of permission (Reference Number PL03.130164) for the approved Moneypoint Wind Farm requires that structures be removed at the expiration of a period of 20 years from the date of grant of permission for the development unless planning permission for a further period has been granted.

The DoEHLG Wind Energy Planning Guidelines (Section 7.20) have subsequently noted as follows:

The inclusion of a condition which limits the life span of a wind energy development should be avoided, except in exceptional circumstances.

Operation and Maintenance

It is expected that the wind farm will have an availability of about 98%, i.e. it will be capable of operation for 98% of the time. Actual operation will be determined by the wind conditions experienced. However, on average, turbines turn and therefore produce electricity for about 80 - 85% of the time. The output of the wind turbines will depend upon the wind regime but a capacity factor of around 35% is expected. This means that over the course of a year each turbine would produce 35% of the amount it could theoretically produce if it was working at maximum output at all times throughout the year.

Wind farms are designed to operate largely unattended and during the operational phase the wind farm will normally be unmanned. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely with the aid of computers connected via a telephone modem link.

Servicing of the wind turbines will be carried out in accordance with the manufacturer's specifications. Modern turbines are provided with automatic lubrication of the pitch system, the hub, the yaw system, the main shaft and the generator, which boosts reliability and reduces the frequency of service visits. Occasional technical problems may require maintenance visits by technical staff.

Decommissioning

It is not envisaged at this stage that special environmental considerations will apply during the ultimate decommissioning of the wind farm. The same principles of mitigation works as apply to the construction works will apply to decommissioning.

During decommissioning all turbines and associated equipment will be removed from the site in their entirety.

- The nacelle units will be lowered from the towers and removed from site as complete units.
- The turbine towers will be demolished in sections.
- The turbine blades will be broken up on site to allow their removal from the site without the need for abnormally long trailers.

The upper sections of the foundations will be covered. Underground cables will be cut back and left buried in order to avoid disturbance of the already vegetated areas.

Costs of Decommissioning

Condition 10 in the grant of permission (Reference Number PL03.130164) for the approved Moneypoint Wind Farm requires that, prior to commencement of the development, the developer lodge with the planning authority a cash deposit, bond of an insurance company or other security to secure the satisfactory reinstatement of the site on the cessation of the project.

The residual value of electrical equipment and the scrap value of wind turbine components will provide a fund that will more than meet the financial costs of decommissioning and site reinstatement. The DoEHLG Wind Energy Planning Guidelines (Section 7.19) recognise that the use of long-term bonds puts an unreasonable burden on developers given the long time span involved in wind energy developments and is difficult to enforce.

It notes as follows:

The recycling value of the turbine components, particularly copper and steel, should more than adequately cover the financial costs of the decommissioning. Accordingly, the use of a long-term bond is not recommended.

2.7 SECONDARY DEVELOPMENT

The project will not involve any secondary development.

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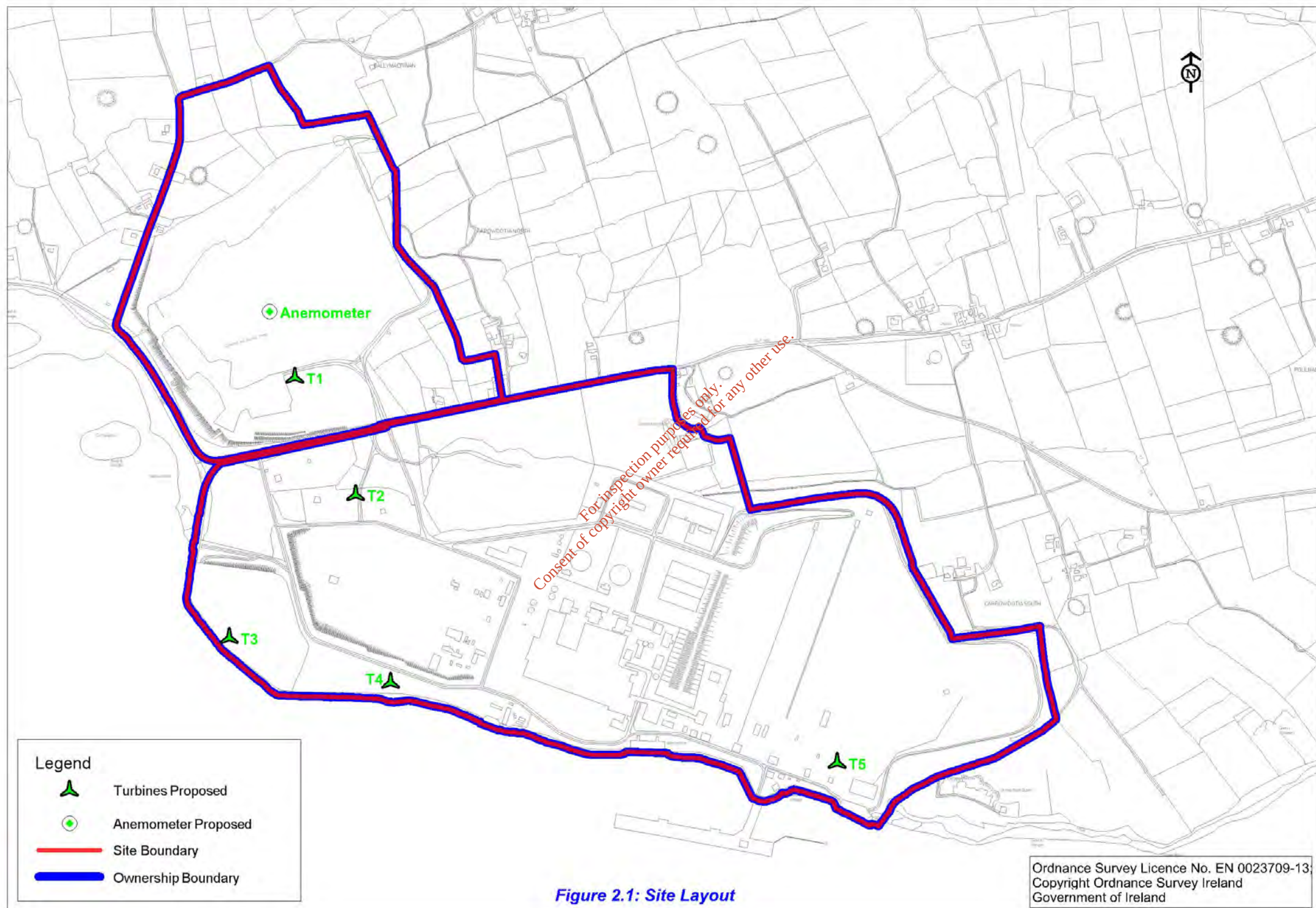
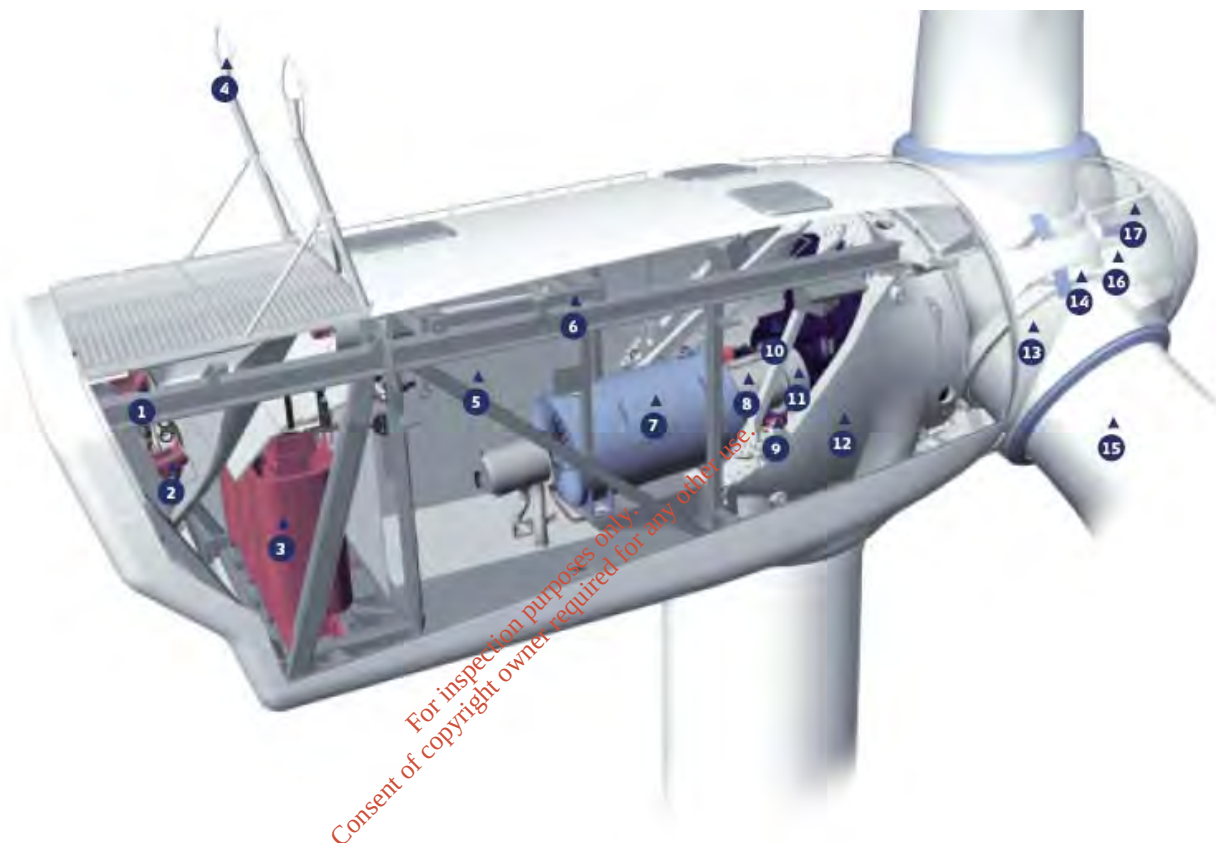




Figure 2.2: View of Wind Turbine



- | | | | |
|-------------------------------------|---------------------------|--------------------------|-------------------|
| 1 Oil cooler | 6 Service crane | 11 Mechanical disc brake | 16 Pitch cylinder |
| 2 Water cooler for generator | 7 OptiSpeed® generator | 12 Machine foundation | 17 Hub controller |
| 3 High voltage transformer | 8 Composite disc coupling | 13 Blade bearing | |
| 4 Ultrasonic wind sensors | 9 Yaw gears | 14 Blade hub | |
| 5 VMP-Top controller with converter | 10 Gearbox | 15 Blade | |

Figure 2.3: View of Nacelle



Figure 2.4: Wind Turbine Foundation

3. ALTERNATIVES

All alternatives that are considered should be capable of successfully achieving the objectives of the development within a reasonable period of time, taking into account economic, social, environmental and technological factors.

3.1 ALTERNATIVE ELECTRICITY GENERATION

3.1.1 Introduction

In the short - medium term at least, current and future demand for electricity generation capacity in Ireland will remain predominantly supplied by fossil fuel plants such as Moneypoint Generating Station.

However, renewable and alternative sources of power will play an increasingly important role in meeting power needs in the future. The development of renewable sources of energy is in line with EU and Government policies, which have strong public support. Onshore wind power is recognised as one of the most promising renewable energy sources for electricity generation in Ireland. Wind energy currently represents by far the most significant viable option for electricity generation from renewables.

An independent study of the Irish public's attitude towards the development of wind energy indicated a high level of support for developing more sources of renewable energy in Ireland, making it the preferred option among energy policies measured within the study.

Ireland's dependence on a finite supply of imported fossil fuels raises questions over the security of supply in future years as reserves of fossil fuels are depleted. This brings the need for locally generated renewable energy sharply into focus.

The main benefits of developing alternative energy sources are seen as reducing air emissions from burning fossil fuel as well as complying with international agreements on limiting such emissions. The utilisation of indigenous resources is also considered of primary importance.

The above are now reflected in Ireland's energy policy and it is evident that the renewable energy sector is strongly supported by Government policy.

3.1.2 Project Context

Wind power has become an important source of energy worldwide, mainly due to the following: environmental considerations; the search for energy alternatives and for a reduction in energy dependence; and the increasing costs of oil and other fossil fuels

The evolution of modern wind turbines is a story of engineering and scientific skill, coupled with a strong entrepreneurial spirit. In the last 20 years, turbines have increased in size by a factor of 100 (from 25 kW to 2500 kW and beyond), the cost of energy has reduced by a factor of more than five and the industry has moved from an idealistic fringe activity to an acknowledged component of the power generation industry. At the same time, the engineering base and computational tools have developed to match machine size and volume.

Worldwide wind generating capacity stood at 13,600 MW in 1999 with the capacity in 2009 representing an almost twelve-fold increase over the intervening decade. Worldwide

growth is shown in Table 3.1 and is presented in Figure 3.3.

Table 3.1: Global Deployment of Wind Power

Year	2005	2006	2007	2008	2009	2010
Installed Capacity (MW)	59,100	74,100	93,900	120,300	158,7000	194,400
Annual Growth	24.2%	25.4%	26.7%	28.1%	31.9%	35.7%

New wind energy installations in 2010 represented an investment of €47.3 billion. Growth has been particularly strong in Europe and the EU moved from 0.09% wind contribution to national electrical demand in 2000 to 4.8% in 2009. In Germany, the country with the most installed wind generating capacity at 22,000 MW, approximately 7% of its electricity is supplied from wind power, while Spain in second place with over 15,000 MW of capacity has 14% its electricity from wind. Denmark's wind capacity meets almost 20% of its electricity needs, the largest share in any country.

In Ireland approximately 1,750 MW of wind energy capacity had been connected to the Grid as of July 2010, having increased significantly from 525 MW in mid-2006.

EirGrid the grid operator has reported that the amount of power generated from wind power on 2nd November 2011 reached 1,412 MW, being enough power to supply the equivalent of 918,000 domestic homes nationally. The previous maximum of 1,323 MW was recorded in April 2010. This figure did not include wind farms in Northern Ireland.

The national target for the renewable energy share of gross electricity consumption is 40% by 2020, estimated as being equivalent to about 5,800 MW of capacity.

Ireland has an abundant wind energy resource and almost the entire country has either an excellent or very good wind energy resource, as indicated in Figure 3.1.

3.1.3 Other Renewable Energy Resources

Wind is the world's fastest growing source of energy. Other renewable energy resources include hydro, solar, biomass, tidal, wave and geothermal.

Hydro - There are no further suitable large and medium-sized hydro generation resources that could be developed in Ireland. While a number of small resources remain, it is not possible that their development could ever present anything other than a minor increase in power generation capacity.

Solar - Solar power may be used in either direct heating applications or direct conversion of radiation to electricity by the use of photo-voltaic cells. However, for large applications, its costs remain very high. Feasibility studies continue in areas of high insolation and it would be reasonable to expect commercial development for significant energy outputs to occur first in such areas. This has not yet happened and at present solar power is not a serious option for electricity generation in Ireland.

Biomass - Biomass energy can be obtained from the combustion of any organic material that is grown and harvested on a regular basis. Suitable materials include forestry waste and specially grown short rotation forestry. However, production of wood biomass from the latter on a large scale remains to be proven in practice. Large-scale electricity or heat generation from dedicated biomass crops is not a feasible option in Ireland at present.

Tidal - The generation of electricity from tidal power has been under assessment for

more than 50 years and various schemes are proposed from time to time. ESB International (ESBI), which is part of the ESB group of companies, is an investor in the pioneering energy project that installed the world's first commercial scale tidal power generating device in Strangford Lough, Northern Ireland. Locations with naturally high tidal ranges are required and those available in Ireland are generally 2 - 4m, which is considered modest. Such schemes are highly capital intensive and further developments at Irish locations will await successful construction and operation of this pilot installation.

Wave - There has been considerable research on wave power and several experimental installations have been constructed. To date, wave power has not been proven to be technically feasible or commercially viable on a large scale. ESBI is providing an Irish owned wave energy company with specialist engineering expertise for the development of its wave energy converter and is working with the company on the design of its first grid-connected device which is due to be installed in Portugal in 2011. Additionally, ESBI was responsible for quantifying Ireland's offshore wave resource through the Irish Wave Energy Atlas. While significant research continues and test installations are being further deployed, ocean energy is not expected to contribute significantly to power generation in the immediate future.

Geothermal - Geothermal power is exploited in many locations throughout the world, where reservoirs of hot or superheated water exist beneath the earth's surface. Most of these systems are installed at locations having reservoirs of water at temperatures in excess of 100 °C. Such high temperature reservoirs have only recently been identified in Ireland and commercial exploitation of these resources is still at the concept stage.

3.1.4 Role and Benefits of Wind Energy

Climate change, security of electricity supply and price stability are amongst the factors supporting the main rationale underpinning the need for renewables.

The case for renewables energy development in Ireland is heightened by the high dependency on fossil fuel sources for primary energy consumption. Today, over 95% of Ireland's total energy requirement energy is still supplied in the form of fossil fuel.

In Ireland, wind energy, because of its developed technology and large resource available, is seen as making the most significant contribution to renewable energy developments. Ireland has a large offshore and onshore wind resource. Onshore wind is only effectively constrained by the amount of non-firm power the National Grid can accept, causing the target to be only a fraction of the accessible resource.

Both onshore and offshore wind farms will have roles to play in renewable energy developments. Offshore wind farms remain considerably more expensive to construct than their onshore equivalents and have higher operating costs, due to the obvious difficulties of access for maintenance, etc. In time, problems associated with offshore wind will be solved. However, a need to develop wind farms at suitable onshore sites remains.

Wind is the world's fastest growing source of energy. In terms of available technology, it is the one of a few viable renewable energy sources currently available in Ireland. This, rather than being a disadvantage, plays to the country's strengths, as it has some of the highest mean average wind speeds in western Europe.

Wind power provides more benefits than just affordable clean energy. The prices of wind-generated electricity are stable and not subject to the price volatility of fossil fuels.

Additionally, since it is inexhaustible, wind offers long-term energy security that electricity derived from non-renewable fossil fuels cannot.

A frequent misunderstanding related to wind is the implication of its variability. In fact, with modern meteorology, wind is very predictable over the time scales relevant for balancing the electricity system. Its variability means that it cannot displace fossil plant MW for MW, but the carbon penalty for having additional conventional plant on reserve duty to compensate for the variability of wind (which is in any case usually predictable) is very small.

Increasing the proportion of wind power in the electricity system does not require greater back-up capacity, as is often believed, but it does slightly increase the cost. The greater the proportion of wind on the grid the lower its capacity value and the lower the quantities of conventional technology it displaces. Nevertheless, it continues to reduce carbon emissions.

3.2 ALTERNATIVE SITES

3.2.1 Context

In pursuit of its policy on renewable sources of energy, ESB's wind power development companies have identified and evaluated many sites in different counties throughout Ireland for their suitability for wind energy development. The criteria used have included wind resource, established and future land use, environmental conservation designations, ease of access, proximity to electricity grid and ease of site development.

A number of siting criteria are applied. These are generic in nature but are intended to be flexible in relation to location of a proposed project, i.e. the acceptability of scale and type of development is dependent on location and land use characteristics of the area. The general criteria for sites suitable for wind farm development considered are as follows:

- Estimated wind speed of at least 7.5 - 8 m/s.
- Proximity to a connection point with the national electricity grid.
- Reasonable site access.
- Terrain and ground conditions suitable for construction.
- No special designations which would significantly affect planning permission potential.
- Low potential for electromagnetic interference.
- Sufficient distance from residences to minimise amenity impacts.

In pursuit of ESB's policy on renewable sources of energy, its companies engaged in wind energy development have identified and evaluated many sites in different counties throughout the whole of Ireland for their suitability for wind energy development.

Some of the wind energy projects for which planning applications have been made over the past number of years and which are additional to Moneypoint are identified in Table 3.2 and are presented in Figure 3.2.

Table 3.2: Planning Applications for Wind Farms

County	Name	County	Name
Carlow	Rossacurra	Mayo	Ballinvully
Clare	Boolynagleragh		Oweninny
	High Street	Monaghan	Coolberrin
Cork	Castlepook	Roscommon	Tullynahaw
Derry	Carrickatane	Tipperary	Bunkimalta
	Eglis		Cappawhite
	Gortmonly	Tyrone	Clunahill
Donegal	Croaghbrack		Crockdun
Kerry	Grousemount		Meenakeeran
Leitrim	Garvagh Glebe	Waterford	Woodhouse
Limerick	Grouselodge	Wicklow	Raheenleagh

The sites listed above are amongst more than 300 separate potential wind farm sites that have been assessed throughout Ireland. The development rate of the order of 5%, meaning that 95% of sites assessed are not proceeded with, is typical in the wind industry.

For ESB Wind Development, which is among the leading developers in the country, the extensive range of factors that arise in site selection would obviously not arise in the case of individuals, groups or companies not engaged in the wind development sector to the same extent.

These factors involve commercial decisions that are made in a portfolio context to identify the most commercially attractive combination of projects with which to proceed. These take account of such factors as strategic geographical spread, size profile, anticipated market movements in civil engineering and equipment costs, physical access, electricity prices, and the risk, prospects or potential impediments to planning approvals and connection to the electricity network.

3.2.2 Site Suitability

Development Policy

Under Clare County Council's Wind Energy Strategy, which forms part of the Clare County Development Plan 2011 - 2017 (see Section 4.5 herein) four classifications have been developed for wind farm development in the county and there are specific objectives pertaining to each. The classifications are as follows:

- Strategic Area
- Acceptable in Principle
- Open to Consideration
- Not Normally Permissible

The Moneypoint site lies within the area classified as Acceptable in Principle, where the target wind energy generation is 150 MW. The site is evidently suitable for a wind farm development.

Wind Speed

Wind speed, on which the power achieved is highly dependent, is critical to the viability of wind farm developments. The power available from the wind is a function of the cube of the wind speed. All other things being equal, a turbine at a site with an average wind speed of 5 m/s will produce nearly twice as much power as a turbine at a location where the wind averages 4 m/s. Doubling the wind speed increases the power output eightfold, whereas doubling the turbine area only doubles the power. In this regard, the windiness of the site is a key development parameter.

On the basis of long-term monitoring of wind speeds at the site at Moneypoint, it is considered that wind resources are adequate for a feasible wind farm with turbines of the dimensions proposed. Overall, because of its location at sea level, wind speed is classified as low – moderate in terms standards applied in the wind industry.

Size and Topography of Site and Setting

The site must be of sufficient size to accommodate a wind energy development that is commercially viable to the developer. A large open site is required for the siting of wind turbines and wind turbines require sufficient distance between each other to ensure that the blades of one operating turbine will not interfere aerodynamically with the wind take of adjacent turbines.

The local topography at any wind farm site should be such that the wind that crosses the site from the prevailing wind direction does not become turbulent. Moneypoint's location renders it exposed to the prevailing wind direction with a long undisturbed upwind fetch.

Moneypoint is suitable on grounds of its size and local topography.

In addition, proximity of residences in the context of protection of residential amenities is a significant factor in site selection. In the proposed arrangement at Moneypoint turbines have been located so that there are no residences located within a 500 m buffer zone between residences and the nearest turbine.

Grid Connection – Overhead Lines

No new power lines will be required for the development of a wind farm at Moneypoint.

The export of power will be via the existing 110 kV overhead lines. Furthermore, there is no requirement for a new Electrical Transformer Station at the site and needs for housing electrical equipment are limited to a new single-storey Control Building within the existing high-voltage Electrical Transformer Station.

Site Access

There is an established existing entrance from the N67 National Secondary Road to the southern part of the power station site and from it via an underpass to the ash storage area where one turbine will be located. No new site entrance is required.

The site has its own barge landing facility, through which the wind turbine components can potentially be delivered directly to the site, thereby eliminating the need for road improvement to accommodate abnormally long loads.

Other Factors

The other favourable characteristics of this site in relation to wind energy generation include the following:

- Ground Conditions: The ground conditions are favourable for civil engineering construction and there are good conditions for foundations at the site.
- Access within the Site: All parts of the Moneypoint site are fully accessible and all turbine locations can be reached without a need to develop new access tracks.
- Established Land Use: The Moneypoint site is located within an area described as the Shannon Estuary Working Landscape in the Co. Clare Landscape Character Assessment, acknowledging the site's existing industrial / electricity generation character. The proposal is compatible with this, reinforcing an existing land use rather than transforming it.
- Landscape: A wind farm at Moneypoint is not uncharacteristic when set within the attributes of a receiving landscape that includes strong vertical elements in the form of the two 90 m high ship unloaders on the station jetty and the two 225 m high chimneys.
- Future Land Use: The proposal development will not compromise alternative future land uses.
- Site Infrastructure: On-site facilities are already available for the workforce engaged in construction of the wind farm.
- Project Management: There is a long history of successful projects on the site. In addition to the initial construction of the power station, there have been many developments and improvements at the site, including the major Environmental Retrofit Project that was recently completed.
- Construction History. All projects at the station throughout its development have been undertaken without any impacts on the Shannon Estuary arising from construction activities.
- Environmental Impacts: While some minor impacts are inevitable, the construction of a wind energy project is fully compatible with the existing environment at the site.

Summary

The availability of existing overhead lines that may be used for export of power from the wind farm development is evidently a very significant advantage over any potential alternative sites.

There are many suitable locations in Ireland for the exploitation of wind energy. However, in many cases these areas coincide with recognised scenic areas. This is not the case at Moneypoint, which, being an industrial site with significant development already in place, is evidently a suitable site for a wind farm development.

3.2.3 Previous Assessments of Site Suitability

Clare County Council's decision to grant of planning permission (P01/1538) in May 2002 for an equivalent wind farm development indicates its assessment that in planning terms the area is suitable for renewable energy projects.

This is further confirmed by An Bord Pleanála in its decision in October 2002 to grant permission (PL03.130164) for the currently permitted development following a third-party appeal of Clare County Council's decision to grant permission.

3.3 ALTERNATIVE CONFIGURATIONS AND LAYOUTS

3.3.1 General Approach

Once the wind farm constraints are defined, the layout of the wind farm can be optimised. As noted above, the aim of such a process is to maximise the energy production of the wind farm whilst minimising the infrastructure and operating costs. For most projects, the economics are substantially more sensitive to changes in energy production than infrastructure costs. Therefore, it is appropriate to use energy production as the dominant layout design parameter.

The objective of the development is to maximise the sustainable wind energy capture of what is a suitable site for wind energy development without causing significant adverse environmental impacts.

The possibility of installing different numbers and sizes of wind turbines was examined originally as part of the planning application for the approved Moneypoint Wind Farm and was reconsidered in development of the current proposal.

While turbines of 850 kW capacity are at the lower end of the range of sizes that are proposed for new developments, consideration was given to installing a larger number of these smaller turbines. However, a sufficient number of 850 kW turbines giving a similar overall wind farm capacity could not be accommodated within the land area available.

It is believed that an arrangement of a greater number of smaller capacity machines offers no significant advantages in visual impact terms and that visual impact is minimised by installing larger but fewer wind turbines. From an aesthetic point of view, larger wind turbines offer an advantage in the landscape because they generally have lower rotational speed than smaller turbines. Large turbines therefore do not attract the eye in the way that fast-moving objects generally do.

The choice of turbine type also requires an evaluation of whether the specifics of the turbine are suited to the topography and wind resource at the site. Turbines of the type proposed are suited to Moneypoint and they can make a significant contribution in energy and environmental terms without imposing the financial burden of less than optimum costs.

3.3.2 Approved Layout

The arrangement of the turbines in the approved Moneypoint Wind Farm comprises nine wind turbines, with three of these being located north of the N67 in the station's ash storage area and the remainder being in the main station area south of the N67.

Various arrangements of the turbines were examined with a view to minimising visual intrusion. Turbines in the approved development comprise 67 m high towers and 40 m long blades. These dimensions represented the prevalent and tested technology at the time of that planning application.

The layout adopted for the arrangement of turbines on the site took into account the constraints imposed by the presence of the existing station buildings, operational efficiency, critical spacing and accepted good design practice. A degree of symmetry was incorporated with a view to maximising visual continuity with the estuary.

Alternative arrangements that would have increased this visual continuity when viewed from the southern side of the Shannon Estuary were also considered. However, these would have resulted in increased overall visibility due to the presence of additional

turbines to achieve the additional continuity and turbine heights up to 50% taller than that proposed being necessary due to the presence of existing buildings.

3.3.3 Development Constraints

The approach to devising the proposed arrangement was first to establish the extent of the developable area at the site. This took on board the existing power station operations and other approved developments, and conservative application of recognised criteria that are applied in that phase of the design.

This was carried out against a more uniform, systematic and consistent approach now advocated in the DoEHLG Wind Energy Planning Guidelines.

Proximity to Residences

The DoEHLG Wind Energy Planning Guidelines (Section 5.6) notes as follows regarding noise impacts from wind turbines:

In general, noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property is more than 500 metres.

The layout of the wind farm fully meets this criterion with no turbine being within 500 m of the nearest occupied residence outside the site. The minimum separation between residences and the nearest turbine has been increased by 100 m in comparison with the approved Moneypoint Wind Farm.

Proximity to Roads

The DoEHLG Wind Energy Planning Guidelines (Section 5.8) note as follows:

Although wind turbines erected in accordance with standard engineering practice are stable structures, best practice indicates that it is advisable to achieve a safety set back from National and Regional roads and railways of a distance equal to the height of the turbine and blade.

The N67 National Secondary Road separates the northern and southern parts of the Moneypoint site. The layout of the wind farm fully meets this criterion.

Landfill Development

The station's Environmental Retrofit Project includes deposition of stabilised FGD by-product in two landfills, one each to the east (Landfill A) and west (Landfill B) of the station site. They will occupy a total area of approximately 41 ha and these areas are not available for deploying wind turbines.

The life expectancy of the landfills may be extended or shortened depending on a number of factors that include generation plant load, coal type, reuse application of FGD by-product, etc. However, it is currently anticipated that Landfill A will operate until 2015 with Landfill B, whose capacity is greater by a factor of three, operating until 2035 or thereafter.

Evidently, locating turbines within these areas would significantly curtail the areas effectively available for FGD by-product deposition because of the necessity for ongoing access to those turbines. The lifetime of the plant would be severely compromised.

While wind turbines could be located within these areas when landfilling is completed, the timescale of their availability is such that this is an impractical option. This is particularly so in Landfill B, which is the area that would offer the greatest potential for considering

alternate arrangements of turbines.

Windtake

Consideration was given to whether adjoining lands had potential for similar wind energy development and thus required windtake protection. Windtake protection ensures that within a development site positions of turbines relative to land ownership boundaries do not compromise the development potential of adjoining lands where such potential exists. (It takes no account of the other factors that determine the actual viability of such development, i.e. topography of lands, adequacy of wind resources, scale of development, etc.)

The DoEHLG Wind Energy Planning Guidelines (Section 5.13) note as follows:

Bearing in mind the requirements for optimal performance, a distance of not less than two rotor diameters from adjoining property boundaries will generally be acceptable, acceptable, unless by written agreement of adjoining landowners to a lesser distance.

The potential for similar development outside of the Moneypoint site was evaluated by marking an exclusion zone of two rotor blade diameters from the boundaries of the power station site. Figure 3.5 shows the exclusion zone in the adjoining lands at the south east of the site. A turbine may not be placed in this area since it would compromise the station's ability to fully utilise its own land for wind energy development.

It is recognised that the location of turbine T5 on station lands is within two rotor blade diameters of the property boundary. However, it does not impact on the development potential of adjoining lands. The geography of the site boundary is such that turbine T5 is located at approximately 570 m from the closest position on adjoining lands where a wind turbine could be placed outside of the exclusion zone.

This minimum separation is in excess of four times the maximum potential rotor blade diameter of 112 m for the turbines that will be installed at Moneypoint. The required windtake protection between turbine T5 at Moneypoint and any potential wind turbine locations on the opposite side of the property line is achieved.

3.3.4 Proposed Arrangement and Chosen Option

Turbine Size – General Considerations

Wind turbine technology still offers a range of power ratings from a few kilowatts (kW) up to several megawatts (MW or thousands of kW). However, wind turbines have generally grown taller and more powerful. Rapid developments in technology have lead to turbines of up to 4.5 MW capacity now being commercially available. These advances in design, which are shown in Figure 3.4, mean that turbines of the type proposed with a capacity of approximately 3 MW are now readily available and many manufacturers are now offering turbines of this size.

The trend in larger turbines is evident locally at Moanmore / Tullabrack Wind Farm, located approximately 4 km north of Kilrush. Here, turbines that have been operational since late-2004 have 65 m high towers, whereas a wind farm extension approved in 2010 has 85 m high towers. The deployment of larger wind turbines is also reflected in countries, such as Denmark, that have well established wind energy networks. New, more efficient and higher rating turbines are replacing older turbines. There is also an industry trend to equip turbines with increasingly larger rotors.

Larger turbines, i.e. those of greater capacity, are intrinsically more efficient than smaller machines and are usually able to deliver electricity at lower cost. This is because the costs of foundations, access tracks and a number of components in the turbine, e.g. electronic control systems, are largely independent of the size of machine. Additionally, the electrical grid connection and maintenance are a much higher proportion of the capital value of the system for small machines.

Small wind turbines remain much more expensive per kW installed than larger ones, especially if the prime function is to produce grid quality electricity. This is partly because towers need to be higher in proportion to diameter to clear obstacles to wind flow and escape the worst conditions of turbulence and wind shear near the earth's surface.

Turbine Size – Specific Considerations at Moneypoint

Key factors for large turbines at Moneypoint include the following:

- Wind speeds generally increase with height above ground and this is particularly relevant at Moneypoint. The site does not have the benefits of many other wind farm locations, including some of the approved developments in Co. Clare, where the site is on elevated terrain. At Moneypoint, the turbines are effectively placed at sea level, requiring the specific advantage that increased turbine tower height confers.
- Fewer turbines are proposed compared with the currently approved Moneypoint Wind Farm and there is an associated benefits of greater separation from the nearest residences. The energy that a wind turbine extracts from the wind is proportional to the swept area of the blades, meaning that longer blades enable greater power generation. Thus, the loss of output resulting from fewer turbines may be compensated for by the greater power generation deriving from longer turbine blades. To accommodate this increase in blade length, it is required that the centre of rotation be placed further above the ground.
- Ongoing operations at Moneypoint include landfilling of stabilised FGD by-product in two landfill areas, pending development of commercial outlets for beneficial reuse. The presence of these landfills reduces the effective height of the towers of any turbines that may be installed to the south of the N67.
 - The enclosing embankments at Landfill A will taper towards the river from a maximum height of 15 m above existing ground level, i.e. from the top of the existing excavated rock slopes in the strategic coal yard, to 5 m at its southern boundary
 - The vegetated screening embankments at Landfill B will be up to 15 m high, with the finished elevation of the capped landfill being 27 m OD at its centre.

The A development of lower capacity would be wasteful of resources at a site capable of sustaining a project of the proposed size with minimal impact on the local environment.

Proposed Arrangement

The proposed revised layout of the wind farm has evolved by taking account of various constraints as they arose during the design. These considerations included the following:

- Technical advances in wind turbine technology that has seen larger turbines becoming the industry standard.

- Completion of a wind measurement campaign on the site which, having used strategic measurement locations, allows the design of an optimum turbine layout that will be least impacted by disturbed airflow in and around the buildings of Moneypoint Generation Station.
- Developments at Moneypoint Generating Station and particularly the station's Environmental Retrofit Project, which includes on-site landfilling of the by-product produced by the FGD process.

The arrangement of turbines was devised to optimises wind energy capture and the meteorological mast was positioned to take best advantage of the direction of the prevailing wind and to avoid wind turbulence effects from surrounding turbines.

The current proposal represents an optimum arrangement for a wind energy development on this site taking account of the constraints applying and the technological developments that have taken place since granting of permission for the approved Moneypoint Wind Farm.

The wind turbines will occupy an even smaller proportion of the overall lands at the site than in the approved development and the remainder will be available for existing or other uses.

A comparison of the approved Moneypoint Wind Farm and this proposal is presented in Figure 3.6.

Summary

Fewer but larger turbines are proposed and, compared with three turbines in the approved Moneypoint Wind Farm, a single turbine only will be located in the ash storage area, the part of the site closest to nearby residences.

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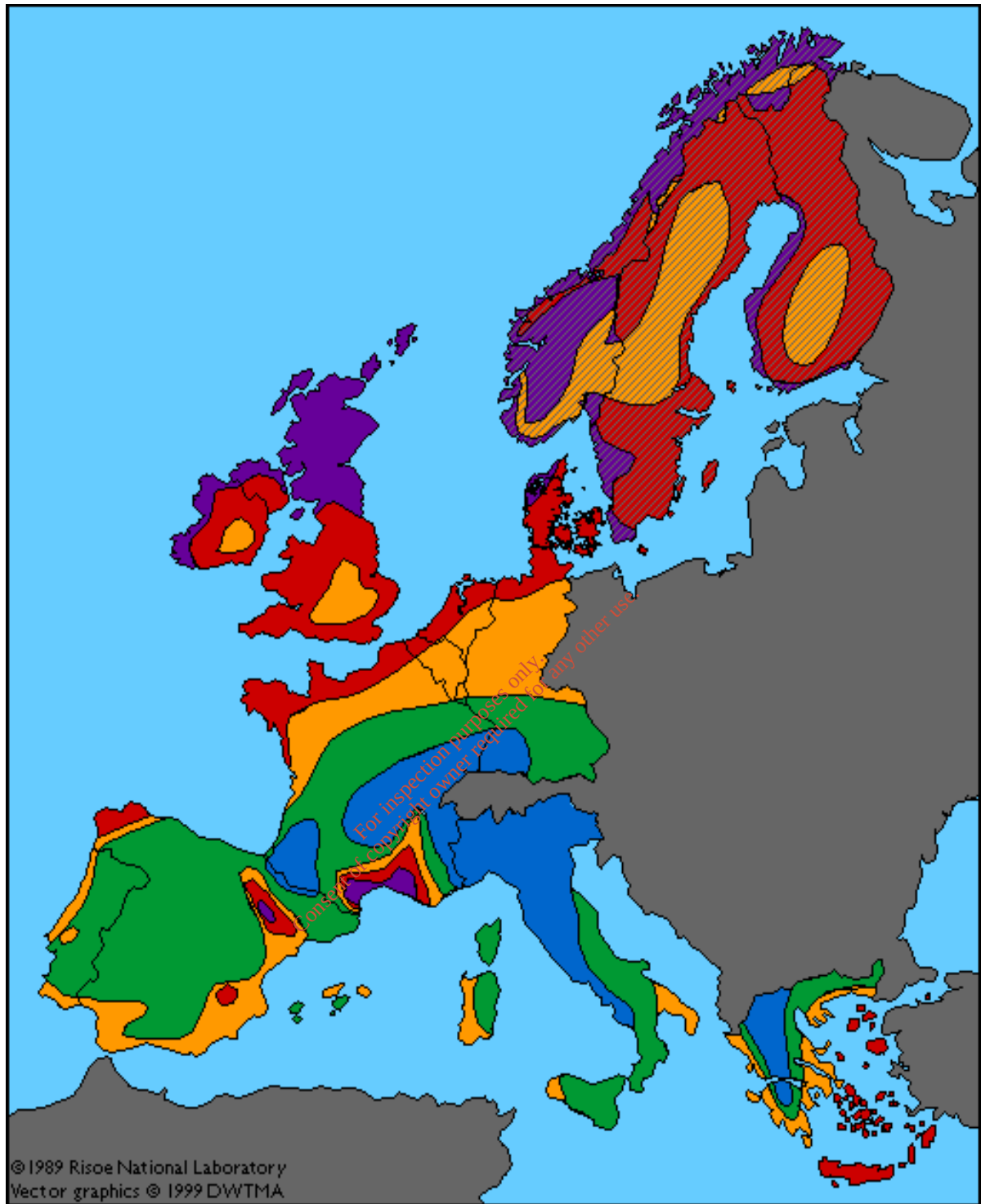


Figure 3.1: European Wind Resources



Figure 3.2: Wind Farm Planning Applications

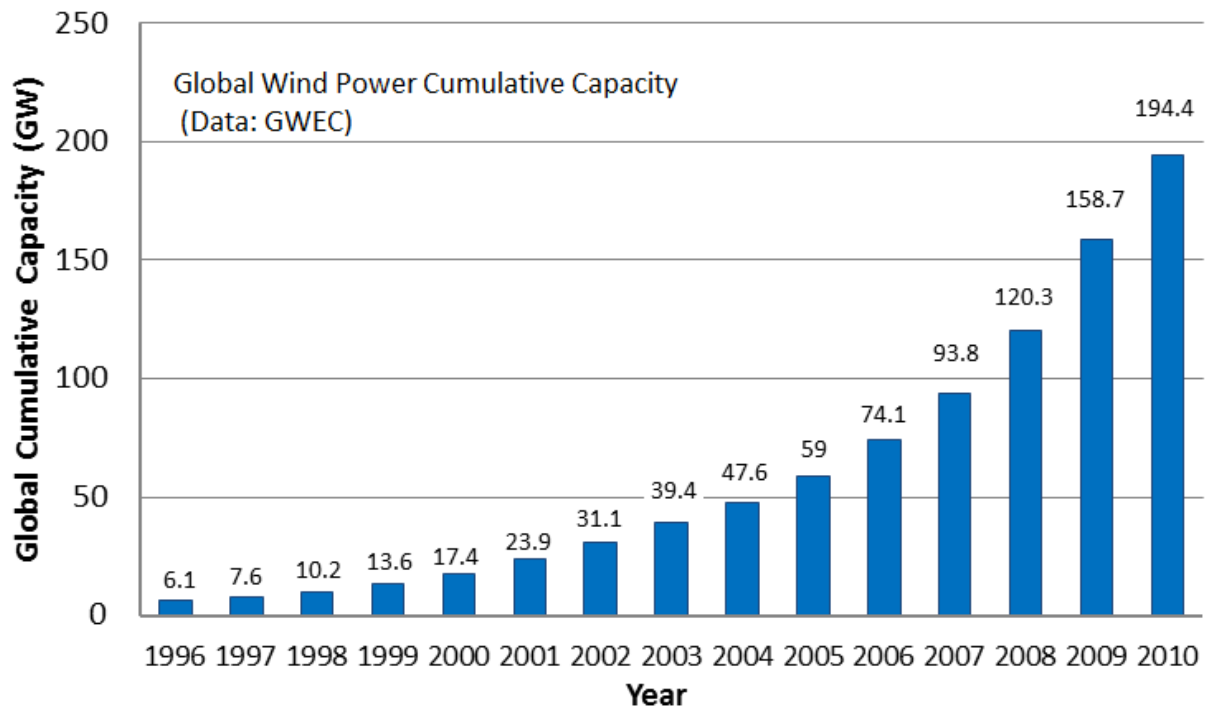


Figure 3.3: Global Wind Power Installation

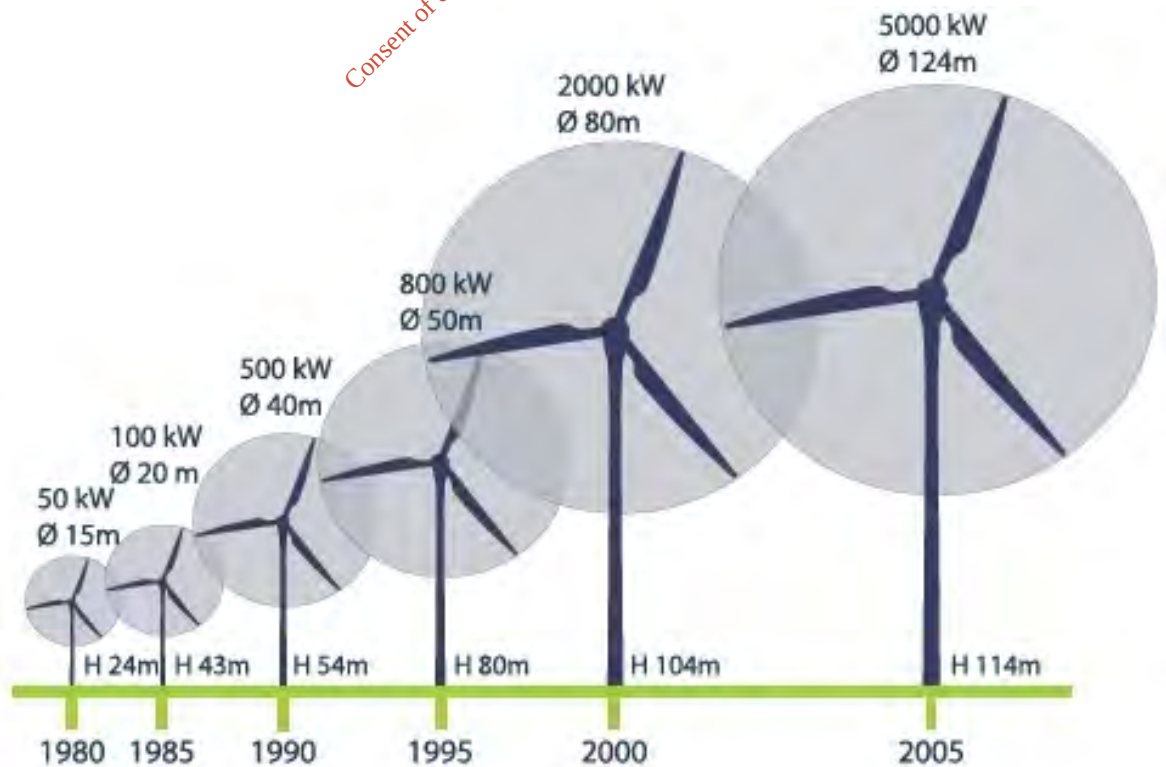
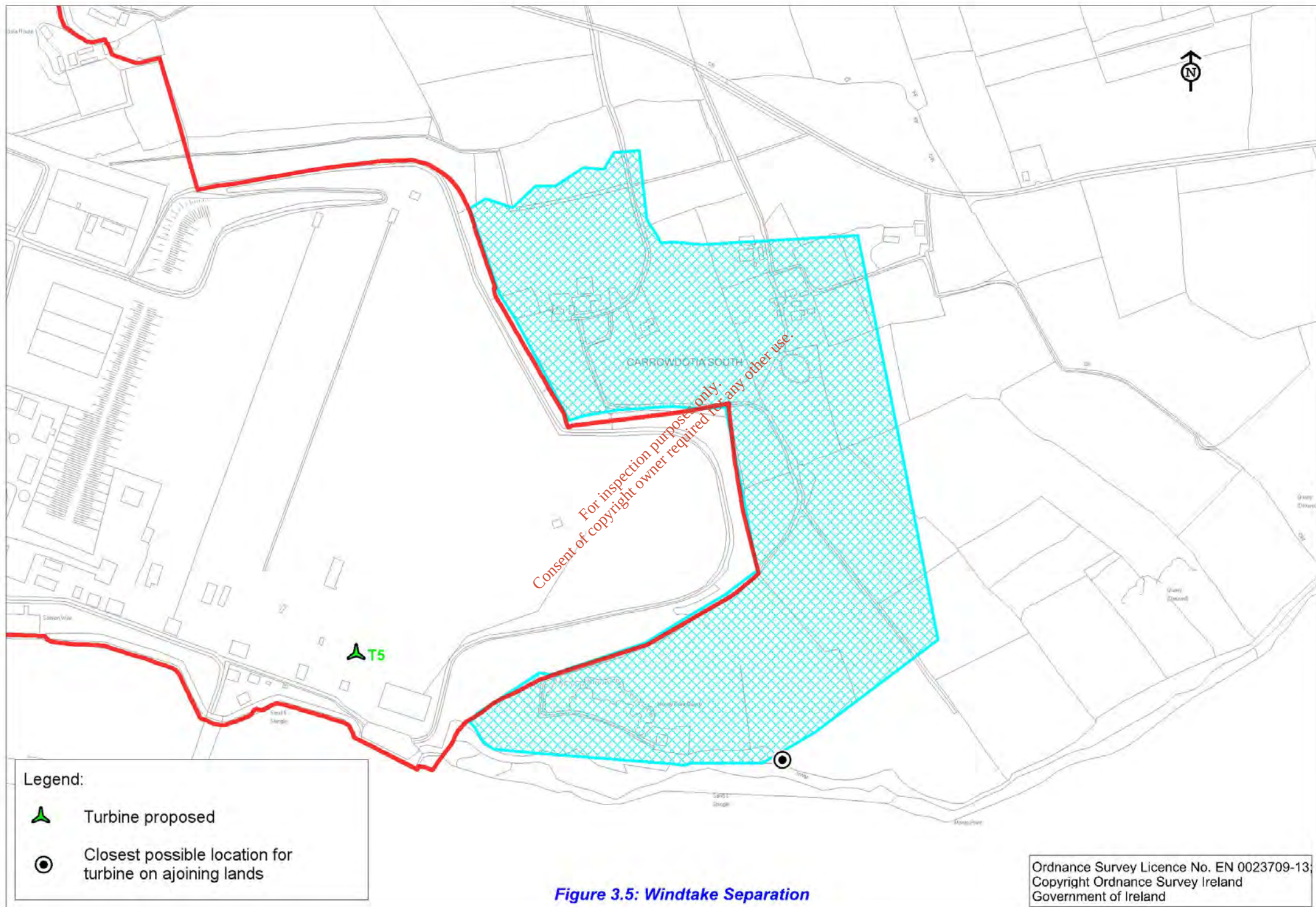
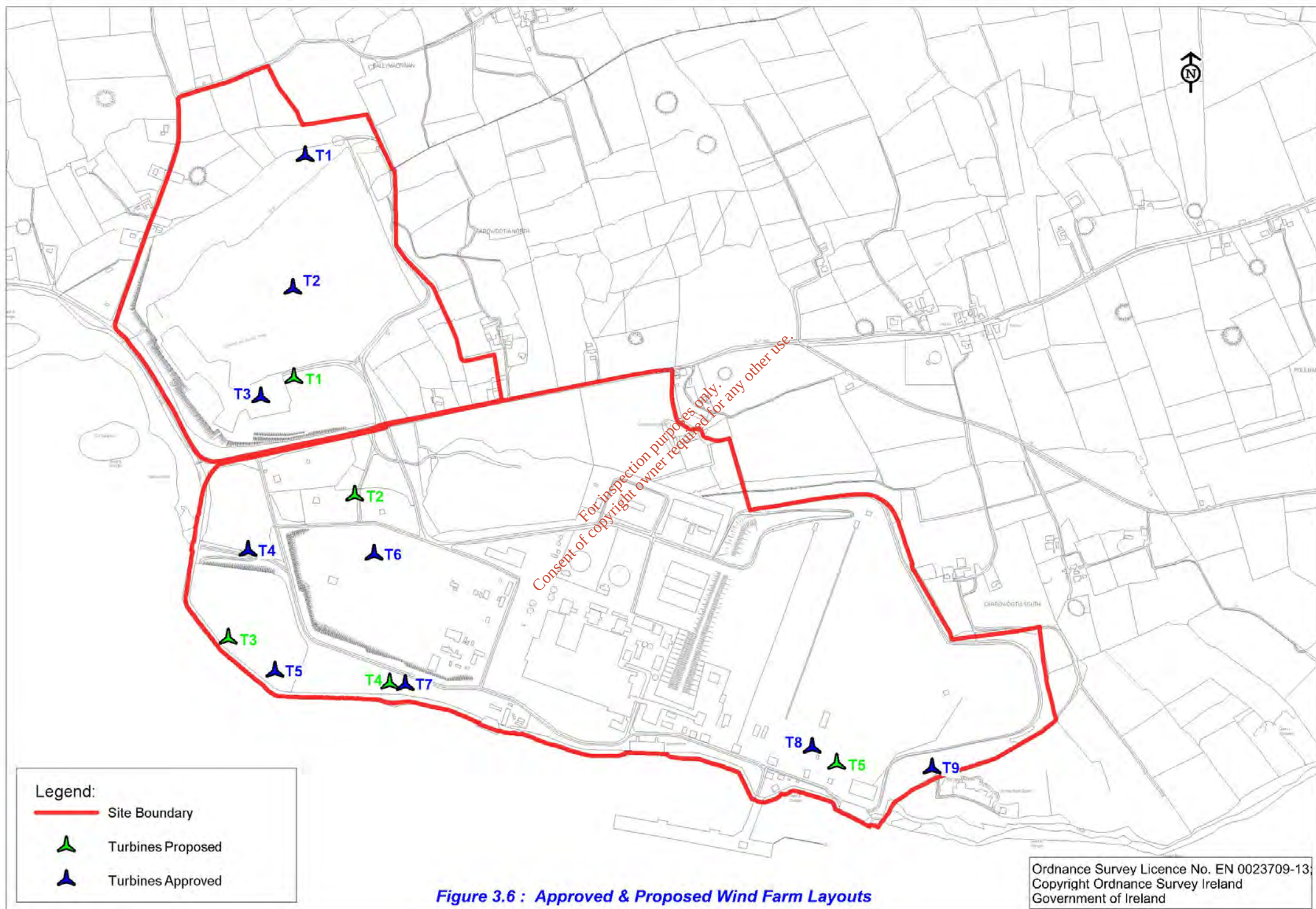


Figure 3.4: Trend in Wind Turbine Sizes





4. POLICY & PLANNING CONTEXT

4.1 ENERGY POLICY – EUROPEAN CONTEXT

4.1.1 *White Paper on Renewables*

Development of renewable energy has for some time been a central aim of EU energy policy and, as a first step towards a strategy for renewables, the EU adopted a Green Paper in November 1996 that sought views on setting an indicative objective of 12% for the contribution by renewable sources of energy to overall energy consumption by 2010.

This target was then established in 1997 in the EU Commission's Energy for the Future: Renewable Sources of Energy - White Paper for a Community Strategy and Action Plan. The purpose of the White Paper was to contribute, by promoting renewable energy, to the achievement of overall energy policy objectives: security of supply, environment and competitiveness, and to improve and reinforce environmental protection and sustainable development.

The overall EU target of doubling the share of renewables by 2010 implied that Member States have to encourage the increase in renewable energy sources according to their own potential. The setting of targets was recognised as providing a stimulus to efforts towards increased exploitation of available potential and an important instrument for attaining carbon dioxide (CO₂) emissions reductions, decreasing energy dependence, developing national industry and creating jobs.

4.1.2 *Green Paper on Security of Supply*

Amongst the tools supporting the EU strategy and instruments for promoting renewable energy sources is its Green Paper on the security of energy supply from November 2000. EU resources are limited with respect to reserves of oil and gas and costs of coal production are a multiple of the world market price. Correspondingly, there is a potential abundance of renewables.

The aim was to put forward proactive strategies to attenuate, if not counteract, the dependence on energy supplies. Future priorities include managing the dependence on supply by development of less polluting energy sources.

New and renewable forms of energy are the first options for action in relation to security of supply, the environment and local populations.

4.1.3 *Renewable Energy Directives 2001 & 2009*

The EU Renewables Directive 2001/77/EC was adopted in 2001 and it was the first time that the EU has adopted a legislative text aimed at promoting the production of energy from renewable sources. It obliged Member States to set indicative targets and committed Ireland to the production of 13.2% of electricity demand from renewable energy sources by 2010.

The Irish Government introduced a range of measures to increase the deployment of renewables electricity.

In outlining a long-term strategy the EU Commission's Renewable Energy Roadmap called for a mandatory target of a 20% share of renewable energies in the EU's energy mix by 2020. The target was endorsed by EU leaders in March 2007.

The EU Renewables Directive 2009/28/EC, which amended and subsequently repealed Directives 2001/77/EC and 2003/30/E, requires each member state to increase its share of renewable energies - such as solar, wind or hydro - in the bloc's energy mix to raise the overall share to 20% by 2020. To achieve the objective, every nation in the 27-member bloc is required to increase its share of renewables by 5.5% from 2005 levels, with the remaining increase calculated on the basis of per capita gross domestic product (GDP).

Ireland's share of renewables is required to increase to 16% by 2020. The Directive set a series of interim targets, known as 'indicative trajectories', in order to ensure steady progress towards the 2020 targets.

4.1.4 Climate Change

Monitoring has shown that the atmospheric concentration of greenhouse gases, including CO₂, is increasing. This raises concerns regarding the effect these may have on the earth's climate as a result of an enhanced greenhouse effect. Despite limited remaining uncertainties, scientists internationally are of the view that the balance of evidence suggests there is a discernible human influence on the global climate as a result of the build-up of CO₂ and other greenhouse gases in the atmosphere.

In response to these concerns, under the UN Framework Convention on Climate Change (UNFCCC), industrialised countries were to stabilise their greenhouse gas emissions at 1990 levels by the year 2000. The EU met this commitment. The Kyoto Protocol to the UNFCCC committed the 15 countries that were EU members at the time to reduce their collective emissions in the 2008-2012 period to 8% below 1990 levels.

The EU has also offered to increase its emissions reduction to 30% by 2020, on condition that other major emitting countries in the developed and developing worlds commit to do their fair share under a future global climate agreement. This agreement should take effect at the start of 2013 when the Kyoto Protocol's first commitment period will have expired.

The Copenhagen Accord reached in December 2009 represents a step towards such an agreement. The EU is pressing for a global deal that is ambitious, comprehensive and legally binding.

4.1.5 Summary

The development of renewable energy, particularly energy from wind, water, solar power and biomass, is a central aim of the European Commission's energy policy. There are several reasons for this:

- Renewable energy has an important role to play in reducing CO₂ emissions, which is a major Community objective.
- Increasing the share of renewable energy in the energy balance enhances sustainability. It also helps to improve the security of energy supply by reducing the Community's growing dependence on imported energy sources.
- Renewable energy sources are expected to be economically competitive with conventional energy sources in the medium to long term.

It is evident that this proposed wind farm development at Moneypoint is strongly supported by policy at European level.

4.2 ENERGY POLICY – NATIONAL CONTEXT

4.2.1 Policy Evolution

It is Government Policy to promote the development of renewable energy sources. Sustainable energy policy includes maximising the efficiency of generation and emphasising the use of renewable resources.

Ireland's Green Paper on Sustainable Energy was launched in September 1999, the policy indicating how Ireland will progress towards meeting its energy requirements in an environmentally and economically sustainable way. It concentrated on Ireland's need to limit energy-related carbon dioxide (CO₂) emissions under the Kyoto Protocol. An additional major justification of this strategy on renewable energy is to reduce Irish dependence on imported fuels for the purpose of security of supply.

The Renewable Energy Strategy Group was formed in November 1999 on foot of the Green Paper. In its report Strategy for Intensifying Wind Energy Development the Group outlined a strategy of promoting large-scale wind energy projects to achieve efficient deployment of wind energy.

In the National Spatial Strategy 2002 – 2020, it is stated as follows:

..in economic development the environment provides a resource base that supports a wide range of activities that include agriculture, forestry, fishing, aqua-culture, mineral use, energy use, industry, services and tourism. For these activities, the aim should be to ensure that the resources are used in sustainable ways that put as much emphasis as possible on their renewability. Renewable Energy Development - 2006

4.2.2 Renewable Energy Development - 2006

The Department for Communications, Marine and Natural Resources holds responsibility for renewable energy policy in Ireland. The Renewable Energy Development Group, established in May 2004, considered the future options to develop increased use of renewable energy in the electricity market to 2010 and beyond. Its Renewable Energy Development 2006 presented an overview of policy and strategy evolution, stating as follows:

Renewable energy deployment fits with a range of policy imperatives across many areas. It has clear environmental benefits and helps meet our international environmental commitments. It reduces reliance on imported fuels, reducing dependence and bringing associated economic benefits.

A conclusion was as follows:

A sustainable energy economy depends on both efficiency in the supply and consumption of energy and in the substantial deployment of renewable sources.

4.2.3 Energy White Paper – 2007

The Government launched its Energy White Paper in March 2007. The White Paper describes the actions and targets for the energy policy framework out to 2020, to support economic growth and meet the needs of all consumers. It is set firmly in the global and European context which has put energy security and climate change among the most urgent international challenges.

Sustainability is at the heart of Government's energy policy objectives. The Paper outlines

that the challenge of creating a sustainable energy future for Ireland will be met through a range of strategies, targets and actions to deliver environmentally sustainable energy supply and use. The underpinning Strategic Goals include accelerating the growth of renewable energy sources.

The key targets as set out in Table 4.1 were set regarding renewable electricity:

Table 4.1: National Renewable Energy Targets

Year	Criterion	Target
2010	Gross electricity consumption from renewable sources	15 %
2020	Gross electricity consumption from renewable sources	40 %

The Government's 40% renewable penetration target for 2020 is estimated to be equivalent to about 5,800 MW of installed renewable capacity. Installed capacity in July 2010 was approximately 1,750 MW, indicating a need for significant further development.

The Government is evidently committed to delivering a significant growth in renewable energy as a contribution to fuel diversity in power generation. Wind energy will provide the pivotal contribution to achieving this target.

4.2.4 National Climate Change Strategy 2007 - 2012

The National Climate Change Strategy (NCCS) 2007 – 2012 of April 2007 follows on from the first national strategy, which was published in 2000 and reviewed in 2002. It details the measures by which Ireland will meet its Kyoto 2008 - 2012 commitment. It also outlines how the measures will position Ireland for the post-2012 period.

With regard to renewable electricity production the NCCS states that "*electricity generation from renewable sources provides the most effective way of reducing the contribution of power generation to Ireland's greenhouse gas emissions*". It is forecast that an annual emissions savings of 3.26 Mt of CO₂ will be achieved on foot of the Government's 33% target for 2020 and even larger savings will result from the revised renewables target of 40%.

4.3 NATIONAL DEVELOPMENT PLAN

The National Development Plan 2007-2013 is the largest and most ambitious investment programme ever proposed for Ireland and it sets out the roadmap to Ireland's future.

The Plan outlines a number of High Level Objectives that will guide investment priorities and allocations. These include environmental sustainability, whose promotion, including tackling climate change, is a key objective of the investment strategy in the Plan. Climate Change and Renewable Energy are two of the six identified areas in which investment under the Plan will make a major contribution to the protection and enhancement of the environment.

This Plan sets out objectives to stimulate renewable energy production and notes as follows:

Ireland has significant renewable energy resources available but their large-scale exploitation continues to require support and intervention by policy makers because of the investment costs and risks entailed. This intervention is required across the three principal energy sectors: electricity, heat and transport and in the industrial,

public, commercial and domestic sectors.

The proposed investments will considerably enhance environmental sustainability. Increased market penetration of renewable energy technologies in the electricity, heat and transport sectors will displace fossil fuels such as coal, oil, gas and peat. In the case of electricity, the 2010 target for renewable energy consumption has been increased to 15%.

The Sustainable Energy Sub-Programme states that renewable energy measures will focus on achieving Government targets for renewable energy production and meeting policy goals with regard to competitiveness, environment, security of supply, R&D and the development of a sustainable All-Island energy market.

In addition to identifying the emerging potential and deployment of biomass and biofuels, preparatory action on ocean energy and deployment of other technologies such as solar and geothermal technologies, it notes as follows:

The primary focus will be on the large-scale deployment of wind, ...

In the context of Regional Development the regional policy approach embraces the role of other smaller towns, villages and rural areas and states as follows:

Towns, villages and rural areas need to be supported in the development of new areas of economic activity such as: local value added enterprise activities; tourism; local enterprise; services; and renewable energy to both complement the surviving elements of a restructured agri-business/natural resource sector and provide new employment opportunities.

4.4 PLANNING POLICY – CLARE COUNTY DEVELOPMENT PLAN

Under Part II Chapter 1 of the Local Government Planning and Development Act, 2000, Planning Authorities are obliged to make Development Plans for their functional area every six years. The Clare County Development Plan 2011 – 2017 is the framework document for guiding and controlling future developments in the county.

The Plan comprises seven volumes in total, including a Wind Energy Strategy in Volume 5. This volume comprises a detailed county-wide Wind Energy Strategy, supplemented by maps which set out Clare County Council's strategy for informing wind energy development, having regard to economic, environmental and visual issues.

4.4.1 Development Plan: Volume 1 – Written Statement

The planning policy response of Clare County Council to achieve its vision identifies key goals that are supported by strategic aims and objectives. The key goals include:

In the context of Energy & Communications, the Plan (Section 10.3) outlines Objectives as follows:

CDP Development Plan Objective:

10.1 Low Carbon Economy

It is an objective of the Development Plan:

- a** To promote County Clare as a low carbon County by 2017 as a means of attracting inward investment to the County and the Mid-West region;
- b** To facilitate the development of energy sources which will achieve low carbon outputs.

CDP Development Plan Objective:

10.2 Renewable Energy

It is an objective of the Development Plan:

- a** To encourage and to favourably consider proposals for renewable energy developments and ancillary facilities in order to meet national, regional and county renewable energy targets, and to facilitate a reduction in CO₂ emissions and the promotion of a low carbon economy;
- b** To support and facilitate the development of new alternatives and technological advances in relation to renewable energy production and storage, that may emerge over the lifetime of the Plan;
- c** To prepare a County Renewable Energy Strategy over the lifetime of the Development Plan, which will build on and support the County Wind Energy Strategy and when adopted, the National Renewable Energy Action Plan;
- d** To ensure that all proposals for renewable energy and ancillary facilities in the County are in full compliance with the requirements of the SEA and Habitats Directives.

In the context of Wind Energy (Section 10.3.3) the Plan notes as follows:

In the Midwest Regional Climate Change Strategy, County Clare is identified as having a potential to generate 600MW of energy from renewables by 2020. County Clare will aim to achieve a minimum target of 550MW from wind energy by 2017.

CDP Development Plan Objective:

10.3 Wind Energy Development and Residential Amenity

It is an objective of the Development Plan:

- a** To promote and facilitate wind energy production in the County. Proposals for the development of infrastructure for the production and distribution of electricity through the harnessing of wind energy will be determined by reference to the County Wind Energy Strategy and the associated SEA and HDA;
- b** To strike an appropriate balance between facilitating wind energy development and protecting the residential amenity of neighbouring property in respect of noise, proliferation and visual impact;
- c** To ensure that all proposals for wind energy development in the County are in full compliance with the requirements of the Habitats Directive.

In the context of Rural Development and Natural Resources, the Plan (Section 13.3.12) notes as follows:

There is significant potential for the development of wind energy in the County. ... As the economics of wind energy projects become more favourable, many more rural areas across the County will be suitable for wind turbines.

CDP Development Plan Objective:

13.11 Wind Energy Development

It is an objective of Clare County Council:

To facilitate the development of wind energy developments in rural areas in accordance with

the Wind Energy Strategy 2011 - 2017 and the associated SEA and HDA.

In the Context of the Shannon Estuary (Section 14) the national importance of Moneypoint and its economic potential are acknowledged.

CDP *Development Plan Objective:*

14.4 Moneypoint

It is an objective of Clare County Council:

- a** To facilitate the development of the energy infrastructure at the Moneypoint site and work with others to ensure that the potential to diversify is supported, if required – ensuring in particular that all such developments shall not adversely affect species and habitats designated by the Habitats Directive;
- b** To facilitate the potential to develop additional complementary sea-related industrial activities at the Moneypoint site – ensuring in particular that all such developments shall not adversely affect species and habitats designated by the Habitats Directive.

Clare County Council aims to establish the Shannon Estuary area as a recognised destination for emerging and established energy generation technologies and to capitalise on both the image and the physical capacity of the estuary and environs.

CDP *Development Plan Objective:*

14.5 Renewable Energy on the Shannon Estuary

It is an objective of Clare County Council:

To encourage renewable energy developments along Shannon Estuary, including wave and tidal, that are appropriately sited, designed and balanced with other planning and environmental considerations, ensuring in particular that all such developments shall not adversely affect species and habitats designated by the Habitats

The objectives required to sustainably manage the change in landscape throughout Co. Clare are outlined in Section 16. The Shannon Estuary is one of two Working Landscapes identified in the county.

CDP *Development Plan Objective:*

16.4 Shannon Estuary Working Landscape

It is an objective of the Development Plan:

- a** To permit development in these areas that will sustain economic activity of regional and national significance – especially through the protection of resources to sustain large scale energy projects, logistics, large-scale manufacturing and associated infrastructure. All such developments shall be required to conform to relevant management and conservation objectives for designated and protected habitats and species within the Estuary;
- b** that selection of appropriate sites in the first instance within this landscape, together with consideration of the details of siting and design, are directed towards reducing visual impact and that residual visual impacts are minimized;
- c** That particular regard should be given to avoiding intrusions on scenic routes and on ridges or shorelines;

Developments in these areas will be required to demonstrate:

- i** That sites have been selected to avoid visually prominent locations wherever feasible;

- II That site layouts avail of existing topography and vegetation to reduce visibility from scenic routes, walking trails, public amenities and roads;
- III That design for buildings and structures reduce visual impact through careful choice of form, finish and colours and that any site works seek to reduce visual impact of the development.

4.4.2 Development Plan: Volume 5 - Wind Energy Strategy

The Council's Wind Energy Strategy (Volume 5) provides for a strategic plan-led approach to renewable wind energy electricity production in County Clare. It seeks a balance between achieving greater energy security, as identified in the Limerick Clare Energy Balance 2006 and Limerick Clare Climate Change Strategy 2006, achieving commitments at national and international level regarding reductions in greenhouse gases, promoting renewable energy and other environmental considerations.

General Objectives for Wind Energy Developments are outlined in Section 3.2, as follows:

WES One:

Development of Renewable Energy Generation

It is the objective of the Council to support, in principle and in appropriate scales and locations, the development of wind energy resources in County Clare. It is an objective of the Council to ensure the security of energy supply by accommodating the development of wind energy resources in appropriate areas and at appropriate scales within the County.

WES Two:

Development of Low Carbon Economy

County Clare will seek to promote itself as moving towards becoming a low carbon County by 2017 as a means of attracting inward investment to the County and the wider Mid-West region.

WES Three:

County Partnership Approach

Clare County Council will seek to promote wind energy in appropriate sites in the County and will work with agencies such as the Clare County Development Board, Clare enterprise Board, Limerick Clare Energy Agency, Shannon Development, I.D.A and Enterprise Ireland to encourage investment in research and technology associated with wind farms and other renewable energy technology.

WES Four:

Response to National Policy

The White Paper on Energy has set a target of 40% of electricity to be generated from renewable sources by 2020. In the Mid-West Regional Climate Change Strategy, County Clare is identified as having a potential 600MW energy produced from renewables by 2020.

Clare County Council will aim to achieve a minimum target of 550MW from wind energy by the conclusion of this Strategy.

General Objectives are set out in respect of Promotion of Community Involvement (WES Five), Infrastructure Development Proposals (WES Six) and Natura 2000 Sites (WES Seven). Four classifications have been developed for wind farm development in the county and there are specific objectives pertaining to each, as follows:

WES Eight: 'Strategic Areas'

These key areas are considered to be eminently suitable for wind farm development and are of strategic importance because of;

- Good / excellent wind resources
- Access to grid
- Distance from properties and
- Outside any Natura 2000 sites

Projects within these areas must:

- Demonstrate conformity with existing and approved wind farms to avoid visual clutter.
- Be designed and developed in line with the Wind Energy Development Guidelines, Guidelines for Planning Authorities (DoEHLG, 2006) in terms of siting, layout and environmental studies.
- Provide a Habitats Directive Assessment under Article 6 of the Habitat Regulations if the site is located in close proximity to a Special Area of Conservation or Special Protection Area.
- Be developed in a comprehensive manner avoiding the piecemeal development of the areas designated as 'strategic'..

Target wind energy generation from strategic areas is 400 MW

WES Nine: 'Acceptable in Principle'

These areas are considered suitable for wind farm development because of:

- Sufficient wind speeds,
- Access to grid network, and
- Established patterns of inquiries.

Projects within these areas must:

- Demonstrate conformity with existing and approved wind farms to avoid visual clutter.
- Designed and developed in line with the Planning Guidelines in terms of siting, layout and environmental studies.
- Provide a Habitats Directive Assessment under Article 6 of the Habitat Regulations if situated in proximity to a Special Area of Conservation or Special Protection Area will require.

Target wind energy generation from Acceptable in Principle areas is 150 MW

WES Ten: 'Open to Consideration'

Wind energy applications in these areas will be evaluated on a case-by-case basis subject to viable wind speeds, environmental resources and constraints and cumulative impacts.

WES Eleven: 'Not Normally Permissible'

These areas are not in principle considered suitable for wind farm development due to their overall sensitivity arising from landscape, ecological, recreational and/or cultural and built heritage resources. The HDA and SEA process in particular assisted in the identification of these areas.

A further objective is set out for **Autoproducers' (WES Twelve)**.

Comment

The Planning Authority has adopted a positive approach to the development of renewable resources, subject to acceptability of impacts. The site is located in an area designated as Acceptable in Principle for wind farm development, as indicated in Figures 4.1 & 4.2.

It is believed that Moneypoint Wind Farm fully meets the criteria established in the policies outlined in the Clare County Development Plan 2011 - 2017.

4.5 PLANNING POLICY - WEST CLARE LOCAL AREA PLAN 2009

The Planning and Development Act 2000 (as amended) introduced a tiered and plan led system, setting out the framework for the provision of Local Area Plans (LAPs) to give more detailed and localised effect to the policies and objectives of the County Development Plan. West Clare is one of four sub-areas within the county requiring a Local Area Plan.

Local Area Plans are required to be amended no later than one year following the making of the County Development Plan, so that their objectives are consistent with the objectives of the County Development Plan. Thus, where any provision of any Local Area Plan conflicts with the provisions of this Development Plan, the provision of the Local Area Plan cease to have effect.

The provisions of the West Clare Local Area Plan are considerations in the determination of applications for planning permission.

Within the context of the requirement that planning and development policies are fully consistent with the environmental sustainability objectives of the Clare County Development Plan, the following are amongst the objectives of the West Clare Local Area Plan:

Objective 2

To establish and maintain; water supply which is acceptable in terms of quality and quantity for human health & economic well-being; management of flood risk; systems for disposing of all forms of waste; secure and adequate power supply with renewable component and relevant telecommunication infrastructure, in a manner which is environmentally and economically sound.

Objective 9

To recognise the role energy of generation to the present and future economy and profile of West Clare and the significance of same countrywide and nationally.

Objective 13

To promote the objectives of the Mid-West Regional Climate Change Strategy and the County Clare Climate Change Strategy so as to reduce carbon emissions, promote sustainable development, energy efficiency, energy security and a low carbon economy.

The Planning Authority's policies and proposals in respect of issues relating to essential services are set out in Chapter 6 - Infrastructure (Services).

With regard to Supply & Renewable Energy Policy (Section 6.12), the Plan outlines as follows:

The Council recognises the importance of ensuring the security of energy supplies and, where power corridors exist, to safeguard them from inappropriate development. Energy industries and utilities generally have very specific land-use planning requirements. In particular, safeguards need to be in place to ensure that the inappropriate siting of other developments does not compromise strategic distribution corridors.

Policy INF S12 Power Provision & Supply

The Council recognises the importance within the Plan area of power generation, both existing and potential, and shall work with others to safeguard and promote this sector.

Policies are outlined as follows regarding Renewable Energy (Section 6.12.1):

Policy INF S13 Renewable Energy

Proposals for renewable energy will be considered provided that:

- a) There would be no significant impact on the character and amenity of the surrounding area;*
- b) There would be no significant impact on the transportation network; and*
- c) There would be no significant adverse environmental impacts*

In assessing applications the Council tries to achieve a reasonable balance between responding to overall policy on renewable energy at Government level and enabling wind energy resources to be harnessed in a manner that is consistent with proper planning and sustainable development.

Policy INF S14 Windfarm Developments

The Council will assess applications for windfarm developments in relation to the Windfarm Development Guidelines (DoEHLG 2006). Proposals for windfarm developments will be considered where it can be clearly demonstrated that:

- a) They do not have an adverse visual impact on the landscape in which they are proposed; and*
- b) They do not have a significant adverse impact on a site of archaeological or historical importance or on sites which have rare or protected flora and/or fauna or a delicate ecological character; and*
- c) Power lines between ESB points of generation and windfarm substations should, where possible, be laid underground to minimise visual impact.*

In its preamble to the above, the Plan states as follows:

The power generating capacity within the West Clare Area has local, county and national significance. Due to location and natural resources it has the potential, by development of renewable energy sources, to contribute to the low carbon economy,

which is an objective at National & Regional level. International & National policy is integral to the Mid-West Climate Change Strategy 2008-2010 and the Clare Climate Change Strategy and the Clare Energy and Emissions Balance. Those documents and subsidiary guidance from LCEA will inform relevant decisions on these matters.

The benefits that windfarm developments provide in terms of employment, rural development, security of energy supply, balance of trade and international image are recognised in the Plan.

Comment

The Planning Authority has adopted a positive approach to the development of renewable resources, subject to acceptability of impacts. It is believed that Moneypoint Wind Farm fully meets the criteria established in the West Clare Local Area Plan 2009.

4.6 CONCLUSIONS

It is clear that there is strong support at multiple levels for the development of renewable sources of energy, such as will result from the proposed revised arrangement at Moneypoint Wind farm. Over the past decade, energy and environment policies have been adopted and realigned to reflect new concerns at national and international levels, to address the new realities in these areas and provide a focus for future actions. These are reflected in the policies of Clare County Council.

It is evident that there is a presumption in favour of wind farm developments.

The site is located within the area identified by Clare County Council as being Acceptable in Principle for wind farm development. In its granting of planning permission (PL03.130164) for the approved development, An Bord Pleanála also considered the site to be suitable for a wind farm development.

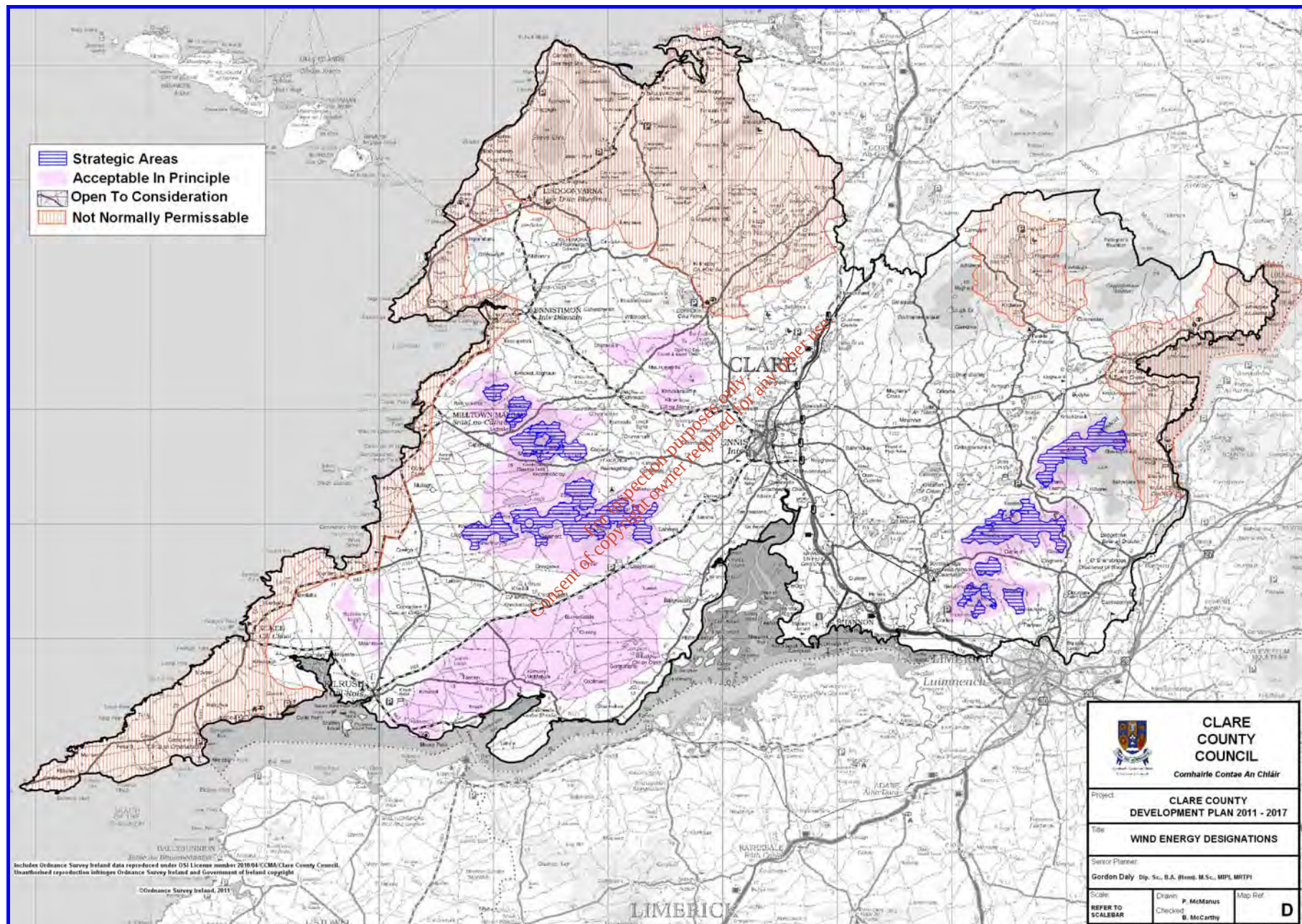


Figure 4.1: Map - County Development Plan - Wind Energy Strategy

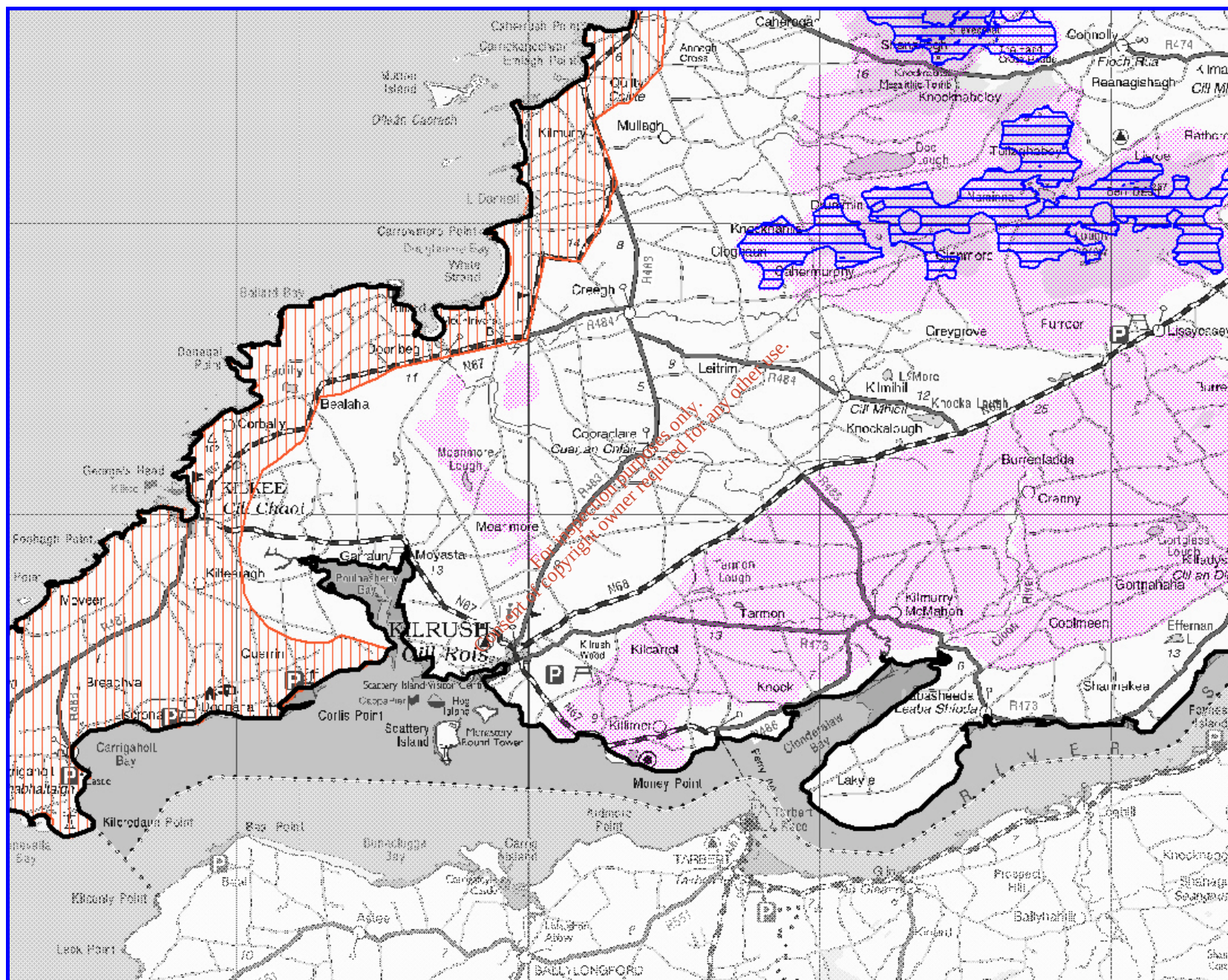


Figure 4.2: Map - County Development Plan - Wind Energy Strategy (Enlarged)

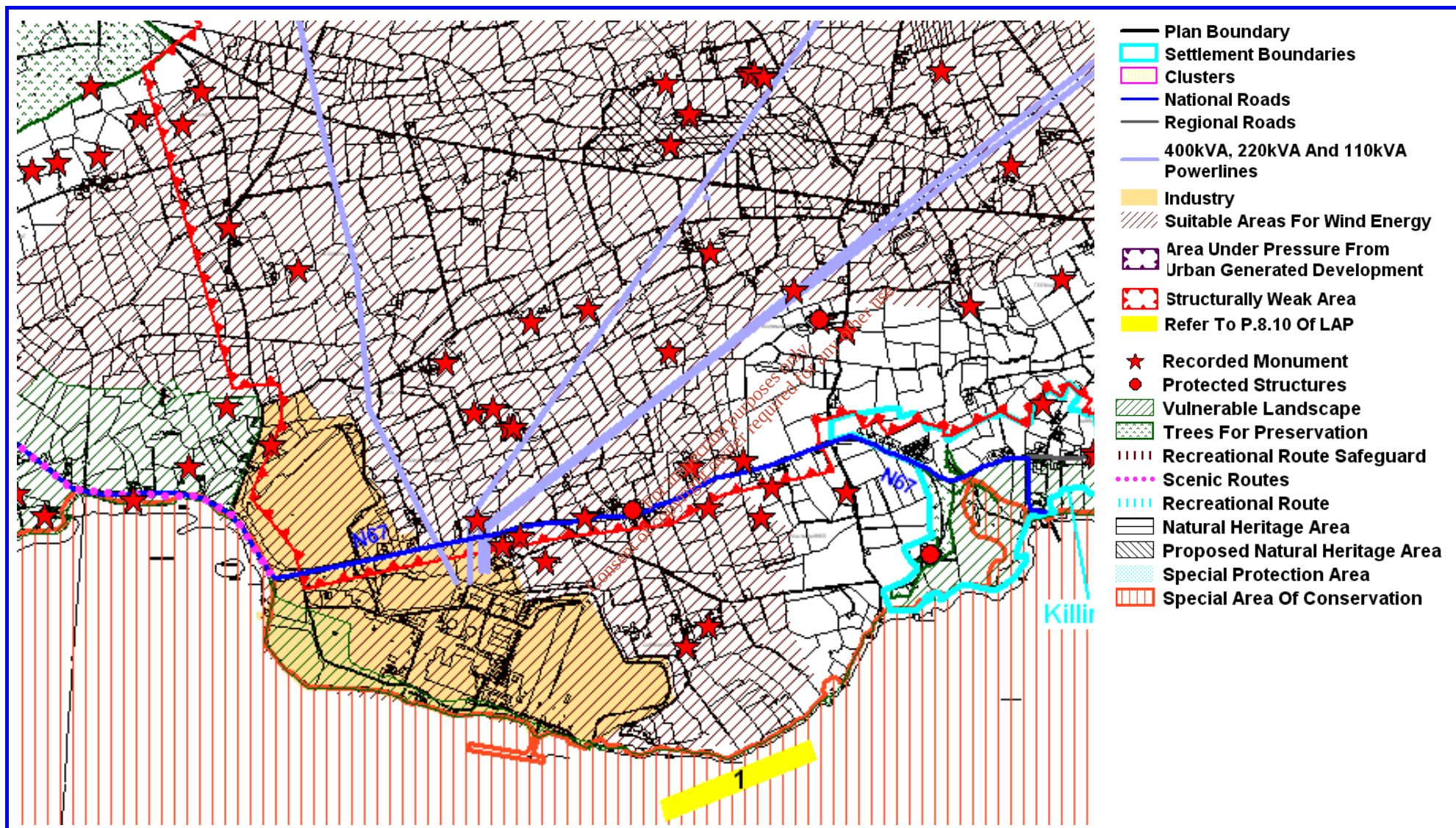


Figure 4.3: Map - West Clare Local Area Plan 2009

5. HUMAN BEINGS

5.1 RECEIVING ENVIRONMENT

5.1.1 Population

Over the last 10 - 15 years, population trends in Ireland changed dramatically. Until about the mid-1990s, these trends were largely determined by labour market conditions in Ireland and in the countries to which Irish people migrated. Overall, there had been a long-term trend towards significant levels of emigration. However, the trend towards emigration reversed for a significant period, becoming a strong trend towards net immigration, fuelled by very strong domestic economic growth rates. A downturn in economic activity has seen a partial return to the former trend.

The site is located in the District Electoral Division of Killimer in the Kilrush Rural District of Co. Clare. The populations of each from Census of Ireland data produced by the Central Statistics Office are shown in Table 5.1.

Table 5.1: Population Trends

Area	2002	2006	2011	Change (02-11)
State	3,917,336	4,234,925	4,581,269	+ 17.0 %
Co. Clare	103,333	110,800	116,885	+ 13.1 %
Kilrush Rural District	10,344	10,742	10,652	+ 2.9 %
Killimer	495	481	498	+ 0.6 %

Following a decrease in the period 1986-1991, the population of Co. Clare has been increasing steadily since then, with the increase up until 2006 being almost directly in line with population growth nationally. Subsequent growth has been at lower level than nationally. However, the increase has not been uniform throughout the county and population numbers in Kilrush Rural District as a whole have effectively been static since 1991 with a drop being recorded over the recent five-year period. A significant decline occurred in the mid-1980s following completion of construction of Moneypoint Generating Station.

A lower increase or decline in population in rural areas is reflective of a number of processes at work. These influences include the decrease in the number of farmers and the consequent increase in farm sizes, lack of locally based employment opportunities, lack of access to services and the movement of population, particularly younger persons, towards the larger urban centres.

Approximately half of the station staff at Moneypoint reside in Kilrush and the surrounding area and the presence of large numbers of ESB employees has a positive impact on maintaining local populations.

5.1.2 Socio-economics

In 2010 ESB contributed €2.2 billion to the Irish economy through purchases from Irish suppliers, taxes, rates, wages and dividends.

At a local level Moneypoint Generating Station is a unique feature in the socio-economic

structure of Co. Clare. It is one of the largest employers in the county and is the largest employer in the Kilrush area. The station's current complement of full-time staff is approximately 235. The number on site can increase to over 500 during major overhauls. Major overhauls occur nearly annually, with each of the station's three units receiving a major overhaul every four years.

In addition to providing direct benefits to the area in respect of employment, there are further benefits associated with the injection into the local economy through the purchase of goods and services by the plant itself and by the workforce.

The station has a major impact on the industrial rate base in Co. Clare, paying a significant annual contribution in rates and water charges to Clare County Council. Up to 12-14 loads of coal are delivered to Moneypoint by ship every year and port dues paid by Moneypoint constitute a significant element of the revenues of the Shannon Foynes Port Authority. Light dues are paid, via Trinity House in London, to the Commissioners for Irish Lights. Each delivery of coal also involves revenues for local shipping agents, towage, pilotage and stevedore charges.

Agriculture is an important industry throughout Co. Clare, with the industry generating significant additional employment in related activities and services, such as cattle marts, meat factories, creameries, etc. The three most important activities are dry cattle production, dairying and sheep rearing.

There is a continuing decline in agricultural employment and this is brought about through natural wastage, as those currently engaged in agriculture age, and through young persons deciding not to enter farming. Changes in agricultural practice and policies have resulted in a large shift in population from the rural areas of the county to the larger settlements for off-farm employment. Decreases in population in rural areas generally are attributed to this decline.

5.1.3 Health and Safety

The basic technology to be employed in the project is well understood and has been used successfully in many equivalent projects elsewhere.

The European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 (S.I. No. 74 of 2006) implement in Ireland the EC COMAH Directive 96/82/EC as amended by Directive 2003/105/EC, also known as the Seveso II Directive. The Seveso II Directive is aimed at preventing major accidents involving dangerous substances and limiting the consequences in the event of such a major accident. The Directive defines major-accident hazard sites as those that store or can generate quantities of dangerous substances in excess of specified thresholds.

Moneypoint Generating Station does not present a major accident risk.

Safety is fully integrated into all aspects of management at the station. The station complies with and constantly aims to exceed all applicable legal and regulatory Health and Safety requirements and all other appropriate guidelines.

5.1.4 Public Attitude

The report Attitudes Towards Wind Farms and Wind Energy in Ireland, which provided the results from Ireland's first independent study of the Irish public's attitude towards the development of wind energy, highlighted the following:

- There is a high level of public support for developing more sources of renewable energy in Ireland.
- The overall attitude to wind farms is almost entirely positive. More than eight of ten people believe wind energy to be a good or fairly good thing.
- A large majority of the general public believe that wind farm developments do not impact on the scenic beauty of an area. This is the case irrespective of the type of landscape.

It was noted that a significant portion of those opposed to a local wind farm did not really have any reason they could articulate, other than that they simply didn't want it.

5.2 IMPACT OF THE DEVELOPMENT

5.2.1 *Population, Employment & Socio-economics*

Local Level

As the proposed development contains no residential component, it is unlikely to have any significant direct impact on the composition of the population in the immediate area. There is no evidence from Ireland or elsewhere that the presence of a wind energy development in an area has an effect on population numbers.

At peak employment, approximately 20 - 25 jobs will be created during construction.

The wind farm development will have no impact on the operation of Moneypoint Generating Station or levels of employment there. Use of the various locations within the site to install wind turbines will have no impact on the viability of ongoing operations and the installations will not preclude other future electricity generation developments at the site.

During the construction phase, which will last about 6 months, there will be significant expenditure on the provision of site facilities including the construction of the civil and electrical infrastructure. These can benefit local companies, contractors and their employees. There will also be indirect employment in the manufacture of building materials and equipment used in construction.

The anticipated total capital cost of the project is of the order of up to €30M. This expenditure will result in economic benefit to the local and national economy. Up to approximately 25% of expenditure will be on the supply of construction material, non-turbine equipment and services.

A requirement for some temporary or medium-term accommodation may arise during project construction.

National Level

Regarding potential employment in the renewables sector, as in many capital intensive industries, renewable energy development tends to be characterised by substantial short-term employment creation during the construction phase and relatively modest long-term employment thereafter. Nonetheless, recent studies have shown that in 2007 with an installed capacity of just over 56,500 MW, the EU wind energy sector employed more than 150,000 people directly and indirectly in the sector.

Based on the estimates of the capacity to be installed to reach national targets for renewable energy generation, a recent report by Deloitte indicated that the Irish wind

energy sector to 2020 is capable of supporting more than 10,760 jobs through direct and indirect involvement in the sector. The construction and development of wind energy projects across the island will involve c. €14.75 billion of investment, c. €5.1 billion of which will be retained in the local Irish economy to 2020.

This is a substantial contribution, particularly given the decline in traditional industries including agriculture and across a number of areas of manufacturing. In addition many of the jobs created in the renewables sector would be private sector employment, thereby contributing to the necessary balance between the enterprise and public sectors.

5.2.2 Health and Safety

The DoEHLG's Wind Farm Planning Guidelines (Section 5.7) note as follows regarding safety aspects:

There are no specific safety considerations in relation to the operation of wind turbines.

The project does not add to the main potential hazards arising at the power station and doesn't alter its status in relation to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006.

Electromagnetic Radiation: In common with all electrical equipment, the turbines and other equipment associated with a windfarm emit electromagnetic radiation. Such emissions for the type of machine proposed would be very low in the immediate vicinity of the machine and almost non-existent at any distance from it. There is no evidence that such emissions, which are common at higher levels in all built-up areas, are injurious to human health.

Wind turbines, like most other engineering products, are designed to operate to very high safety standards. There are two situations where wind turbines could prove a threat to human safety:

Structural Integrity of Turbines: In the past, some poorly designed wind turbines have experienced blade failures during storms. This has applied particularly to two-bladed machines.

The type of wind turbine proposed will be a three-bladed machine with Class One Certification for Structural Integrity issued by Germanischer Lloyd. The machines will be designed to withstand gusts of up to 70 m/s (157 miles/hour), which is well above the wind speed applicable to the design of conventional structures in this part of Ireland. The extreme conditions represented by the design wind speed are very rare and, if they did occur, would cause widespread destruction to dwellings and infrastructure. Because of the distance to the nearest dwellings, it is extremely unlikely that even under these conditions the wind turbines would cause additional damage or risk to persons.

The DoEHLG Wind Energy Guidelines refer to the possibility of injury to people or animals from a damaged blade as being very remote. The Guidelines explain why this is the case, as follows:

Most blades are composite structures with no bolts or separate components and the danger is minimised as a result.

Hazard from Falling Ice: In cold climates or at high altitude ice can potentially build up on the blades or other parts of a wind turbine. Ice falling off could potentially injure persons below. This does not arise when a turbine is in operation but rather where it has

been stopped, following a grid failure for example, and the ambient temperature is very low, allowing ice to build up. Any ice formation during operation would be likely to cause a dynamic imbalance on the rotating blades that would automatically result in a shut-down of the wind turbine.

The DoEHLG Wind Energy Guidelines refer to the possibility of injury to people or animals from flying fragments of ice. The Guidelines to explain why this is the case, as follows:

The build up of ice on turbine blades is unlikely to present problems. Most wind turbines are fitted with anti-vibration sensors, which will detect any imbalance caused by the icing of the blades. The sensors will cause the turbine to wait until the blades have been de-iced prior to beginning operation.

Wind turbines installed in such environments may incorporate an automatic ice warning system and some components in the wind turbine require a certain time for preheating prior to turbine restart. This does not arise in Irish conditions and there is no single known recorded incidence of flying fragments of ice occurring at a wind farm in Ireland in almost 20 years of commercial operation.

Summary: The minimum desirable distance between wind turbines and occupied buildings, established on the basis of protection of residential amenities including visual impact and expected noise levels, will always be greater than that necessary to meet safety requirements. Extensive operational experience has shown that the health and safety record of wind turbines is exceptionally high, being better in most instances than other forms of electricity production.

Ireland has had operational wind farms for a considerable period at this stage, without any safety incidents.

5.2.3 Public Attitude to Wind Farms

Surveys of public attitudes both across Europe and in specific countries show consistent, strong support for renewable energy in general and for wind power in particular.

Ireland

The results from Ireland's first independent study of the Irish public's attitude towards the development of wind energy were reported by Sustainable Energy Ireland.

Because wind turbines and wind farms are a relatively new feature on the landscape and have been largely confined to remote areas, the direct experience by the public of wind farm is limited. Thus, while the supportive attitude of the general public towards wind farm development is of obvious interest, the views of those living in close proximity to existing wind farms are of special interest. For this reason the study collected views of people living in the vicinity of a wind farm.

The report noted that, not only are people in the immediate vicinity of an existing wind farm positively disposed to the development, those living in direct sight of it are even more positively disposed towards it.

The study highlighted that wind farm are seen in a positive light compared to other utility-type structures that could be built on the landscape.

Of those who are positively disposed to a local wind farm, the overwhelmingly cited reason was that it produces clean energy. Where negative attitudes were voiced towards

wind farms the visual impact of turbines on the landscape was the strongest influence. However, impact on the landscape was not a major concern for those living near an existing wind farm.

Britain & Northern Ireland

Various wind farm developers have carried out surveys to explore public attitudes to wind farm development. In all surveys, a majority of respondents have indicated a high level of satisfaction with wind farm. The surveys also show that local approval rises once a wind farm starts operating. The British Wind Energy Association has noted that over 50 surveys have determined that wind farm have a high level of public support, with an average of 70 - 80% of respondents, including those residents living near wind farm, believing that wind energy is in principle a good thing.

In 2003 a Scottish Executive poll of nearly 2,000 people living within 20 km of Scotland's ten largest wind farm found more than 80% are in favour of increasing the amount of electricity generated by the turbines. Only 2% said that it should be reduced. Around 20% thought that wind farm have a positive effect on their area, compared to 7% who disagreed. Almost 90% said the landscape had remained unspoiled by the development of wind-powered turbines.

These surveys are echoed in Northern Ireland by the study Attitudes and Knowledge of Renewable Energy¹, prepared on behalf of Department of Enterprise Trade and Employment (DETI) and others. It showed that 98% of the general public of Northern Ireland believes that renewable energy is a "very good idea" or "a fairly good idea." Of the respondents in this survey 87% stated that they would be happy to have a renewable energy development in their area. Of all types of renewable energy, on-shore wind ranked with solar-power as the most widely accepted technologies. Of the respondents 90% believed that wind development is a good idea and 70% approved of such a development locally.

Market Research Northern Ireland carried out a survey of residents around Elliot's Hill Wind Farm in 2003, interviewing 400 householders within 4 km of the development. The results showed that 70% of residents expressed approval for the wind farm and 86% were of the opinion that the wind farm fits in with the surrounding countryside and landscape. Those residents close to and within sight of the wind farm were more likely to have a favourable opinion.

These results are further echoed by a Milward Brown Ulster survey conducted in Northern Ireland in April 2005. This study determined that 87% of people in Northern Ireland believe that wind farm are necessary to meet current and future energy needs; that 66% of people in Northern Ireland and 73% of those in the western portion of the province would be happy to have a wind farm in their local area. This survey showed increases in positive attitudes towards wind farm by those in the southern and western regions of Northern Ireland.

5.2.4 Other Issues

Other concerns for human beings will be audibility, shadow flicker and visibility. These issues are dealt with in the Sections 6, 7 & 10, which deal with Noise, Shadow Flicker and Landscape.

¹ Attitudes and Knowledge of Renewable Energy amongst the General Public, Report of Findings August 2003

5.3 MITIGATION

General

Mitigation of impacts on human beings has been considered in the context of mitigation of other aspects of this development in the relevant Sections of the EIS.

5.3.1 Health & Safety

Safety is a core value in power station operations at ESB Moneypoint. Its management and continual improvement are an integral part of the station's activities and this will extend to construction and operation of the wind farm.

The station complies with, and constantly aims to exceed, all applicable legal and regulatory Health and Safety requirements and all other appropriate guidelines.

The wind turbine model has not been chosen at this stage, but the model selected will require full certification from an internationally recognised authority and have a proven track record of safe operation.

Access to electrical equipment will be restricted to authorised persons who will operate under specific safety rules.

Health and safety provisions will be in accordance with recognised best practice in the wind energy industry. General health and safety procedures will include but will not be limited to the following:

- Site access will be restricted to authorised construction personnel only.
- A secure site will be maintained at all times with restricted areas being clearly marked.
- All appropriate safety regulation signage will be displayed at the site entrance and elsewhere as appropriate.
- All construction works will be to codes of practice and certified standards set by the various construction trades, such as electricians, excavators, transportation, etc.

It is the intention that the project will be built, operated and maintained to the highest standards of safety. All relevant legislation will be fully adhered to during all stages of development. Any risks that might be associated with this project will be minimised by the use of recognised best practice and technology.

Specific actions in relation to safety will include the following:

- The turbines will be equipped with lightning protection to effectively and safely discharge a lightning strike to earth.
- All electrical systems will comply with the relevant national and international standards.
- Access to electrical equipment will be restricted to authorised persons who will operate under specific safety rules.

5.4 CONCLUSIONS

In summary, the proposed development will not result in significant adverse impacts on human beings.

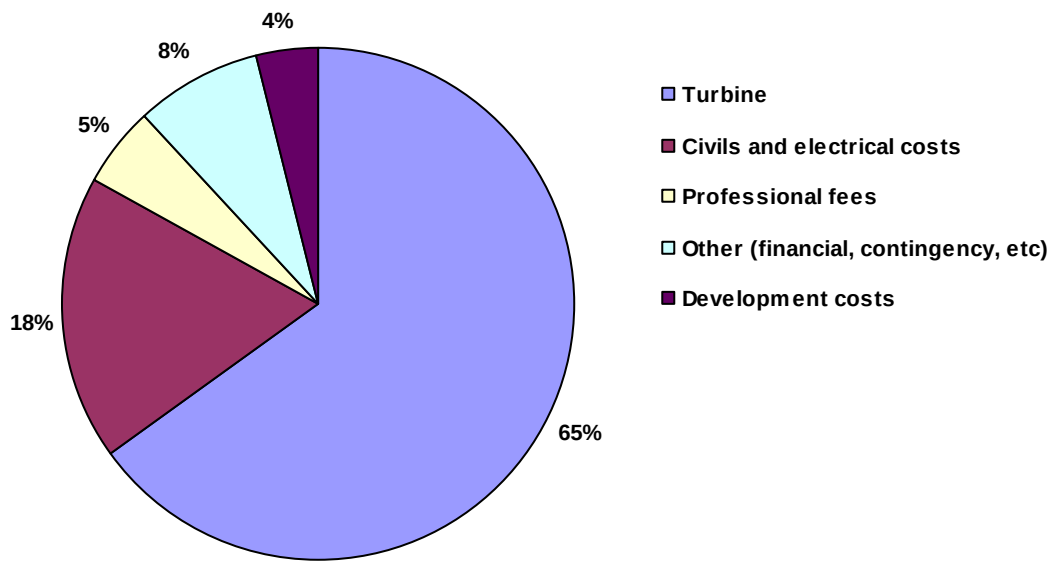


Figure 5.1: Wind Industry Investment Costs by Category

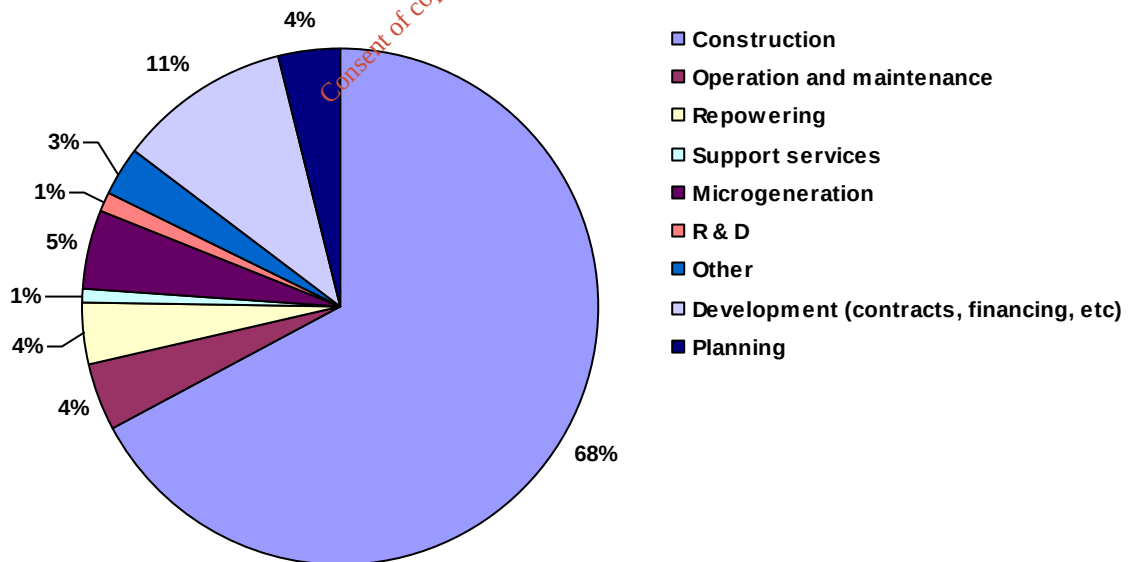


Figure 5.2: Irish Wind Jobs by Category

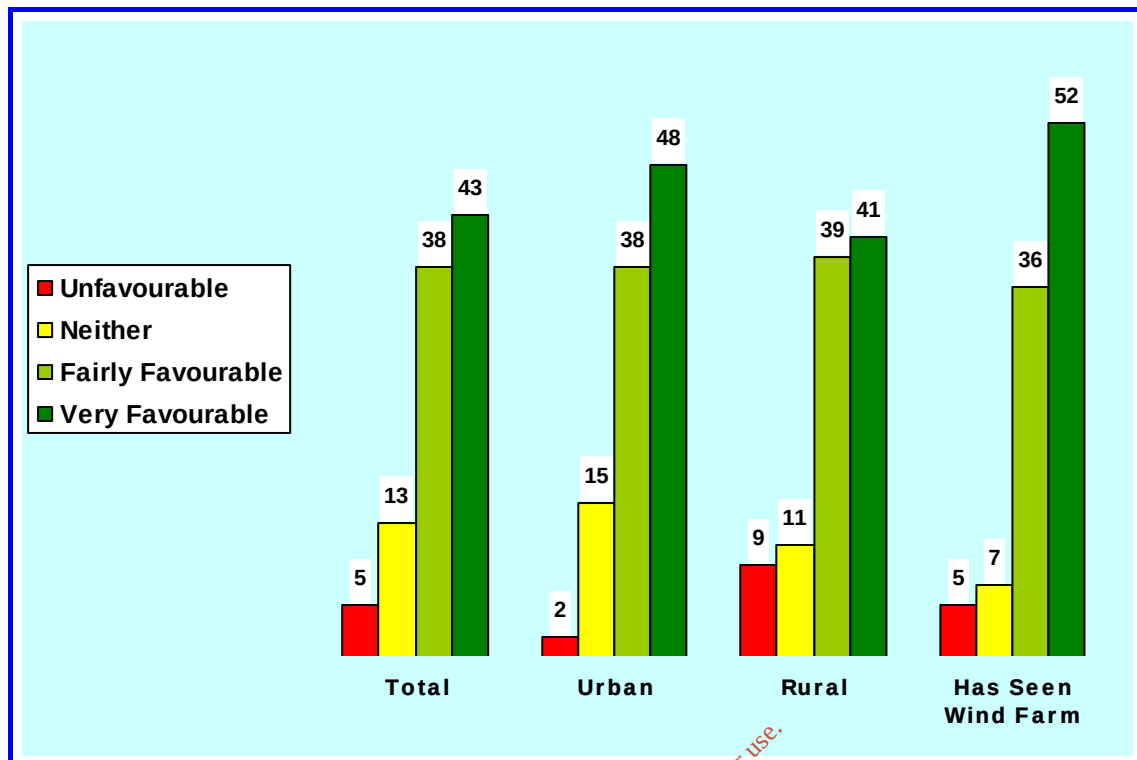


Figure 5.3: Overall Attitude to Construction of More Wind Farms in Ireland

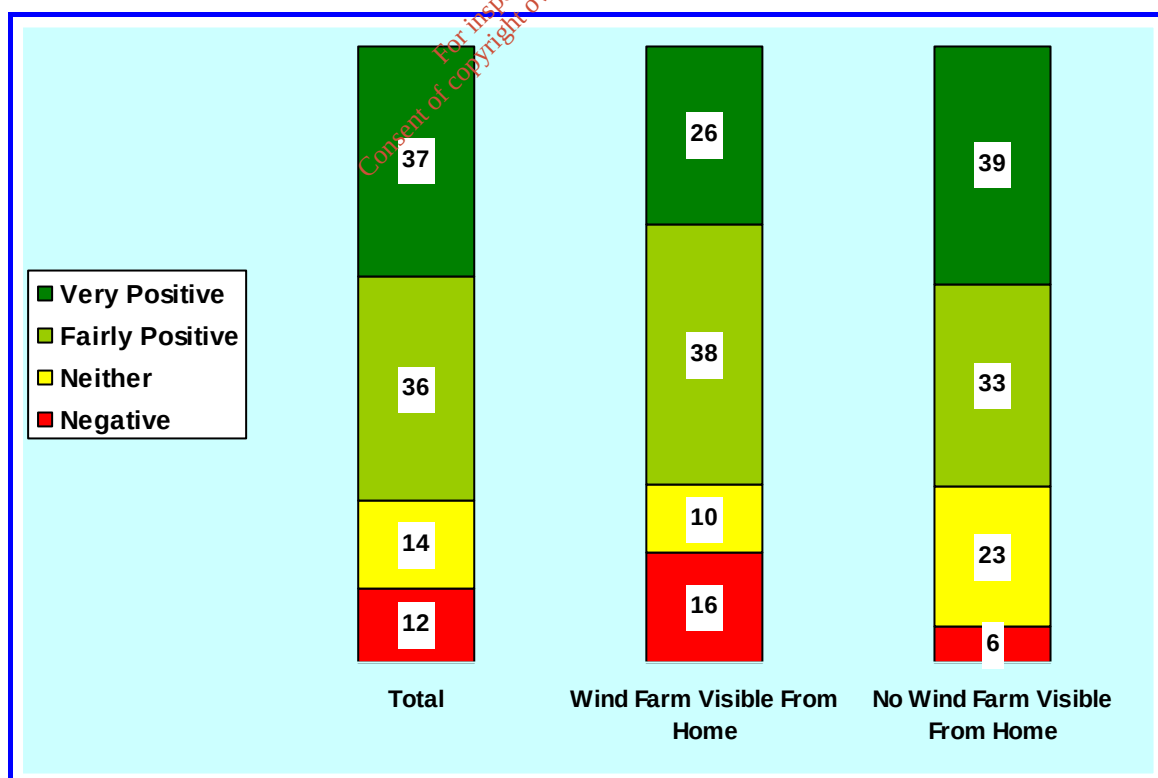


Figure 5.4: Effect of Wind Farm on Local Area

6. NOISE

6.1 RECEIVING ENVIRONMENT

Annual Noise Measurements

As required by its IPPC Licence No. 605-02, Moneypoint Generating Station reports annually to the EPA on compliance with limit values in the Licence, as part of its Annual Environmental Report (AER).

The AER for 2010 reported the following results of noise measurements at three locations external to the station.

Table 6.1: AER Noise Results 2010

Location	NSL1		NSL2		NSL3	
	Day	Night	Day	Night	Day	Night
Noise Leq30	43.5 dB	< 33 dB	46.2 dB	40.6 dB	44.7 dB	32.5 dB
Noise LA90	39.0 dB	< 33 dB	40.1 dB	36.8 dB	39.6 dB	< 33 dB

The above are representative of results reported annually.

Ambient Noise Conditions

Noise monitoring was undertaken by independent consultant Biospheric Engineering to establish the existing noise environment in the environs of the site. Measurements were undertaken over the period 6th - 16th April 2010.

Wind farm related noise measurements were previously been made in March / April 2001. The measurements in April 2010 were more comprehensive and were undertaken against a more uniform and systematic approach to assessment of noise impacts from wind farms that has been established through the DoEHLG Wind Energy Planning Guidelines.

Measurements were taken using Bruel & Kjaer model 2260 type 1 sound level meters with modular real-time analysis using BZ7210 noise analysis module and BZ 7208 FFT module. The instruments were calibrated using a Bruel & Kjaer model 4231 sound level calibrator. The system was calibrated by Bruel and Kjaer 18th March 2009. No drift in calibration was evident during the monitoring period. Post-measurement analysis was carried out using Bruel & Kjaer Noise Explorer software.

The noise measurements were carried out using a weatherproof enclosure with the microphone mounted on a stainless steel pole. The microphone was enclosed in a Bruel & Kjaer UA 1404 Outdoor Microphone Kit, which is capable of operating at wind speeds in excess of 30 m/s. BS 4142 *Rating of Industrial Noise affecting mixed residential and industrial areas* indicates that windshields are effective in wind speeds up to 5 m/s. The performance of the UA 1404 is vastly superior to that of a windshield and would appear to have no impact on measurements in wind speeds of up to 10 m/s.

Noise measurement was in accordance with International Standards Organisation ISO 1996-2 – Acoustics – Description, measurement and assessment of environmental noise.

The unattended long-term measurement was at the occupied residence nearest to the station's coal store (Callinan Residence), the location of which is shown in Figure 6.1. The monitoring equipment was located approximately 50 m from the front of the house and away from the adjoining farmyard to avoid intrusion of specific noise events.

The noise log was analysed into Day (08:00 - 22:00) and Night (22:00 - 08:00) periods over the duration and the results are presented in Table 6.2.

Table 6.2: Results of Noise Monitoring

Period	Day	Night	Overall
Noise LAeq	47.1 dB	43.7 dB	46.01 dB
Noise LA90	31.4 dB	27.2 dB	28.7 dB

During the period of the survey a ship was being unloaded intermittently at the station's jetty, resulting in a slight increase in noise levels at these times.

The noise climate in the vicinity of the power station is typical rural with high values of LAeq recorded during the day due to traffic on the N67. Apart from local traffic, the N67 is an important national route, linking Co. Clare and Co. Kerry. Due to the cyclical nature of the Killimer - Tarbert car ferry, traffic tends to peak coinciding with ferry times. This results in peaks and valleys in traffic noise.

The L90 noise level, which is the noise level exceeded for 90% of the time, is usually considered to give a more correct description of background noise than Leq noise levels, which is the equivalent continuous noise level. This is because the use of Leq noise measurements allows corruption from relatively loud transitory noise events.

There is a very significant difference between the recorded L90 and Leq noise levels. The noise associated with operation of the power station is predominantly a steady state noise source and, while station operations inevitably make a contribution, a significant portion of this difference is accounted for by traffic noise from the N67.

The Leq levels presented clearly overstate noise solely associated with the powers station operations and the true Leq may be significantly lower than the noise levels presented in Table 6.1.

6.2 IMPACT OF THE DEVELOPMENT

6.2.1 Sources of Noise

The two most relevant types of noise emission for modern wind turbines are broadband and tonal noise emissions. Both of these are types of audible noise, the frequency range of which is generally taken to be the range of 20 - 20,000 Hz, with the greatest sensitivity to sound typically in the central 500 - 4,000 Hz region. A report for the UK Department of Trade and Industry (DTI) in 2006 concluded that neither low frequency noise, which is in the range of 10 - 200 Hz, nor infrasound, which generally refers to noise with frequencies below 20 Hz, was a significant factor at the separation distances from wind turbines that are typical of residential locations.

The sound spectrum of modern wind turbines has the same characteristics as broadband noise, i.e. there are no outstanding tones or pulsating variations to the sound level. Tonal noise, which overwhelmingly has mechanical origins, has generally been eradicated completely. Tonal noise due to mechanical sources is typically associated with the

rotation of mechanical equipment and pure tones tend to be related to the rotational frequencies of shafts and generators and the meshing frequencies of gears. However, the control of tonal noise from the mechanical systems is similar to that of noise control of any machine noise and can be achieved by attention to gear teeth, adding baffles and acoustic insulation to the nacelle, using vibration isolators and vibration mounts for major components, and designing the turbine to limit noises from being transmitted into the overall structure. These steps are part of the normal design of modern wind turbines.

Wind turbine technology has been greatly refined and modern turbines, such as those proposed, produce little noise.

There have also been other factors lessening the importance of noise of mechanical origin from wind turbines, notably their increasing size. Sizes have increased greatly over the past decade but mechanical noise does not increase with the dimensions of turbine as rapidly as aerodynamic noise.

Standing next to the turbine, it is usually possible to hear a swishing sound as the blades rotate and this is the modulation of aerodynamic noise produced at blade passing frequency (the frequency at which a blade passes a fixed point). The whirr of the gearbox and generator may also be audible. However, as distance from the turbine increases, these effects are reduced.

The noise a wind turbine creates is expressed in terms of its *sound power* level. Although this is measured in dB(A) re 10^{-12} watts, it is not a measurement of the noise level that is heard but of the noise power emitted by the machine. Under constant operational conditions, the *sound power* level will be constant, but the sound pressure at some distance will depend on the distance away, atmospheric conditions and topography.

The *sound power* level from a single wind turbine is usually 100 – 107 dB(A) re 10^{-12} watts at a wind speed of 8 m/s. This creates a sound pressure level of 55 - 60 dB(A) outdoors at a distance of 50 m from the turbine, i.e. about the same level as conversational speech. At a house 500 m away, the equivalent sound pressure level would be 30 - 35 dB(A) when the wind is blowing from the turbine towards the house. Because of the necessary separation between turbines for design reasons, it is usually the case that any receiver will only be influenced by few of the turbines in a wind farm.

There is an increase in turbine noise level as wind speed increases. However, ambient noise, the noise from wind in nearby trees and hedgerows, around buildings and over local topography, also increases with wind speed, as indicated by the noise monitoring undertaken near the site, but at a faster rate.

Wind turbines do not operate below the wind speed referred to as the cut-in speed (usually around 3 - 5m/s). Ambient noise is low in calm conditions and turbine noise could be more discernible. However, they are not in operation in these conditions.

6.2.2 Construction Noise

Construction activity will comprise standard construction techniques using standard equipment.

Construction works will effectively be limited to a small amount of earth moving, excavations and concreting. Excavations will be necessary for turbine foundations and for cabling. Concreting will be required for construction of foundations.

Noise levels for various distances were calculated from the *sound power* data for a

variety of construction plant types. The results, which are shown in Table 6.3, are expressed as dB LA_{eq} (12 hour) equivalent continuous noise levels, the standard units for construction noise.

Table 6.3: Noise Impact of Construction Activities

Distance	500 m	1,000 m	1,500 m	2,000 m
Earth Moving	45.2 dB(A)	37.7 dB(A)	33.3 dB(A)	30.2 dB(A)
Concreting	42.3 dB(A)	34.8 dB(A)	30.4 dB(A)	27.3 dB(A)

The noisiest construction activities are those associated with the excavation and pouring of the turbine bases. It is to be noted that these activities are not coincidental so the noise is not additive. Furthermore, unlike operational noise, construction activities are both short lived and typically occur only during daytime. Excavation of a turbine base can typically be completed in 1-2 days and concreting of a turbine base is usually conducted in one continuous pour, which is completed within a matter of hours.

While no formal limits exist for construction noise, standards that have been applied to large civil engineering projects tend to fall in the range of 70 - 75 dB LA_{eq} (12 hour) for daytime construction activities. Construction noise will evidently not create significant impacts.

There is no published Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. While acknowledging that local authorities, where appropriate, should control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion, the National Roads Authority (NRA) considers that the noise levels in Table 6.4 are typically deemed acceptable.

Table 6.4: Typical Construction Noise Limits

Days & Times	Monday - Friday 07:00 - 19:00	Monday - Friday 19:00 - 22:00	Saturday 08:00 - 16:30	Sundays & Bank Holidays 08:00 - 16:30
Limit Leq (1hr)	70 dB(A)	60 dB(A)	65 dB(A)	60 dB(A)

Predicted construction noise levels are evidently much below relevant limit values and significant impacts will not arise.

Ground-borne vibration due to construction is very rapidly attenuated over distance. BS 5228-2: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 2: Vibration discusses vibration attenuation at distances up to some tens of metres from the source. Vibration from construction activities, hundreds of metres from the receptors, and vibration from vehicle movements, with relatively low source levels, is considered to be not significant.

6.2.3 Operational Noise

Noise Limits

It is a requirement of the EPA to ensure that IPPC licensed sites do not cause unacceptable impact on the environment. This includes noise impact on the human

environment.

EPA noise limits are normally set to control fixed noise level sources and, therefore, fixed noise limits are appropriate. The noise limits that apply at Moneypoint Generating Station under IPPC Licence Reg. No. 605-02 are as follows:

3.5.1 Noise from the activity shall not give rise to sound pressure levels (Leq,T) measured at the specified noise sensitive locations which exceed the limit value(s) by more than 2 dB(A)

8.2 Activities on-site shall not give rise to noise levels off-site, at noise sensitive locations which exceed the following sound pressure limits (Leq,30min) subject to Condition 3 of this licence:

Daytime: 55 dB(A),

Night-time: 45 dB(A).

Annual reporting of noise levels indicates that the station is in compliance with the above limit values.

Unlike typical noise sources at licensed sites, wind turbine noise is directly related to wind speed. The DoEHLG Wind Energy Planning Guidelines suggest noise assessment based on comparison of predicted external noise levels with fixed limits when background noise is low or relative to background noise itself as it increases with wind speed, whichever is the greater. A common interpretation of these limits is as follows:

- 43 dB LA90 or 5 dB above background noise, whichever is the greater, for night-time.
- 45 dB LA90 or 5 dB above background noise, whichever is the greater, for daytime.
- 35 - 40 dB LA90 or 5 dB above background noise, whichever is the greater, for daytime when background noise is less than 30 dB LA90.

All operations within EPA licensed sites are currently required to meet the conditions of the licence. The EPA considers that, other than in specific cases where noise limits in line with the DoEHLG Wind Energy Planning Guidelines may be appropriate, where wind turbines are within sites licensed by it, the noise conditions in the operational licence should apply to the cumulative turbine and site noise. The following cumulative site and turbine noise limits are advised.

Table 6.5 : Cumulative Site and Turbine Noise Limits at EPA Licensed Sites

Period	Daytime	Night-time
Hours	08:00 – 22:00	22:00 – 08:00
Limit	55 dB LAr,T	45 dB LAeq

Noise Impacts

The DoEHLG Wind Farm Planning Guidelines (Section 5.6) notes as follows regarding noise impacts from wind turbines:

In general, noise is unlikely to be a significant problem where the distance from the nearest turbine to any noise sensitive property is more than 500 metres.

The predicted noise levels from the wind turbines at all surrounding residences identified in Figure 6.2 were determined using the computer programme WindPRO version 2.7.486 January 2011. The computer model performs calculations based on ISO 9613-2 Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General method of calculation.

The turbine noise characteristics used are based on the use of Vestas V112 3 MW rated turbines and are shown in Table 6.6. The turbines will be certified free of audible tonal or impulsive qualities in the sound.

Table 6.6: Turbine Noise Characteristics

Wind Speed m/s	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8+ m/s
Lwa Ref dB(A)	94.7	97.3	100.9	104.3	106.0	106.5

In terms of noise characteristics, these turbines are representative of the noise ratings associated with modern turbines of the size proposed. Noise levels peak at a wind speed of 8 m/s with noise levels at wind speeds in excess of this being the same or lower.

Results of the WindPRO analysis for all residences assessed are presented in Appendix B.

The worst case exposure to potential noise impact will be the properties identified as H6 and H7 on Figure 6.2, where all residences surrounding the site are shown. Table 6.7 presents predicted noise levels associated with the turbines and the cumulative impact of turbine noise and site noise and limit values for wind speeds from 3 m/s to 8 m/s.

Table 6.7: Predicted Noise Impacts at Residences H6 & H7

Wind Speed	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8+ m/s
Noise Level dB(A)	30.9	33.5	37.1	40.5	42.23	42.7
Daytime	Limit 55 dB(A)					
Cumulative Noise dB(A)	47.2	47.3	47.5	48.0	48.3	48.4
Night-time	Limit 45 dB(A)					
Cumulative Noise dB(A)	43.9	44.1	44.6	45.4	46.0	46.2

The results indicate that the noise limits in IPPC Licence Reg. No. 605-02 (Conditions 3.5.1 & 8.2, as cited above) are not exceeded.

The conservative nature of the calculations undertaken provide assurance that noise levels will actually be lower than predicted.

It has been shown, by measurement-based verification studies, that the ISO 9613 Part 2 model tends to slightly overestimate noise levels at nearby dwellings. The model adopts a number of very conservative assumptions including the following:

- Downwind propagation is modelled in all directions, whereas in reality noise propagation biases towards downwind locations. Thus, predicted values are over-estimations upwind and crosswind of the proposed wind turbines.
- Whereas in reality the ground is predominantly porous, i.e. acoustically absorptive, the ground coefficient was modelled as $G = 0.5$, indicating a mixed environment, i.e. a

combination of hard and porous.

- The receiver height was 4 m, equating approximately to first floor window level, at which height a predicted noise level of up to 2 dB(A) higher can be expected compared to a height of 1.2 - 1.8 m, which is typical of the listening height for humans.
- Noise attenuation by physical barriers such as topography and belts of trees is discounted.

6.3 MITIGATION

State-of-the-art wind turbines will be used, bringing to the project the dramatic improvements in noise attenuation that the latest developments in wind turbine technology have realised.

The turbines will be kept in good working order and will be maintained on a regular basis. This will minimise the potential for noise or vibration impacts resultant of faulty or worn out components.

Noise Controls

The wind turbines proposed are pitch controlled variable speed machines, meaning that unlike older technology fixed speed machines, which operated at one or possibly two speeds regardless of the wind speed, by design these turbines operate at a range of different rotor speeds and can vary their rotor speed on demand.

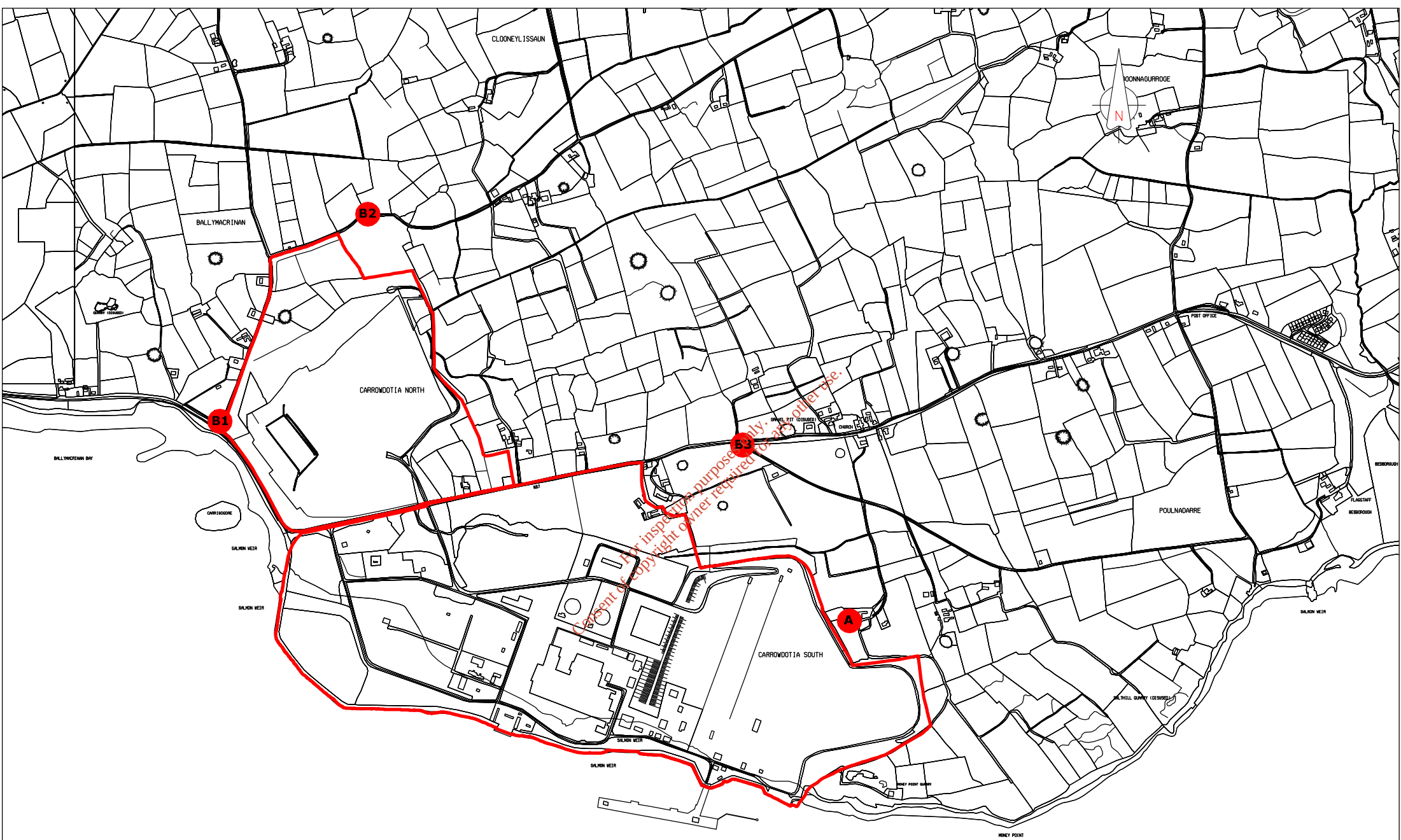
As blade noise is related to blade tip speed and the turbines are capable of being operated at varying rotor and pitch settings, the turbines can be tuned either aggressively for maximum energy recovery or, in noise sensitive areas, for lower energy recovery and lower noise on a turbine by turbine basis.

It is possible to reduce or eliminate localised impacts on a residence by selecting the appropriate turbine power curve and warranted lower noise levels can be achieved by use of the noise reduced operation modes as necessary.

No speed control measures are proposed at Moneypoint. However, these are available and may be incorporated during commissioning noise tests to ensure noise levels are within limits.

6.4 CONCLUSIONS

The proposed development will not result in significant adverse environmental impacts.



The following 5000 mapping sheets 4789 & 4790 is shown in this drawing:

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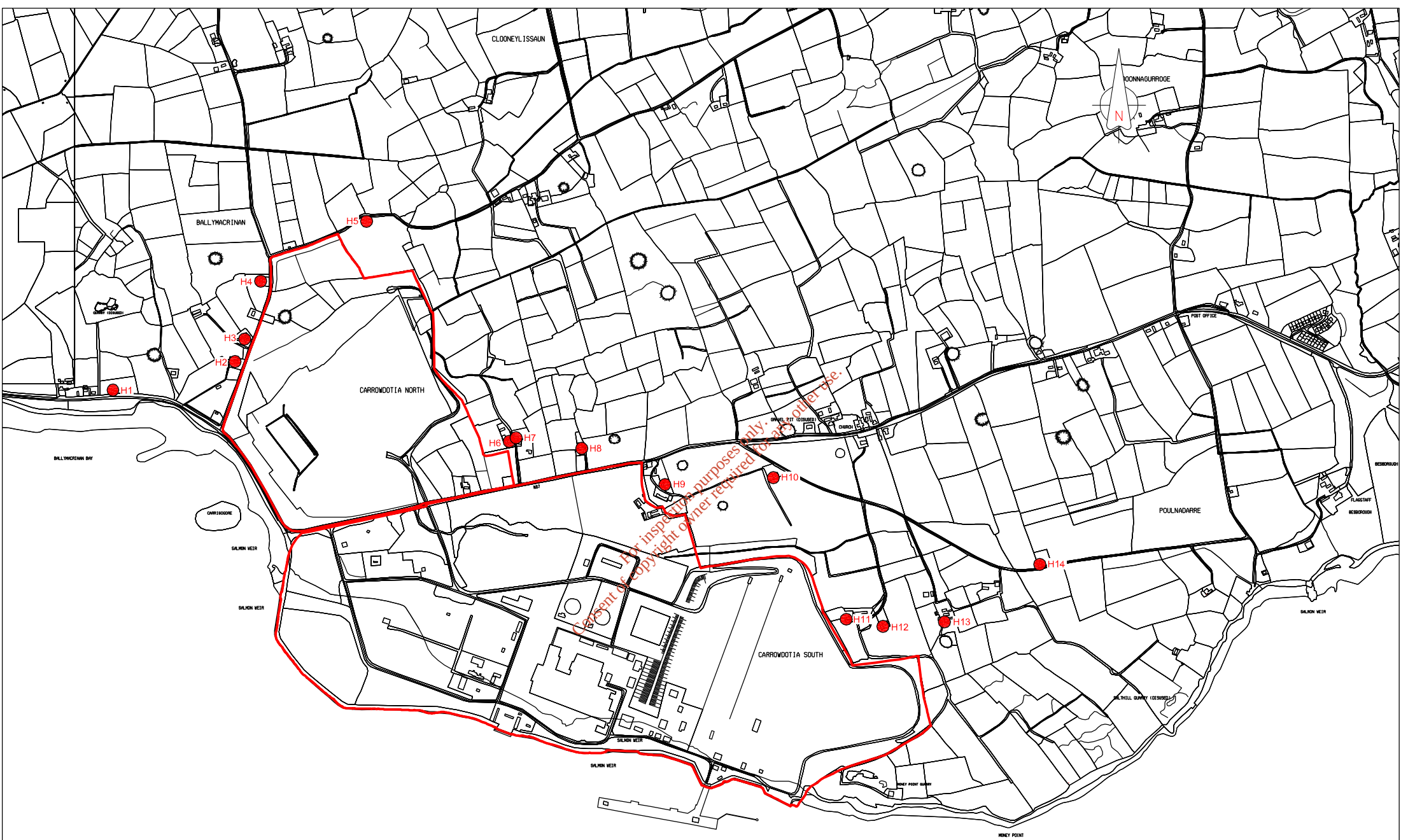
Figure 6.1 - Noise Monitoring Locations

Legend:

Land Boundary

B1

Noise Monitoring Locations



The following 5000 mapping sheets 4789 & 4790 is shown in this drawing:

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Legend:

- Land Boundary
- H1 House Locations

Figure 6.2 - Noise Analysis - Locations of Residences

7. SHADOW FLICKER

7.1 RECEIVING ENVIRONMENT

Wind turbines, as with trees or any other tall structure, can cast long shadows when the sun is shining and is low in the sky. A phenomenon known as shadow flicker, which could be considered a nuisance, even though the effect would be very short-lived, could occur under certain conditions. This is where the blades of a wind turbine cast a shadow over a window in a nearby house. The rotation of the blades might cause a shadow to be cast about once per second in the room whose window is affected.

The shadow flicker effect lasts for just a short period and depends for its occurrence on the following factors:

- The sun not being obscured and being at a low angle in the sky.
- The turbine being directly between the sun and the affected property.
- There being enough wind for the turbines to be in operation.

It is part of the nature of long shadows that they pass any particular point relatively quickly and, due to the movement of the sun across the sky, the effect, if present, lasts for only a short period of time. It is generally only observed in the period after dawn and before sunset as the sun is rising and setting.

Concerns about shadow flicker have largely arisen in continental countries where wind turbines are located much closer to dwellings than is the practice throughout in Ireland and where in summer months there is a high frequency of sunshine at dawn and before sunset.

Shadows that are cast outdoors are not considered a nuisance any more than shadows from trees moving in the wind.

7.2 IMPACT OF THE DEVELOPMENT

Where a window in a property is sufficiently far away from a wind turbine, the blades of the turbine will not appear to be chopping the light.

The DoEHLG Wind Farm Planning Guidelines (Section 5.12) note as follows:

At distances greater than 10 rotor diameters from a turbine, the potential for shadow flicker is very low.

Shadow flicker analysis was carried out for all residences surrounding the site (see Figure 7.1) using the computer programme WindPRO, which calculates times throughout the year when the disc outlined by a rotating turbine blade viewed from the window of a house is in line with the sun and therefore shadow flicker could occur.

Shadow flicker calculations were conducted based on a notional window measuring 1 m wide x 1 m high and facing directly toward the closest turbine. The centre height of each window was assumed to be 2 m above ground level.

Further to the above the following was assumed in the analysis:

- All residences have a window that is oriented in such manner that it could potentially be affected.

- There is no intervening vegetation between turbines and receptors.

7.2.1 Predicted Impact

The full results are summarised in Table 7.1. The calculations indicate that all but one property (H6) has a potential to be affected by shadow flicker.

Table 7.1: Potential Shadow Flicker Occurrence

House	Annual Hours	House	Annual Hours	House	Annual Hours
H1	5:35	H7	14:57	H12	6:24
H2	8:15	H8	8:09	H13	4:25
H3	4:31	H9	6:33	H14	1:19
H4	2:00	H10	1:47	H15	0:33
H6	15:22	H11	2:32	H16	0:26

In the above, the potential annual hours have been automatically calculated by applying three factors to theoretical values, namely the rotor plane factor, the sunshine hours factor and the operational hours factor.

- It is unlikely that the wind and thus the rotor will track the sun, so there will be occasions when the rotor plane is in line with the sun direction and no flicker will occur. (The orientation is determined by the wind rose for the site, which has been derived from the on-site wind monitoring campaign at Moneypoint. An alternative assumption of a random rotor position leads to a reduction to approximately 63% of the theoretical results.)
- The sun will not be shining during all daylight hours. (The long-term mean value is typically less than 30% of daylight hours, but evidently this varies from month to month. Records from the nearest meteorological station for which such records are available indicate average daily sunshine hours ranging from 1:04 hours in December to 5:47 hours in May.)
- Long-term wind speed records are applied to take account of periods when wind speed is below the turbine cut-in wind speed. (Values used are derived from the on-site wind monitoring campaign at Moneypoint. Typical values are the range 80% - 85%.)

Further to the above, turbines will be unavailable for operation at certain times, due for instance to routine and emergency maintenance, substation outages, etc. These factors also reduce potential shadow occurrence, but they are not reflected in the results.

7.2.2 Assessment

The DoEHLG Wind Energy Planning Guidelines (Section 5.12) recommends that shadow flicker should not exceed 30 hours annually. Predicted maximum annual occurrences (15:22 hours at house H6 and 14:57 hours at H7) are approximately 50% of this recommended limit value.

The Guidelines suggest that this limit should apply at neighbouring offices and dwellings within 500 m. At Moneypoint all residences at which shadow flicker was analysed, including H6, are more than 500 m from the nearest turbine and in that context the

predicted annual hours above are evidently low.

The following factors, of which no account has been taken in the analysis, also arise:

- The rooms whose windows are potentially affected will not be in use at all times that shadow flicker could occur.
- Occupants in rooms that are potentially affected will not be awake at all times that shadow flicker could occur.
- The impact of internal light levels and the presence of blinds or curtains on the potentially affected windows will have a mitigating effect.
- The presence of natural features such as trees and hedges, which will reduce or eliminate shadow flicker occurrence, has not been taken into account.

Shadow flicker analysis is based on the potential for even faint, partial shadows to be cast by the blades of a turbine. However, because of the distance of all houses from the turbines, at most only some of the sun's light can ever be blocked out. A sharp shadow will never be cast on a residence by a blade.

The combined effect of many factors pertaining to the geometry of shadows and the dimensions and geometry of wind turbine blades is to greatly reduce the effect and impact of shadow flicker. It will actually be imperceptible for a significant amount of the time that blades are passing between the clear sun and a window of a residence.

The flickering frequency of the any shadow occurring depends on the rate of rotation and the number of blades. It has been recommended that the critical flickering frequency should not be above 2.5 Hz, so as to avoid any possible potential to impact upon sufferers of a condition known as photosensitive epilepsy. (The UK National Society for Epilepsy identifies this threshold criteria as being 3 Hz). For a three bladed wind turbine this is equivalent to a rotational speed of 50 revolutions per minute (rpm). The turbines are likely to operate at a maximum of 19 rpm. Therefore, the health impact of flicker frequency is not considered further.

7.3 MITIGATION

It is evident that, without operational constraints, the actual occurrence of shadow flicker at Moneypoint will be very low and well below the accepted limits of tolerance.

The principal means of reducing the potential for shadow flicker is by turbine siting and maintaining a suitable turbine exclusion zone around sensitive receptors. However, if a flicker nuisance was identified after entering service, the impact could be mitigated by restricted running of the problem turbine(s) during the few hours when shadow flicker was a problem.

7.4 CONCLUSIONS

It is considered that significant impact from shadow flicker will not arise.

8. FLORA & MAMMALS

This flora and mammals assessment reviews earlier ecological assessment work carried out at Moneypoint during 2001 by Mrs Eleanor Mayes (Ecological Consultant).

8.1 RECEIVING ENVIRONMENT

8.1.1 Methodology

Desktop Review

Before visiting the site a desktop review was carried out to identify any features of ecological significance that occur within or close-by. The broader ecological context is addressed by assessing the site and any surrounding areas of ecological interest, i.e. areas with environmental designation as Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

The review of public information and other available documentation included the National Parks and Wildlife Service (NPWS) site synopses of the surrounding environmental designations. Environmental Protection Agency (EPA), Geological Survey of Ireland (GSI) and NPWS web browser GIS maps were also reviewed for relevant information.

The legislative and statutory contexts are presented in Appendix C.

Field Survey Work

Field survey work was carried out in 2001 in connection with the planning application for the permitted wind farm development at Moneypoint. Further surveys were undertaken in 2010 in spring (May) and autumn (late-August and early September-2010).

Habitats: The site and surrounding areas were walked. Habitats were identified and target notes were made on all semi-natural habitats encountered during the survey including notes on dominant vegetation, possible presence of rare or scarce species, topography, disturbance and management.

Amphibians: The survey was conducted by searching any water bodies i.e. ditches and ponds on site.

Mammals: The survey assessed usage of the site by all mammals (including coastal otters). All mammals recorded during site visits were noted and listed. Signs and tracks of mammals are the best way of assessing a site without conducting night surveys. All signs and tracks were assessed as they were encountered in the field.

Bats: The survey, which was conducted over one day and two nights, assessed usage of the site by bat species. Weather conditions were suitable with night-time temperatures of 10 - 13 °C. All bats recorded during site visits were noted and listed. Signs and droppings of bats were checked for at all accessible potential roost sites during day surveys. The entire site was surveyed as far as accessibility allowed.

Dolphin & Whale: No specific field work was undertaken and the desktop assessment reviewed sightings for the locality.

8.1.2 Location and Setting

Most of the Moneypoint site that fronts onto the Shannon Estuary is rock armoured reclaimed land, with a small area of low rocky cliff at the eastern end of the site. The

shoreline to the west at Ballymacrinan Bay is a narrow steeply shelving cobble / gravel beach, sloping up to low / very low soft cliffs. Rock excavation in the coal store has left steep faces of broken / eroded rock surface running up to the site boundary. In this area, soil berms have now matured with vegetation, especially on the exterior of the site boundary.

The site includes a range of habitat types from the almost entirely un-vegetated coal store and gravelled yard areas, to landscaped and regularly mown grassed areas, an ash storage area, much of which have been levelled and sown with grass, and new and established mixed woodland. The general surrounding area is gently rolling agricultural countryside with almost all land under grass. There is no extensive drainage network and natural drainage at the locality is good. There are no watercourses within the site.

Several old derelict buildings with bat roost potential also exist on or near the site.

8.1.3 Designated and Non-Designated Areas

The site is not part of any site designated for nature conservation. Nearby designated sites are as follows:

- Lower River Shannon Special Area of Conservation (SAC) (site code 111025) forms the southern boundary of the site and extends along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km.
- St. Senan's Lough Proposed Natural Heritage Area (pNHA) (site code 001025) is located approximately 3 km to the north.

Details of the above are presented in Appendix C, where other designated sites within the broader area are also identified.

A group of Irish NGOs published a shadow list of SACs in 2000 to highlight perceived deficiencies in the government list of SACs. None of the more than 500 sites suggested for designation is within or close by the study area (Dwyer, 2000).

Similarly in 2000, the Irish Peatland Conservation Council (IPCC) published a list of wetland sites that it believed merit further survey and possible designation (Crushell, 2000). None of those sites occur within or close by the wind farm site.

8.1.4 Habitats

The flora and habitats of the site were surveyed using Phase 1 habitat survey methodology. Habitats present were classified according to Fossitt (2000). Plant species nomenclature follows Webb et al (1996) and follows Scannell and Synnott (1987).

No red data book plant species were recorded within the site and, considering the quality of habitats present, it is deemed unlikely that any rare or threatened plants occur.

Two rare or protected species are identified within the 10 x 10 km grid square (as outlined in the NPWS web browser mapping tool). Within grid square Q94 *Mertensia maritime* is found along the north estuary coastline. The grid square to on the opposite south bank of the estuary identifies that *Mentha pulegium* is present at Tarbert Bay (Grid square R04).

A total of 13 habitat types were recorded and their distribution is shown in Figure 8.1.

Improved Grassland (GA1)

Improved agricultural grassland has been planted / reclaimed in the ash storage area in the northern part of the site, where the area is re-vegetated with grasses comprising a

ryegrass / white clover mown sward, with occasional Yorkshire fog, common mouse-ear and ribwort plantain (Figure 8.10).

This habitat is common throughout the wider countryside and is not considered to be of conservation importance. It is regarded as being of Low value, as it is classified as a semi-natural habitat.

Amenity Grassland (GA2)

Amenity grassland is established around the site entrance, the Visitor Centre and on screening mounds within the site. It is a regularly mown and fertilised sward. This habitat is of low ecological value, but is relatively long established compared with the improved agricultural grassland in the ash storage area and it provides some feeding habitat for fauna.

This habitat (Figure 8.12) is common throughout the site and is not considered to be of conservation importance. The habitat is regarded as being of Low value, as it is classified as a semi-natural habitat.

Spoil and Bare Ground (ED2) & Recolonising Bare Ground (ED3)

Spoil and bare ground is extensive within the power station site. The operational section of the ash storage area is entirely un-vegetated (Figure 8.9). There is no vegetation over most of the coal store, with a sparse flora present in less disturbed areas to the south and east. These are vegetated with a sparse cover of red fescue, Yorkshire fog, hawkbit, daisy, mayweed, teasel, ribwort plantain, soft rush, and occasional small plants of willow and gorse.

A further area of bare ground with a gravelled / crushed rock surface lies to the west of the power station main buildings. It supports a very sparse vegetation of buck's-horn plantain, moss, daisy, mayweed, Yorkshire fog, willowherb, bird's-foot trefoil, white clover, and willow. Wind turbine T3 is proposed for this area. This habitat is of low ecological value.

Artificial Lake and Ponds (FL8)

There are two artificial water ponds. One at the ash storage area that acts as a reservoir for use in wetting newly deposited ash has a sparse marginal flora of common reed, great willowherb and bulrush. An aquatic algal mat has formed over part of the surface. A further small artificial reservoir, which has no ecological value, is present to the south-east of the site.

Some small pools are present in the spoil and bare ground habitat. These were dry during the 2010 visits and any aquatic vegetation had died back. During wetter periods they are expected to be vegetated with bulrush and ivy-leaved crowfoot, with a marginal vegetation of curled dock, great willowherb, soft rush, toad rush and jointed rush. These pools are of low ecological value.

This habitat is not considered to be of conservation importance. It is regarded as being of Low value.

Semi-natural Woodland (WN1/2)

This woodland area pre-dates construction of the power station and is dominated by mature, wind stunted oak trees. Beech, hazel, ash, birch and alder are occasional, and crab apple occurs rarely. The woodland margins are dominated by willow, blackthorn and

birch. The shrub layer is dominated by bramble, with occasional holly, honeysuckle and bracken. The ground flora is dominated by ivy, with lesser celandine, bluebell, herb robert, opposite-leaved golden saxifrage, creeping buttercup, wood sorrel, wild strawberry, foxglove, nettle, sedges, soft rush, wood rush, and Yorkshire fog. Hard fern and lady fern are occasional. This habitat is of high ecological value. The areas with mature woodland have increased during the operation of the power station. The area surrounding a derelict house and out houses east of the 400 kV lines is now overgrown and impassable. The area immediately south east of the ash storage area has also matured. Many patches of mature trees exist along the northern boundary at Carrowdotia South and especially along sloped topographical bank separating the coal store from the surrounding agricultural lands. This habitat is of high ecological value.

The habitat is regarded as being of Moderate value and of local importance, as it is classified as a semi-natural habitat.

Mixed Broad-leaved Woodland (WD1)

This woodland area is a semi-mature alder, ash and pine plantation with trees up to 6 m in height (Figure 8.8). The ground flora is dominated by a species poor moss flora with ivy, bramble and lesser celandine, occasional male fern and clustered dock. It is of moderate ecological value, which is expected to increase as the trees mature and a more typical woodland ground flora and shrub layer develops. This habitat is of high ecological value. This habitat not common throughout the wider countryside and it is considered to be of conservation importance.

The habitat is regarded as being of High value and of local importance.

Immature Woodland (WS2)

There are fairly extensive areas of immature woodland planted in the northern part of the site. Young trees are ash, oak, pine and larch. Blackthorn, bramble, gorse and willow are frequent within the planted area in the northernmost part of the site. Elsewhere, the ground flora is dominated by grasses. This habitat is currently of low / moderate ecological value, but will increase in value as the plantation matures. This habitat is not common throughout the wider countryside and it is considered to be of conservation importance.

The habitat is regarded as being of High value and of local importance.

Conifer Plantation (WD4)

There is a small area of conifer plantation within the ash storage area. Immature conifer trees also exist directly under the 400 kV lines and in small patches around the yards in the west of the site. This habitat is currently of low / moderate ecological value.

The habitat is regarded as being of Low value, as it is classified as a semi-natural habitat.

Scrub (WS)

Gorse dominated scrub with occasional broom has developed on steep slopes on the eastern perimeter of the power station site and around the soil berms adjoining the coal store. Willow, honeysuckle, blackthorn and bramble are frequent in some areas. There is a sparse, grassy ground flora. This habitat is of moderate ecological value. This habitat not common throughout the wider countryside and it is considered to be of conservation importance.

The habitat is regarded as being of High value and of local importance.

Ornamental / Non-native Shrub (WS3)

Ornamental shrubs are planted at the site entrance, along the main road within the power station site and near the reception area. This habitat is of low ecological value and is not considered to be of conservation importance.

The habitat is regarded as being of Low value, as it is classified as a semi-natural habitat.

Sheltered Littoral Rock Shores (LR3)

This habitat type (Figure 8.13) is present as the southern boundary of the power station site as part of the Lower River Shannon SAC. This habitat is of high ecological value.

The habitat is regarded as being of High value and of international importance.

Estuaries (MW4)

This habitat type is present beyond the southern boundary of the power station site as part of the Lower River Shannon SAC. This habitat is of high ecological value.

This habitat type is regarded as being of High value and of international importance.

Buildings and Artificial Surfaces (BL3)

This habitat type is present across the majority of the central part of the power station site. The rock-armoured coastline immediately fronting the industrial site is included in this classification. This classification covers large parts of the site and is not considered to be of conservation importance.

The habitat is regarded as being of Low value, as it is classified as a non-natural habitat.

8.1.5 Mammals

Mammal Survey - Results 2001

The 2001 mammal assessment information has been consulted as part of this assessment. It reported as follows:

Mammals recorded as present in the Moneypoint Wind Farm site were badger, fox, hare, and rabbit. Additional species likely to be present are hedgehog, pygmy shrew, field mouse, stoat, and possibly bank vole. Rabbit droppings were frequent within the site area in grassland and re-colonising bare ground habitats. Hares also frequent these areas. Fox scat was found occasionally throughout the site. Badger signs were frequent in the northern part of the site in immature woodland and mixed broadleaved woodland; it is likely that setts occur in these habitats, but since they will not be impacted by the proposed development detailed searches were not carried out. Tracks led from these areas to adjoining farmland, where badgers are likely to forage.

Mammal Survey – Results 2010

Results similar to 2001 were recorded in the 2010 mammal survey. Badgers dropping were recorded in the northern section of the site. Foxes were recorded at night in the agricultural lands to the north and east. Several rabbits were identified during night surveys across the site.

In addition, otter activity was recorded. Evidence of their activity was found to the east of the jetty within the industrial site where otter spraints were found on the rock armour to the front of the site (see Figure 8.3). Evidence was also found along rocks above the high

tide mark at Ballymacrinan Bay. These locations do not appear to be regularly frequented by otters as only old spraints and feeding remains were found. Fresh otter spraints were identified to the east of the power station along the natural sections of rocky / cobble and reef coastline.

8.1.6 Bats

The first night survey concentrated on areas outside the power station area in the immediately adjacent agricultural lands to the east. The second night survey covered all areas within the industrial area including the eastern perimeter and the ash storage area. Emergence checks were carried out at two potential roost locations over the two nights.

The site surveys indicate that bats exist in the locality and survey results are presented in Figure 8.2. There are patches of optimum habitat conditions in parts of the site, while large areas of unsuitable habitat also occur. Only areas where bats were recorded feeding / foraging and commuting are identified on the bat survey map.

Bats Survey - 2nd September 2010

Roost Inspection Results

Five potential roost sites were investigated during the day and night. On the basis of the daytime assessment, an emergence monitoring site was established at the gates of an overgrown inaccessible derelict former house immediately adjacent the 400 kV lines, as shown on Figure 8.2. Bats were recorded exiting the house and flying northwards. Solitary pipistrelles were recorded commuting approximately every 2-3 minutes with approximately 15 bats being recorded along the overgrown driveway over a 16-minute period. It is believed that this building is being used as a bat roost by pipistrelles and possibly other species, which use the adjacent and surrounding mature mixed oak, ash, hazel and beech woodland as a feeding ground. Close to this area and directly under the 400 kV lines a *Myotis* sp. bat was recorded foraging within woods near the roadside.

An additional potential roost was investigated east of the site boundary near the point marked as the 'Salmon Weir' on Figure 8.2. Mature trees and light scrub surround this derelict building. The general locality is low lying and sheltered from the wind, providing immediate access to many moderate areas of feeding habitat in the surrounding countryside. However, bats were not recorded in large numbers, nor were any recorded roosting. Two pipistrelles were recorded feeding adjacent to this area along the tree-fringed roadside. Several other potential roost sites, as shown on Figure 8.2, were investigated but no activity was recorded.

Night Results

Moderate numbers of pipistrelles were recorded commuting along the country roads and they were also recorded commuting in small numbers (four or less) along the N67 adjacent to the power station boundary. The largest numbers of pipistrelles (all feeding) were recorded along the public road between Ballymacrinan and Carrowdotia North. Here, a minimum of 12 soprano pipistrelles was recorded. There are significant lengths of high quality hedgerows with mature tree lines and an area of woodland and scrub exists just off the road. Feeding and commuting habitat is considered good in the general locality. No bats were recorded feeding along the main road or the county road from the church to Pouladaree (east of site), which both have severely trimmed hedges. However, the occasional pipistrelle was recorded commuting past. A possible *Myotis* sp. was recorded feeding under a mature tree on the country road leading south to the farm

building private house and disused quarry to the east of the site. Five soprano pipistrelles were also recorded feeding along this road. A further two soprano pipistrelles were recorded feeding at the sheltered low-lying area proximal to the salmon weir east of the site. While a potential roost also exists here, there was no evidence suggesting a large roost. Some Anabat sonograms from the field surveys are presented in Figures 8.15 & 8.16.

Bats Survey - 6th September 2010

Roost Inspection Results

Four potential roost sites were investigated during the day and night. A modern but disused power station building at the southwest corner of the mature mixed woodland was inspected for signs of bats. No evidence or activity was recorded externally or internally. The exteriors of two further small buildings were inspected near the pond / water reservoir at the ash storage area. Bats were recorded foraging near these building, but none was noted entering / exiting and / or roosting.

Night Results

An emergence site was established at the same location as previously but smaller numbers of pipistrelles were recorded on this occasion. Surveys were concentrated on areas within the power station site. Moderate numbers (~12) of soprano pipistrelles were recorded feeding along the road to the pond and over the pond east of the ash storage area. No bats were recorded over the adjacent ash storage area or along the western site boundary. One pipistrelle was recorded feeding underneath the N67 under-bridge. Again, pipistrelles were recorded commuting along the N67 adjacent to the woodland area. A *Myotis* sp. was recorded feeding within the wooded area where it borders the internal station road. Here three pipistrelles were also recorded commuting in opposite directions along the woodland fringe. Moderate numbers of soprano pipistrelles were also recorded feeding along the scrub and tree-lines which have matured on the soil berms which enclose the coal store and industrial site from the adjacent agricultural farmland at Carrowdotia South (see Figure 8.2).

No bat activity was encountered across any of the built areas of the power station and no activity was recorded around any of the areas of amenity grasslands and re-colonising bare ground. Some Anabat sonograms from the field surveys are provided in Figures 8.15 & 8.16.

Bats Survey Results - Summary & Evaluation

Bat activity within the locality is as expected for the habitats present.

Bat numbers on site are moderate and all bat activity is concentrated around the areas of habitat that provide suitable foraging areas and commuting routes for bats. Bat numbers are moderate to high around the sheltered scrub and woodland areas, but are low to absent around most of the built-up areas of the power station and its surroundings.

Soprano pipistrelles are the most common species present. Some common pipistrelles were also recorded and there were four *Myotis* sp. encounters on site. No lesser horseshoe bats were encountered. No bat roost of conservation status was identified at the site, although it is believed that one may exist at the inaccessible derelict building near the 400kV lines. A significant area of optimal feeding habitat exists within the dense stand of mature mixed woodland and bat activity may be high within this area.

No bats were recorded using any of the power station's many night-lights as feeding posts, probably because more suitable and abundant prey is available elsewhere, where semi-natural areas also provide the feeding bats with cover from potential predators. Commuting bats travelled along areas with suitable vegetation and not along any built features of the site.

8.1.7 Amphibians

Frogs were not recorded on site but are expected to be present, especially at the ponds on site that which hold water during wetter periods.

There is no particular amphibian biodiversity of conservation status at the site.

8.1.8 Whales and Dolphins of the Shannon Estuary (desktop review)

To date 24 cetacean species (whales, dolphins and porpoises) have been recorded in Irish waters (Irish Whale and Dolphin Group <http://www.iwdg.ie/>). Parturition in Irish waters has been confirmed for a number of species including harbour porpoise, common dolphin, bottlenose dolphin, Risso's dolphin, white-sided dolphin and white-beaked dolphin and pilot whale, while other species such as bottlenose and minke whale are also suspected of breeding (Berrow <http://iwdg.ucc.ie>). Many species are not breeding in Irish waters but migrate annually along the western seaboard, while others are vagrants on the edge of their range in the northeast Atlantic and only occur occasionally (Berrow <http://iwdg.ucc.ie>).

The Shannon Estuary is one of the most important sites for the conservation of cetaceans in Ireland. It is home to the only known resident group of bottlenose dolphins (*Tursiops truncatus*), who breed there and whose number residing in the Estuary was estimated in 2001 at approximately 113 individuals (Dr. Simon Ingram, *pers. comm.*). The population that occurs here is one of only six known resident European populations. The presence of neonatal calves only from July to September indicates that there is a marked breeding season for this population and that the area is important as a nursery area (Rogan et. al. 2000). Research has also shown that the Shannon Estuary population is genetically discrete from a coastal population and putative offshore population in Ireland.

Studies indicate that, while they were seen throughout the Estuary, dolphins exhibited preferential use of two critical areas (Rogan et. al. 2000; Ingram and Rogan 2002). Large groups were frequently observed in the narrow waters at Kilcredaun and in the mouth of the estuary. The second critical area, identified further upriver around Moneypoint and Tarbert / Killimer, was comprised of a smaller number of individuals. Both critical areas were located in deep parts of the estuary within fast tidal currents.

The Lower River Shannon designation is based on the presence EU Habitats Directive Annex I habitats and Annex II species. These include the bottlenose dolphin, sea lamprey, freshwater pearl mussel, Atlantic salmon and otter. The Estuary also supports the harbour porpoise and a variety of whale species. Recent sightings around the mouth of the Estuary include bottlenose and common dolphin, harbour porpoise, minke whale and humpback whale (Irish Whale and Dolphin Group as of 09/09/2010). Other species that have stranded in the estuary in the past include striped dolphin (April 2010 at Poulnasherry) and pilot whale (July 2004 also in Poulnasherry Bay) (Shannon Dolphin and Wildlife Foundation <http://shannondolphins.ie>).

8.2 IMPACT OF THE DEVELOPMENT

8.2.1 Impacts on Habitats and Plant Species

Silt laden run-off to watercourses and aquatic habitats is the most significant potential impact of wind energy developments. If chronic high-suspended solid loadings were to be encountered in the runoff, this could have the potential to directly and indirectly impact on aquatic biota. However, any impact arising would be temporary, being associated only with construction phase.

The site has no natural drainage ditches or watercourses and pollution of watercourses is not a potentially significant issue due to the nature of the development.

Normal precautions that are adopted in the design and construction of wind farms will ensure that no siltation or negative impact on the Lower River Shannon will arise from Moneypoint Wind Farm.

The proposed development will cause direct habitat loss of small insignificant amounts of the following habitats:

- Improved Grassland (GA1)
- Amenity grassland (GA2)
- Spoil and bare ground (ED2)

These habitat types are of low-moderate ecological value and the minor losses arising are not significant. There is no potential for habitat fragmentation as part of the development.

Other habitats are not effected by the development.

The occurrence of two rare or protected species (*Mertensia maritime* in grid square Q94 and *Mentha pulegium* in grid square R04) has been identified within the 10 km x 10 km grid square (as outlined in the NPWS web browser mapping tool). Any presence of these species along the coastal area of the site will not be affected by the development, as no removal of coastal habitat is proposed.

8.2.2 Impacts on Mammals, Amphibians and Bats

There will be no significant impact on the various mammal species that inhabit the site and surrounding areas. All the species recorded, or considered likely to occur, would be expected to continue to be found in the area after the wind farm is completed.

The wind farm will constitute an insignificant impact on amphibians.

The proposed locations of the turbines are not adjacent to or within any areas of actual or potential areas of valuable feeding or roosting bat habitat. They do not have the potential to pose any significant habitat or commuting impact on bats within the locality.

No bat roosts of conservation status were identified on site and no potential bat roosts will be affected by the proposed development. Although there are areas of valuable bat feeding habitat present, no areas of significant bat feeding habitat will be affected by the development. There is no significant bat-commuting route identified within the path of or near to any turbines. The wind farm will constitute an insignificant impact on bats.

8.2.3 Whales and Dolphins

Concern has arisen that sounds introduced into the sea by humans could have

deleterious effects on marine mammals that obtain much information about their environment by listening to the sounds from other natural sources, as well as from members of their own species. Sound, unlike light and other possible stimuli, is transmitted very efficiently through water. Man-made acoustic disturbance may interfere with the mammals' ability to detect calls from conspecifics or echolocation pulses. Secondly, it may disturb their behaviour, from brief interruptions to short- or long-term displacement from noisy areas. Thirdly, strong sound may cause temporary or permanent reductions in hearing sensitivity (Richardson et. al. 1995).

Although whales and porpoises are known to occur within the Estuary, it is the resident group of bottlenose dolphins that have the potential to be affected by any acoustic disturbance caused by onshore construction activities.

Short- or long-term disturbance during the breeding season of bottlenose dolphins may result in reduced foraging opportunity / nurturing at this critical time. Reported reactions of animals to noise include a cessation of feeding, resting, socialising, and the onset of alertness or avoidance (Richardson et. al. 1995). For many marine mammals, disturbance is known to have occurred at continuous noise levels of about 120 dB (Mahtab 2005).

However, the significant construction activities that have taken place at Moneypoint evidently have all been completed without significant impacts. These included the initial development of the station, significant features of which included in excess of 3,5000,000 m³ of earth moving that involved blasting and extensive marine piling for the station's deep water jetty, and most recently the Environmental Retrofit Project.

Furthermore, routine sources of noise, such that arising from the passage of ships in the Estuary, unloading of coal at the Moneypoint jetty and operation of the Tarbert – Killimer ferry, appear not to have had significant impacts on the population of bottlenose dolphins that preferentially use the upriver part of the Estuary near Moneypoint. Research in 2010, in combination with previous studies, suggests the population is stable.

The wind farm development will involve five wind turbine foundations only. The excavation for each base typically can be completed in 1-2 days and concreting of a turbine base is usually conducted in one continuous pour, which is completed within a matter of hours.

This is a very modest scale of activity in construction terms and significant impacts are not expected.

8.3 MITIGATION

No mitigation measures are proposed in respect of amphibians or bats.

While the habits present are of low conservation value, habitat disturbance in areas of semi-natural habitat during construction work will be confined to within the direct landtake of the wind farm.

Construction machinery will be restricted to designated access routes to the turbine locations.

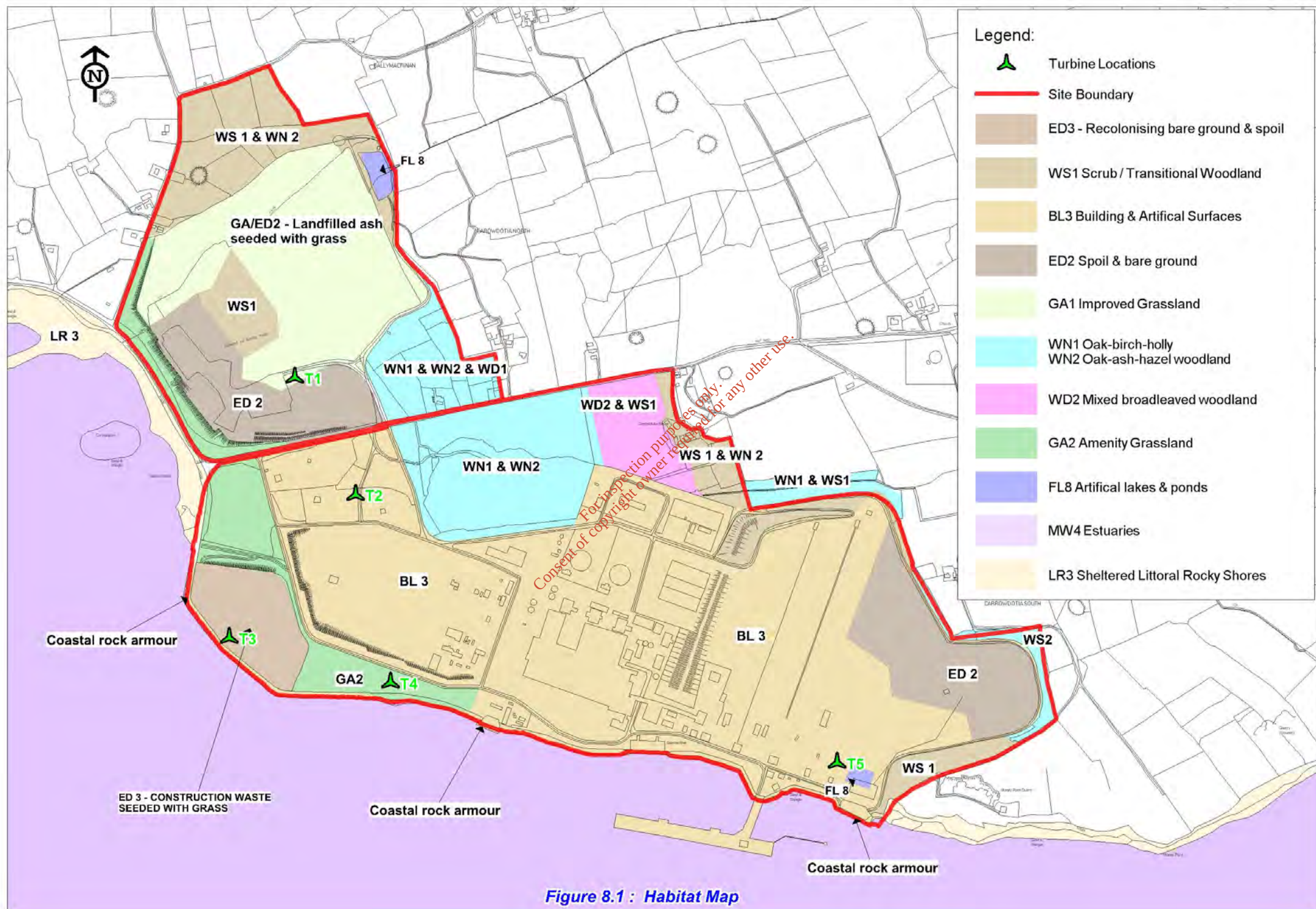
No monitoring or reinstatement of flora is required.

Should piling of turbine foundation be the preferred structural arrangement for construction of the foundations for turbines T3 and T4, this will be confined to the non-breeding season (October to June) of bottlenose dolphins.

8.4 CONCLUSIONS

Construction of the wind farm does not pose a significant threat to the flora and mammals of the lands within or adjacent to the site. The development occurs on semi-natural habitats with low ecological value.

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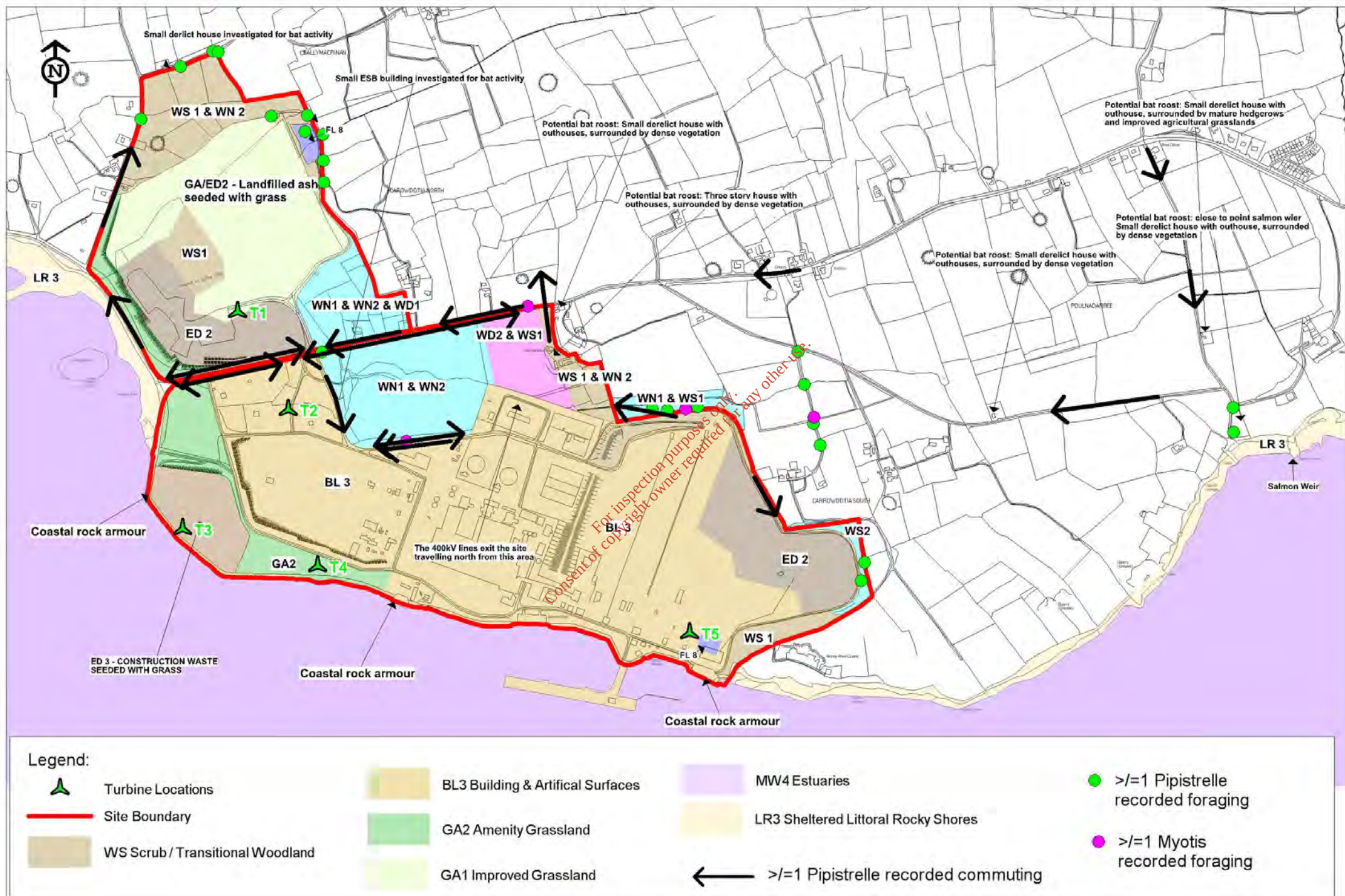


Figure 8.2 : Bat Survey Map

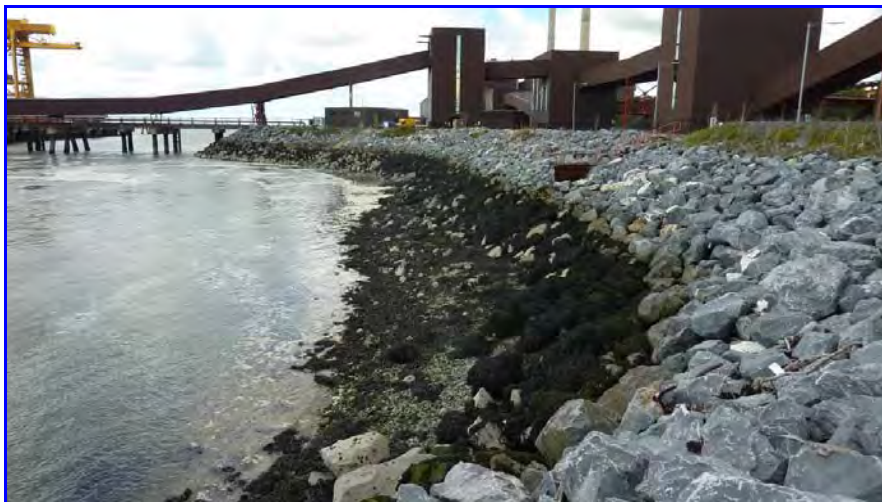


Figure 8.3: Rock armour near the station jetty where evidence of Otter was recorded



Figure 8.4: Immature woodland at eastern boundary of the site



Figure 8.5: Mature mixed woodland within the site



Figure 8.6: View east to the coal yard boundary where several pipistrelles were recorded feeding in the adjacent wood



Figure 8.7: Mature woodland north of coal yard where *Myotis* and pipistrelle bats were recorded



Figure 8.8: Southern fringe of mature mixed woodland where commuting *Pipistrelles* and one feeding *Myotis* within were recorded



Figure 8.9: Example of initial stages of filling in ash storage area



Figure 8.10: Example of ash storage area which has been reinstated



Figure 8.11: Scrub underneath the 400 kV lines



Figure 8.12: Wildlife tracks at south-western boundary of the site



Figure 8.13: Coastal rock armour at southwestern boundary of the site

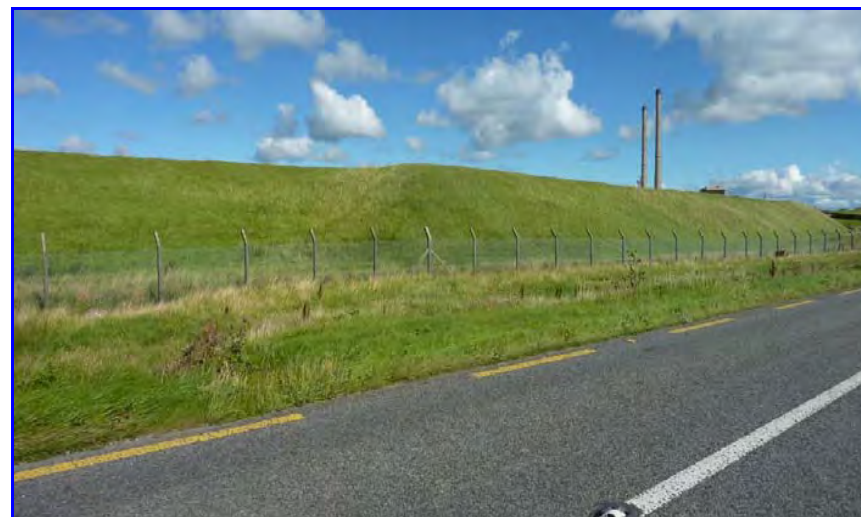


Figure 8.14: Amenity grassland at southwestern boundary of the site

9. AVIFAUNA

9.1 RECEIVING ENVIRONMENT

9.1.1 Conservation Designations

Selected intertidal areas have been designated as Special Protection Areas (SPA) under the Birds Directive (79/409/EEC) because of their importance for wintering waterfowl. These are the Shannon and Fergus estuaries, the Deel, Maigue and Cashen river estuaries, and within 10 km of Moneypoint the intertidal areas of Clonderalaw Bay, Poulnisherry Bay, Ballylongford Bay and Tarbert Bay (Figure 9.1).

None of the species recorded at intertidal areas within 10 km of Moneypoint occur in nationally important numbers (1% or more of the all-Ireland population).

The Lower Shannon River (Site code: 002165) is a designated Special Area of Conservation (SAC) under the Habitats Directive (92/43/EEC) and is also a proposed Natural Heritage Area (NHA) under the Wildlife (Amendment) Act. This site is the most important site for wintering waterfowl in Ireland, with Whooper Swan, light-bellied Brent Goose, Lapwing, Dunlin, Black-tailed Godwit and Redshank occurring in internationally important numbers. Species occurring in nationally important numbers are Cormorant, Mute Swan, Greylag goose, Shelduck, Wigeon, Gadwall, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey plover, Knot, Bar-tailed Godwit, Curlew and Greenshank.

Other proposed NHAs within 10 km of Moneypoint are St. Senan's Lough, Derrygeeha Lough and Scattery Island.

- St. Senan's Lough (Site Code 1025) is located 3 km north of Moneypoint. It is an acidic lake with adjoining marsh habitats. Acidic wetlands of this type support only small numbers of waterfowl in comparison with calcareous systems.
- Derrygeeha Lough (Site Code 50) is a small freshwater lake approximately 2 km inland from Clonderalaw Bay, with lake, wet woodland and cutover bog habitats. Its main interest is as one of only two known stations for the caddis fly *Cyrnus insolutus* in Ireland.
- Scattery Island (Site Code 1911) lies approximately 7 km west of Moneypoint. It is composed of glacial till, with soft cliffs on the western side. There is a tidal lagoon and some areas of saltmarsh. Most of the island is grassland in light agricultural use.

9.1.2 Winter Survey 2001

A comprehensive survey of bird movements at the site was undertaken in November / December 2001 in relation to the approved Moneypoint Wind Farm.

Waterfowl

Significant movements of waterfowl within the Shannon Estuary occurred well clear of the Moneypoint site, with birds flying east-west in the middle of the estuary. Waterfowl using Clonderalaw Bay were not observed to move further west than Killimer Bay / Lynch's Point on survey days. Flight lines out of the Poulnisherry Bay were in a north-south direction.

Small numbers of waterfowl were recorded in the immediate vicinity of Moneypoint, with

bird use centred on Ballymacrinan Bay.

Bird counts and observations were carried out on the Moneypoint site on eight days in November and early-December 2001. The results for waterfowl are summarised in Table 9.1.

Table 9.1: Summary of Species Recorded – Winter 2001

Species	Species	Species
Bar-tailed Godwit	Herring Gull	Ringed Plover
Blackheaded Gull	Grey Plover	Ring-billed Gull
Cormorant	Lapwing	Shag
Common Gull	Lesser Black-backed Gull	Shelduck
Curlew	Mallard	Snipe
Dunlin	Moorhen	Redshank
Great Black-backed Gull	Oystercatcher	Teal
Great Crested Grebe	Pochard	Turnstone
Greenshank	Red-breasted Merganser	Wigeon
Grey Heron	Red Throated Diver	

Species recorded regularly as feeding within or flying through the site were Cormorant, Grey Heron, Snipe, Curlew and Gulls. Lapwing moved between Ballymacrinan Bay and wet fields to the north.

No species occurred in nationally important numbers in the immediate vicinity of Moneypoint during the survey period, with numbers at most being at 10% of the 1% national level (the threshold number representing 1% of the estimated all-Ireland population).

Birds of Prey

Sparrowhawk, Kestrel, Merlin and Peregrine were recorded on the Moneypoint site during waterfowl counts. Peregrines (a male and a female) were observed on the ship unloaders on the coal unloading jetty, on separate occasions. The possibility of Peregrines breeding at the Moneypoint site cannot be ruled out; this species sometimes uses tall industrial structures as nest sites.

9.1.3 Breeding Bird Survey 2010

Methodology

Field surveys were carried out at Moneypoint over three days in May 2010.

Their scope was to assess spring (early breeding season and migration) usage of the site by both wildfowl and terrestrial species. Survey methods included Breeding Bird Transects following Countryside Bird Survey Methodology (CBS) and a Vantage Point Survey to observe wildfowl movements over the site. All methodologies followed current best practice.

The objective was to assess the interactions of the terrestrial early breeding bird population within the Moneypoint site using standard 1 km line transect methodology for

bird census (Bibby *et al.* 2000). This was a modification on the CBS methodology using four linear transects which allowed sampling of all habitats present on site. These transects were located sufficiently apart in order to minimise the risk of double counting. Birds were recorded at distance intervals from each transect of 25 m, 25-50 m, 50-100 m and greater than 100 m or flying. Birds were identified by direct observation and by recognition of calls or songs.

The conservation status of each bird species recorded was assessed. Birds of Conservation Concern in Ireland (BoCCI) are classified into three separate lists, namely Red listed species of high conservation concern, Amber listed species of medium conservation concern and Green listed species of no conservation concern (see Lynas *et al.* 2007). To date, two BoCCI lists have been published, where the current list by Lynas *et al.* (2007) replaced the former by Newton *et al.* (1999) in December 2007. The EU Birds Directive (79/409/EEC) also lists high priority bird species, known as Annex I listed species.

All records of birds within 100 m of each transect were totalled per species per visit. The maximum number of each species was then extracted from each visit in order to give an overall early breeding season (relative) abundance figure. The percentage of the four survey transects in which each bird species was recorded was calculated. In this manner, a taxa list of the birds present in the area, together with an estimate of their relative abundance, was generated.

Results

The results of the breeding bird survey are presented in Appendix D. A total of 24 species were recorded over four 1 km long transects. The majority of habitat sampled was Improved Agricultural Grassland but other habitats included gardens, scrub, woodland and exposed shoreline. In general, all of the species recorded are typical of the habitats sampled. The most abundant species, as shown by maximum numbers recorded, were Whimbrel (40) and Rook (37) followed by Starling, Swallow, Jackdaw and Blackbird (range 11-14).

Three species (Robin, Starling and Willow Warbler) were found to occur in all four transects with the majority of species being recorded in at least two or more transects. Most passerines were recorded in low numbers with the exception of Blackbird, Starling and Swallow. Some species, such as Coal Tit, House Sparrow and Lesser Black-backed Gull, were only recorded in one of the four transects. This may be reflective of habitat suitability and local densities in the area.

Most of the species recorded are of low conservation concern in Ireland, i.e. Green Listed according to the BoCCI. Five species are of BoCCI Medium Conservation Concern, including House Sparrow, Linnet, Skylark, Starling, Swallow and Lesser Black-backed Gull. Of these, House Sparrow and Lesser Black-backed Gull were recorded only at one transect on one occasion. However, relatively high numbers of Starlings and Swallows were recorded on site.

None of the species recorded are of BoCCI High Conservation Concern (Red Listed) or are listed as an Annex I species of the EU Birds Directive.

9.1.4 Vantage Point Surveys 2010/2011

Vantage point surveys were carried out in Spring 2010, Autumn 2010 and over the winter of 2010 / 2011 (November - February) with all methodologies following current best

practice.

Three vantage points were employed for the site during each survey with two watches of three hours duration being carried out at each vantage point. The vantage points are presented in Figure 9.1.

The primary objective was to monitor flight paths for all species moving over the site. The vantage point methodology employed during the survey has been used for many years by ecological fieldworkers / researchers and relates specifically to the hen harrier, but can readily applied to other species. Flight lines of every species seen, including gulls, waders, corvids and raptors, were noted on maps as well as any additional information such as sex, flight height and habitats used.

The following were recorded for each vantage point watch: Vantage point number, Date of Watch, Watch Period and Weather Conditions.

When a species of interest was sighted the following was recorded: Sighting number during that watch, approximate height of flight, Time of sighting, Bird location on or off site or both, Sex of bird and Notes, i.e. any further information on the activity of the bird. Flight activity was classified at height intervals of <10m, 10-100 m and >100 m. Total flight duration in seconds for each recorded flying bout was also noted.

The survey methodology used was based on the National Parks and Wildlife Service recommended standard methodologies and the Scottish Natural Heritage Survey Methods for use in assessing the Impacts of Onshore Windfarms on Bird Communities (SNH 2005). Details of flight lines of all species recorded during vantage point watches are presented in Appendix D.

Results – Spring 2010

Full details are presented in Appendix D and results are summarised in Table 9.2. A total of 11 species were recorded during the three days of vantage point watches, including Raptors, Waders and Corvids.

Table 9.2: Summary of Species Recorded – Spring 2010

Species	Species	Species
Cormorant	Kestrel	Sparrowhawk
Grey Heron	Lesser Black Backed Gull	Whimbrel
Hooded Crow	Rook	Woodpigeon
Jackdaw	Raven	

Corvid species included Raven, Rook, Hooded Crow and Jackdaw. Raven was the most frequently observed corvid with the other three only being recorded on one occasion each. It is believed that Ravens were nesting within a mature tree line in the site and accounted for the high number of sightings. Flight height of corvids was in the range 10-100 m. A single flight line was recorded for Woodpigeon to the northwest of the site, although undoubtedly more birds are present.

Sparrowhawk and Kestrel were the only two raptor species observed within the site. A Sparrowhawk was noted on two occasions between the areas of Carrowdotia North and Killimer. One of these sightings recorded flight activity at a height of 120 m. However, considering the dominance of agricultural landscape in the surrounding area, the density

of this primarily-woodland species is likely to be low at Moneypoint. Kestrels were recorded on three occasions flying at heights of 10-100 m in the vicinity of the power station and to the northwest of the site.

Lesser Black-backed Gull was the only gull species observed with four observations recorded. However, all were in low numbers (1-3 birds) and flight height was 10-100 m. A Cormorant was twice recorded off-site, flying low over the shores by the power station, along with one record of a Grey Heron.

Whimbrel was both the most abundant (up to 20 birds in one flock) and frequently observed species (seen on seven occasions) recorded. All observations were concentrated around Ballymacrinan and Ballymacrinan Bay and all were within the study envelope. Flight heights were quite low, being in the range 10-20 m.

Results – Autumn 2010

Full details are presented in Appendix D and results are summarised in Table 9.3. A total of 12 species were recorded during the three days of vantage point watches, one species more than the spring survey.

Table 9.3: Summary of Species Recorded – Autumn 2010

Species	Species	Species
Black Headed Gull	Grey Heron	Raven
Common Gull	Herring Gull	Rook
Cormorant	Kestrel	Sparrowhawk
Curlew	Lesser Black Backed Gull	Starling
Glaucous Gull		

The most frequently observed species was the Common Gull (15 recorded sightings) with flocks of up to 70 birds present. This species is a common winter resident in Ireland. Most sightings were concentrated between Ballymacrinan Bay and Clooneylissaun in the western section of the site. Flight height was generally in the range 10 – 100 m. Other gull species included Black Headed Gull (8), Herring Gull (2), Lesser Black-backed Gull (4) and one Glaucous Gull. The latter was seen on the shoreline just east of Moneypoint.

The second most frequently observed species was the Curlew, recorded on 11 occasions. As with the Common Gull, Curlew sightings were concentrated between Ballymacrinan Bay and Clooneylissaun. Other wildfowl species recorded included Grey Heron (2) and Cormorant (2).

Similarly to the spring survey, Sparrowhawk and Kestrel were the only two raptor species observed within the site. A Sparrowhawk was noted on two occasions between the areas of Carrowdotia North and Clooneylissaun. A Kestrel was recorded on four occasions in the vicinity of Killimer and the Moneypoint shoreline.

Only two corvid species, namely Raven and Rook, were recorded within the site. A Raven was recorded once near Clooneylissaun and once at Carrowdotia. A Rook was seen on two occasions on shore near Ballymacrinan Bay. Large flocks of up to 120 Starlings were recorded on four occasions around Moneypoint Generating Station and Killimer. Starling flight height was in the range 10-100 m.

Whimbrel, the most abundant species recorded during the spring survey, was not recorded in autumn.

Results – Winter 2010/2011

Full details are presented in Appendix C and results are summarised in Table 9.4. A total of 92 flying bouts were recorded between November 2010 and February 2011. Recorded flight activity was across 19 different species.

Table 9.4: Summary of Species Recorded – Winter 2010 / 2011

Species	Species	Species
Black Headed Gull	Hooded Crow	Raven
Common Gull	Jackdaw	Redwing
Cormorant	Lapwing	Rook
Curlew	Lesser Black Backed Gull	Snipe
Great Black Backed Gull	Merlin	Sparrowhawk
Grey Heron	Peregrine	Starling
Herring Gull		

Total recorded flight duration across all flying bouts was 2,627 s. The majority of the total flight activity was at a height interval of 10-100 m (total flight duration t=1,928 s) with the remainder (t=699 s) at the height band of <10 m (see Appendix D).

At species level, overall flying bouts was highest for Lapwing (n=13, t=344 s). Curlew and Black Headed Gull both had 9 flying bouts overall, but overall flight duration was highest for Black Headed Gull (t=392 s). This is reflective of the behavioural mechanisms at species level, as many of the Lapwing movements, although perhaps more frequent, are localised and involve short flights.

Wildfowl and gulls were primarily found to utilise the height band 10-100 m. For species such as Lapwing (t=294 s) and Curlew (t=183 s), flight activity was primarily at this height interval. Gulls such as Common Gull (t=236 s) and Black Headed Gull (t=298 s) also primarily used this height interval.

In terms of raptor activity, total number of recorded flying bouts was highest overall for Sparrowhawk (n=5), whilst Merlin and Peregrine were each represented with only one flying bout, indicating low levels of usage of the site during winter months. As expected, the majority of Sparrowhawk flight activity (t=75 s) was at the height band of <10 m (see Appendix D).

Distribution of recorded flight lines was primarily in two distinct areas, the area south of Killimer village between VP1 and the coast and also the area north of Ballymacrinan Bay. The majority of wildfowl flight lines were either birds moving along the coast (such as Cormorant), visible from VP1 or birds moving between fields and/or Ballymacrinan Bay at the western part of the site. Many of these movements were brief, as species such as Lapwing and Curlew were often disturbed from foraging in fields due to agricultural activity.

The total number of species recorded from the site over the winter period, including casual sightings was 55. A complete list of the species recorded is presented in Appendix

D.

9.1.5 I-WeBS Survey

An autumn wetland bird survey was carried out in August / September 2010 and a winter wetland bird survey was carried from November 2010 to February 2011. The surveys followed methodologies employed on I-WeBS surveys with the exact methodology employed being a 'look-see' method (Bibby *et al*, 1992 in Crowe 2005). This involves recording the number of individuals of a number of waterbird species on visits to predefined wetland sites (Crowe 2005). In this instance the pre-defined sites were Lynch's Point to Killimer (Section A), Killimer to Moneypoint (Section B) and Moneypoint to Ballymacrinan Bay (Section C).

Results – Autumn 2010

The results are presented in Appendix D. A total of 19 species were recorded. Sections A (13 species) and Section C (12 species) recorded similar levels of bird diversity. The lowest number of species (4) was recorded in Section B. Black Headed Gull was the most abundant species (49) with 48 birds recorded in Section A. Ringed Plover and Turnstone were also in relative high abundance and only seen in Section C. Cormorant was the most abundant species in Section B.

The flight line maps indicate that the western area around Ballymacrinan Bay and north to Clooneylissaun has the greatest bird activity within the site, followed by the central area from Killimer to Moneypoint. Flight heights of all species recorded were within 100 m. Results from the I-WeBS survey (Table 9.7) indicated that Lynch's Point to Killimer (Section A) is an important site for Black Headed Gulls (48). Moneypoint to Ballymacrinan Bay (Section C) also held good numbers of wading birds and gulls. Thus the coastal region from Lynch's Point to Ballymacrinan Bay and north to Clooneylissaun appear to be the areas of highest bird activity within the site.

Results – Winter 2010-2011

The results are presented in Appendix D. A total of 27 species were recorded. The primary areas of usage were Section A and Section C which included Ballymacrinan Bay.

Total Wildfowl peaked in January with a maximum of 265 birds comprised of 17 different species recorded on 27th January. Lapwing (n=31) and Curlew (n=85) were a large component of the birds recorded in January. Additionally, a casual count of 150 Lapwing and 80 Curlew was also recorded in January making these two species the most abundant overall during the mid-winter period. Many of these birds were recorded foraging in fields proximal to the coast during vantage point effort.

Species diversity was highest in November with 19 different species comprising a total of 195 birds. This may have been due partly to autumn passage species such as Common Sandpiper remaining in the area into November and also the occurrence of two species of rare gull, namely Glaucous Gull and Mediterranean Gull which were both recorded singly.

The mean number of wildfowl recorded per month was 245 birds. The months of December (n=78) and February (n=76) were decidedly low in wildfowl. The low total in December may have been as a result of the extremely cold weather, whilst the low count for February is more indicative of normal trends for wintering birds in coastal estuaries, which often see a decline in species numbers from February onwards.

9.1.6 Summary of 2010-2011 Surveys

In general, all of the species recorded are typical of the habitats found at or near the site (Birds of the Western Palaearctic 2006, Coombes *et al.* 2006).

While most of the species recorded in spring are currently of low conservation concern in Ireland (Lynas *et al.* 2007), eight species are of medium conservation concern. These include Kestrel, Linnet, Skylark, Starling, Swallow, House Sparrow, Lesser Black-backed Gull and Cormorant. Linnet, Skylark and House Sparrow were recorded in low numbers, but the site and wider area has suitable habitat and historically these species have been recorded in the general area during the breeding season (Murphy, 2002, Mayes, 2001).

The Common Gull was the most frequently observed species utilising the site in autumn, being recorded on 15 occasions. This species is a common winter resident in Ireland. Curlew was the second most frequently observed bird. This red-listed species (Lynas 2007) also winters on Irish coastal wetlands.

Kestrels forage in open areas and is a common bird on farmland (Birds of the Western Palaearctic 2006, Gibbons *et al.* 1993). At least one Kestrel uses this site, most likely for foraging, but a nest is likely within the vicinity. Two recorded sightings of Sparrowhawk were noted during vantage point watches during both spring and autumn surveys. It is likely that the area around Moneypoint supports at least one Sparrowhawk and one Kestrel throughout the year.

Starling and Swallow were seen in relatively high numbers during the spring survey, most likely as a result of habitat suitability. Both forage within open fields and nest at buildings such as houses and sheds. There is good habitat suitability for this species on site. Starlings were also seen in relatively high numbers during the autumn survey and had the greatest flock size of up to 120 birds. Resident starlings are often joined in winter by large numbers of birds from the continental Europe (Birdwatch Ireland www.birdwatchireland.ie).

The species of primary concern in springtime at Moneypoint are migrating Whimbrel. This Green-listed species was the most abundant species recorded in spring during both line transects and vantage point watches, and the most frequently observed during the latter. Movements of Whimbrel appeared concentrated in the Ballymacrinan and Ballymacrinan Bay areas. Birds were primarily recorded on the shoreline at Ballymacrinan Bay but also foraging in and transiting through farmland to the north.

The Whimbrel is a passing migrant to the Irish coastline, seen in autumn (August / September) and spring (April / May) while moving between Icelandic breeding areas and wintering grounds in West Africa (Boland *et al.* 2008). However, numbers are generally small with just 77 birds recorded in September (0.1% of total wading birds) during the 2006 / 2007 I-WeBS survey (Boland *et al.*, 2008).

Whimbrel was not recorded at Moneypoint during the autumn survey.

The 2010 / 2011 winter survey recorded a total of 55 species utilising the site. Overall flight activity during the winter months was highest for wildfowl such as Lapwing, Curlew, Black Headed Gull and Common Gull. The I-WeBS survey found that wildfowl numbers peaked in January. Areas primarily used by wildfowl included Killimer Quay (east of the site), Ballymacrinan Bay and also the fields immediately north of Ballymacrinan Bay which were used by foraging gulls and waders such as Curlew and Lapwing. Overall numbers were still relatively low within the context of the site and its proximity to nearby SPAs.

Raptor usage of the site was low in winter with only one record each for Merlin and Peregrine. Sparrowhawk was recorded on a number of occasions but primarily at height intervals of <10 m.

9.2 IMPACT OF THE DEVELOPMENT

Breeding Birds

The loss of relatively small amounts of habitat due to the development would not be expected to have any significant impacts on the populations of any of the common bird species that currently frequent the site and all would be expected to retain a presence in the immediate area.

It is possible that bird species may be displaced from a zone around each turbine for feeding and / or nesting purposes. As all of these species occur commonly in the area, the effect of possible displacement is unlikely to have a significant impact on the overall populations of any species. Furthermore, the displacement area is likely to decrease over time with habituation.

In a study of wind farms in the United Kingdom (Pearce-Higgins *et al.* 2009 - hereafter referred to as Pearce-Higgins 2009) it was found that critical distances exist within which birds may be adversely affected by developments such as wind farms. For species such as Meadow Pipit, Pearce-Higgins 2009 found that the breeding distribution of this species is affected by wind turbines. Pearce-Higgins 2009 predicts a percentage reduction of 14.7% in breeding density within 500 m of a turbine array (with 95% confidence intervals) in comparison with undeveloped sites. However, given the amount of available habitat in the area in the event of displacement, no significant impact is expected on this species.

Skylark, which was also recorded from the site during the breeding season, was also reviewed in Pearce-Higgins 2009. It found that, while some species were significantly affected by wind farms, Skylark is largely unaffected. The following is quoted from same; "*the effects of turbine proximity on skylark were of marginal significance*". Therefore, it is considered unlikely that the number of breeding pairs of this species will be affected.

In the unlikely event of Snipe breeding on the site, displaying males could be vulnerable to collision with rotating turbines. Pearce-Higgins 2009 found that Snipe is one of the species adversely affected by proximity to wind farms and the predicted reduction in breeding density (95% confidence intervals) within 500 m of a turbine array is 47.5%. However, given the low numbers recorded on site and the proximity of available habitat in the event of displacement, no significant impact on this species is expected.

Additional Amber listed passerine species such as House Sparrow, Starling, Swallow and Linnet were also recorded. However, none is considered likely to be significantly affected by the development. Pearce-Higgins 2009 states that there is little evidence of any effect of wind turbine proximity on passerines.

Evidence from comparable modern wind farm sites elsewhere in Europe indicates that the risk of collision by birds striking wind turbines is generally low, even in coastal sites where there are large concentrations of wintering waterfowl close by. At Moneypoint, it is considered unlikely that such losses could be of a scale whereby there would be significant adverse effects on the local bird populations.

In the case of raptors, the main species likely to be found breeding on site are Sparrowhawk and Kestrel. For species such as Kestrel, there are two principal but

mutually exclusive potential impacts of wind turbines, namely loss of habitat through displacement and collision mortality. Pearce-Higgins 2009 found equivocal evidence for weak avoidance of turbines by Kestrel, indicating that displacement from foraging areas is unlikely. As the proximity to wind farms seems to have no effect on distribution, it is believed that the proposed development will have no significant effects on Kestrels.

Given the low occurrence of Sparrowhawk on site (only two sightings in spring and autumn and four in winter), it is unlikely that birds occur in sufficiently high densities to be affected by the proposed development. Sparrowhawk may breed on site as there is a small area of woodland adjacent to the power station. Although Sparrowhawks have been recorded as wind farm fatalities in Ireland (Cullen and Williams 2010), the low occurrence of flight activity at the 10-100 m height interval on the site indicates that the likelihood of collision is low. Thus, the impact on this species is assessed as imperceptible negative.

Non-Breeding Species

While there are limited records available for Whimbrel specifically, collisions with turbines have been known to occur in waders (Percival, 2003). Factors such as the mobility of a species (sedentary, migrant, partial migrant or vagrant), flight behaviour (height), abundance, age (e.g. avoidance / flight skill), flocking behaviour and whether the species is diurnal or nocturnally active, all contribute to the risk of collision. Whimbrel are primarily diurnal and relatively low in abundance when compared to other flocks of waders. Given the number of birds utilising the site on a yearly basis, the risk to this species is not considered significant.

Impacts are expected to arise principally from disturbance from the presence of the turbine structures, rather than from collision.

Flight lines of Cormorant are likely to alter to avoid the turbines, in the way that the very significant existing structures at Moneypoint are avoided. Cormorants are not likely to be displaced from Ballymacrinan Bay or the immediate vicinity of Moneypoint.

Curlew feed in the ash storage area and may also be disturbed by the turbines, but in this event they are likely to feed elsewhere in the locality. Collision impacts are unlikely for Curlew. Invertebrate prey for waders is likely to increase over time in the ash storage area as grassland habitats become more established and this may balance potential disturbance impacts.

Pearce-Higgins 2009 found that Curlew (during the breeding season) is one of the most affected species and likely to show significant avoidance and reduced breeding density within a 800 m buffer of turbines. No breeding occurred within the site and it is believed that any displacement from foraging areas of agricultural grassland can be adequately compensated within the surrounding hinterland. Therefore, the effect on this species during winter is considered imperceptible negative.

Lapwing were not recorded breeding on site at Moneypoint, but utilise the area in winter. Birds may be deterred from using immediately adjoining fields by disturbance from the new structures. In this case, they are likely to move to other fields in the general area.

As Pearce-Higgins 2009 found no significant effects due to proximity to wind farm infrastructure on Lapwing distribution, it is believed that there will be no significant effect on wintering Lapwing in the area.

Potential impacts on Grey Heron and Gulls are assessed as low.

In summary, some alteration in flight lines and feeding area may occur for Cormorant, Lapwing, Snipe and Curlew in the short, medium and long term. None of these species is expected to be displaced from the immediate locality of Moneypoint and may continue to use the site as they become habituated to new structures, in the way that existing power station structures are accommodated in the existing patterns of use.

The majority of wintering wildfowl which utilise the Ballymacrinan Bay area and coastal zone immediately south of the power station are unlikely to be affected by the wind farm development. Many of these species are tied to specific coastal habitats where no turbines will be located and, therefore, the impact on these species is considered insignificant.

9.3 MITIGATION

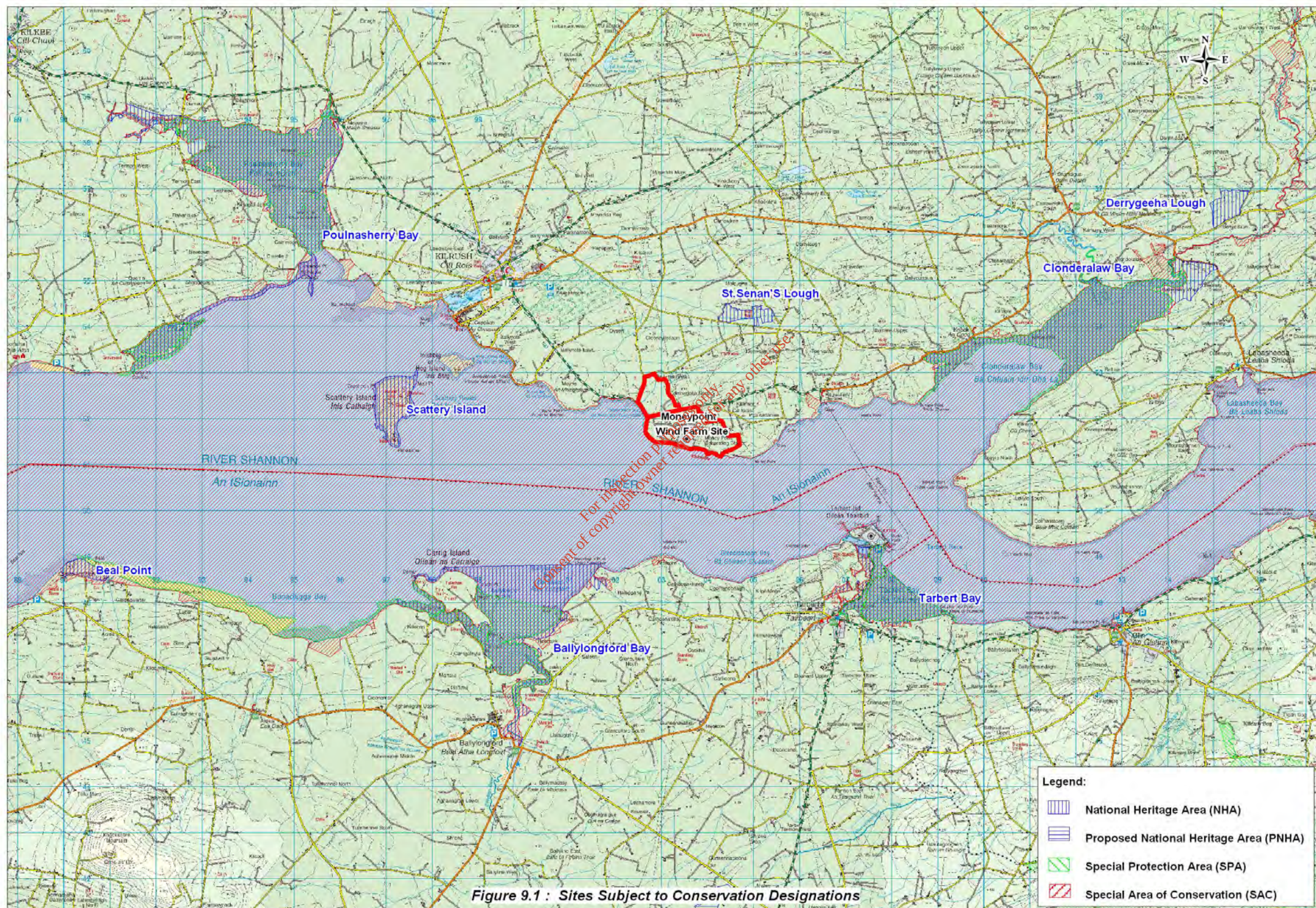
Overall, impacts are assessed as insignificant. However, the following mitigation is proposed:

- The footprint of the development, as defined by the extent of the development area, will be minimised with habitat removal being confined to the smallest possible area.
- Should works be intended during the breeding season, a breeding bird survey should be conducted for ground nesting species in the area proposed for works and all nests identified and protected.
- While the extent of vegetation to be removed for construction works in connection with the development is extremely limited in the context of the overall site at Moneypoint, where possible its removal should take place outside of the bird breeding season (1st March – 31st August) to avoid disturbance to Amber-listed species Starling and Swallow.
- Connection between turbines and the Electrical Transformer Station will be by underground cabling rather than overhead lines.
- Guy wires on the temporary anemometer masts will be marked with flags or marker-balls to minimise collision risks.
- The ultimate decommissioning of the project will be conducted outside of the main bird breeding season.

After construction of the wind farm, the majority of the habitat within the site will remain intact, with the added presence of turbines and associated access roads.

9.4 CONCLUSIONS

The numbers of waterfowl potentially impacted at Moneypoint are small. As previously, it is concluded that the proposed development will not impact adversely on waterfowl numbers either in the immediate area of Moneypoint, or in the bays subject to SPA designation at Clonderalaw, Poulmarsherry, Ballylongford and Tarbert. Provided the mitigation measures are adhered to, no significant negative impacts on any local population of birds is anticipated as a result of either construction, operation or decommissioning of the proposed wind farm development.



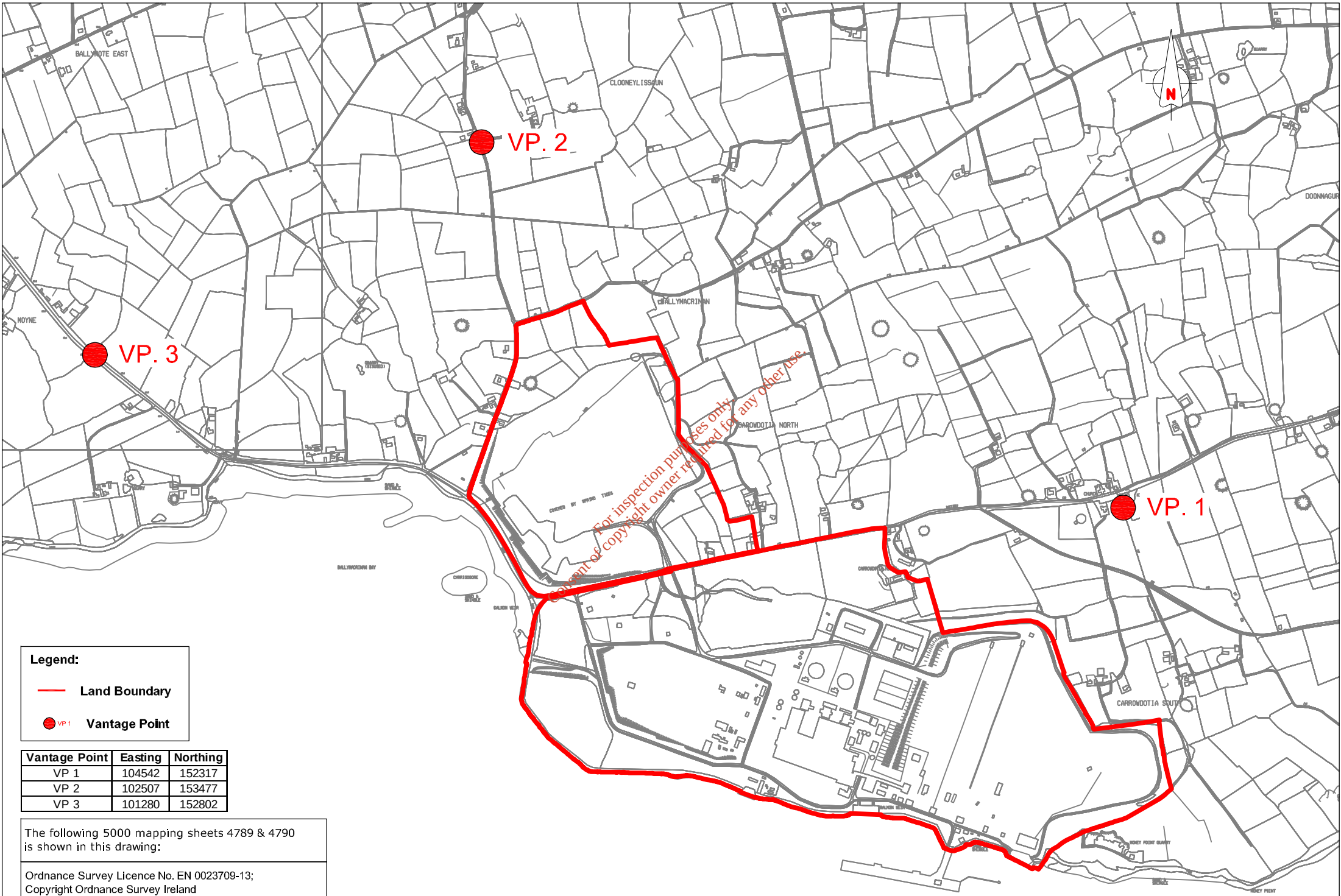


Figure 9.2 : Avifauna Surveys - Vantage Point Locations



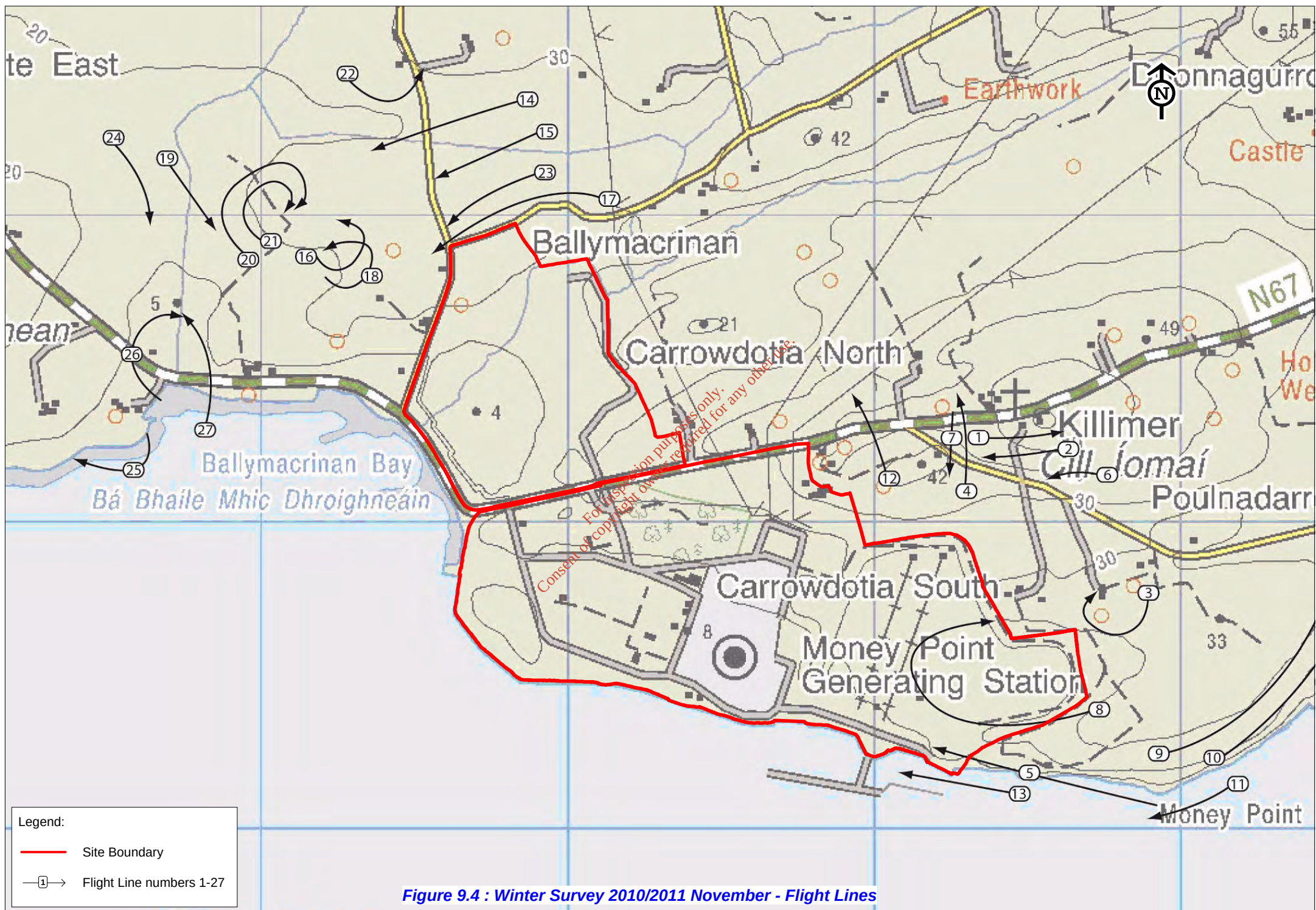
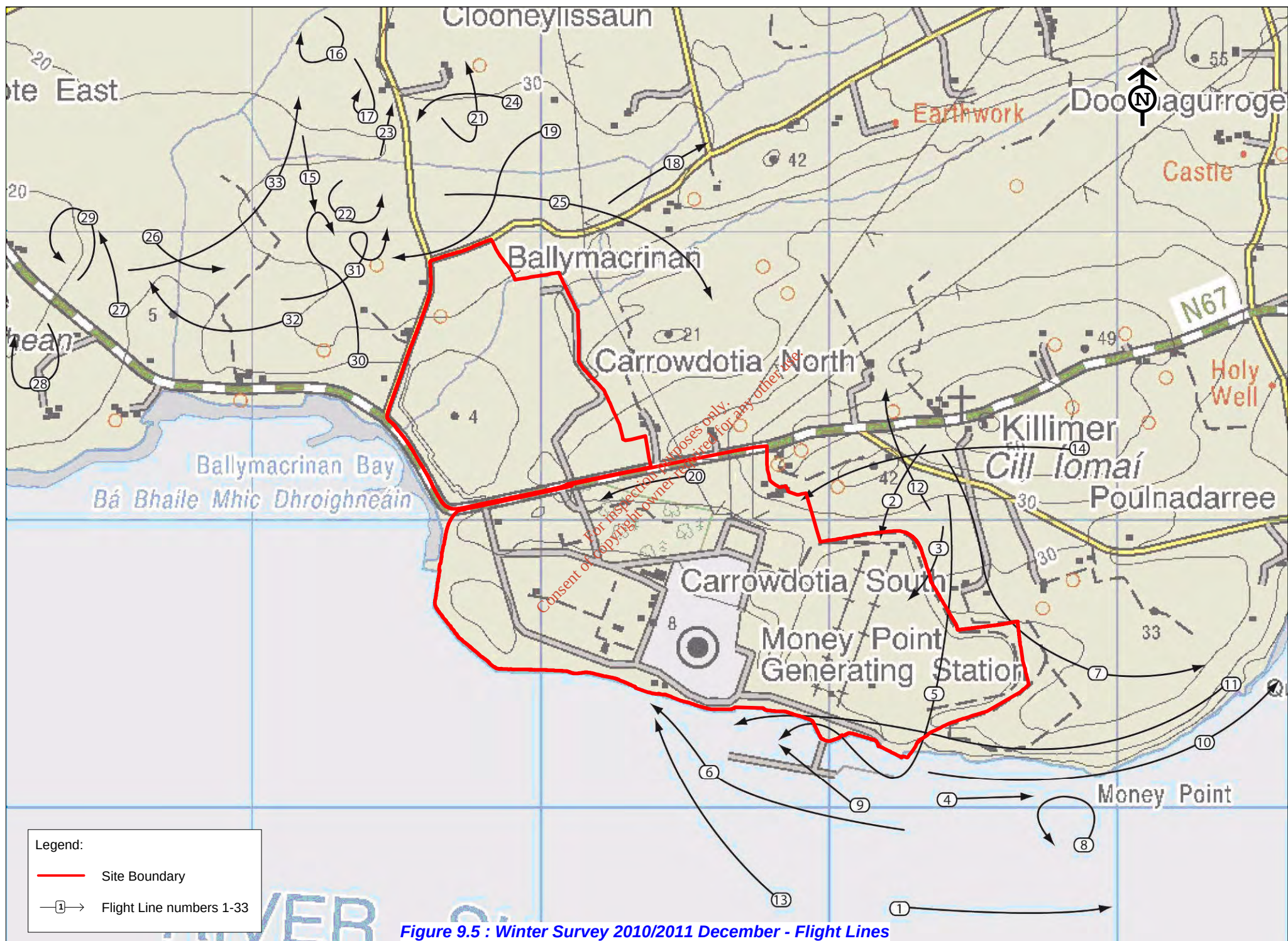
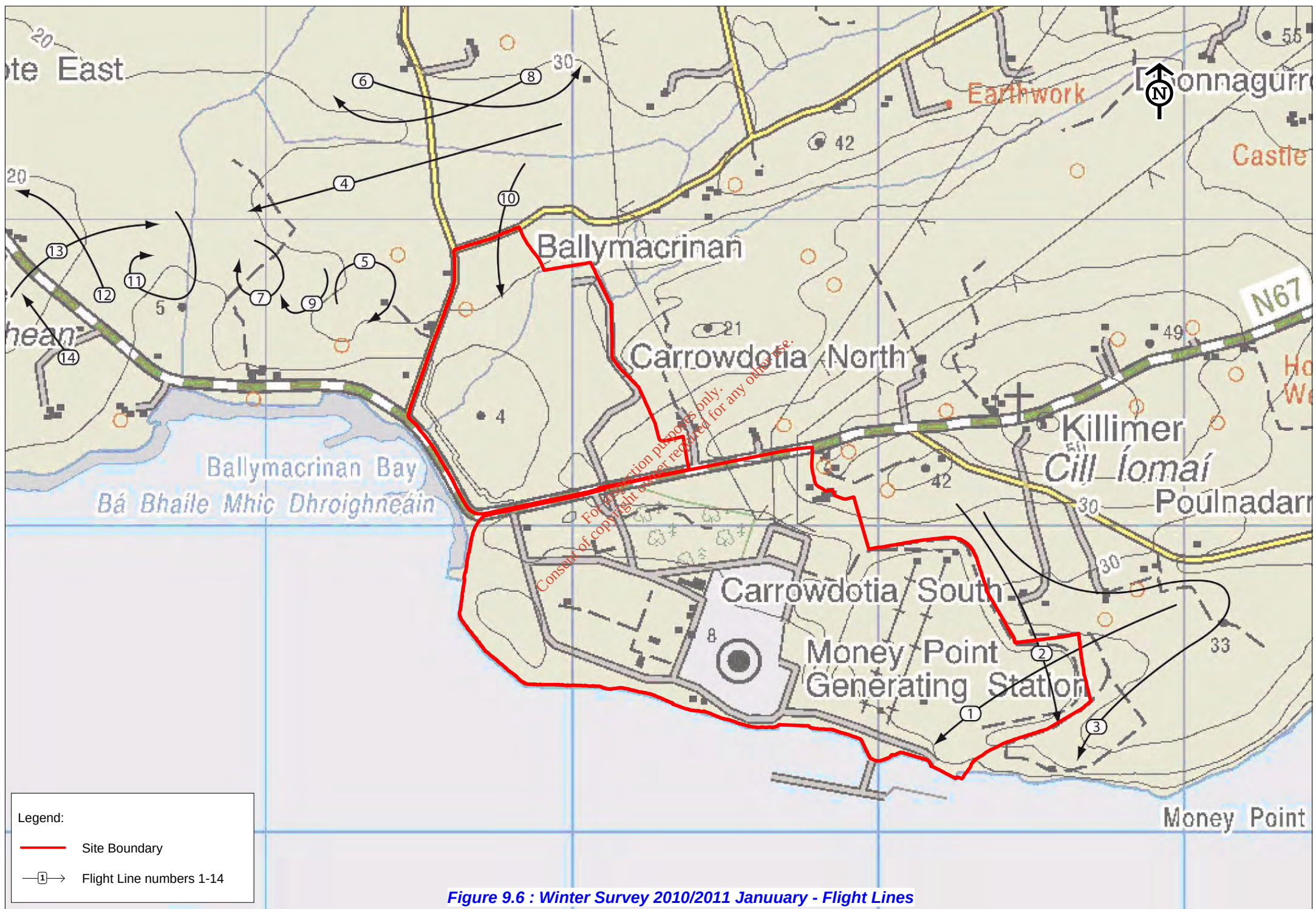


Figure 9.4 : Winter Survey 2010/2011 November - Flight Lines







10. LANDSCAPE

10.1 RECEIVING ENVIRONMENT

10.1.1 Introduction

Where installed, wind turbines modify the traditionally perceived image of the countryside and as they become part of the rural landscape they influence the character of the surrounding area.

It is a common conception that a significant impact of wind farms is caused by the dominance of their visual characteristics. So it is desirable, when feasible, to decrease that effect. However, wind farms like all developments should not be judged solely on their visual properties but should also be valued for other qualities such as what they symbolise.

A wind farm obviously indicates human impact within the landscape and as a consequence reduces the perception of remoteness, but when wind farms are related to the landscape characteristics then their sculptural image as well as their functional role may be seen as an enrichment of the local landscape character.

10.1.2 Parameters of Assessment

Zone of Visual Influence

The function of wind turbines and their utilisation of optimum wind speeds result in a wind farm being highly visible. However, this also relates to a number of other variables such as meteorological conditions, the mode and speed of viewing, and the nature of the surrounding landscape.

The description of the nature of visibility from the following viewing distances informs the assessment of the visual impact.

- 0-2.5 km (radius) - Turbines typically form the dominant landscape element in good visibility.
- 2.5-5 km (radius) - Turbines are perceived as one element of many within the landscape in good visibility.
- 5-10 km (radius) - Turbines are perceived within the wider landscape setting in good visibility.

The human eye can detect movement at great distances because the natural landscape is motionless. At 2.5 km motion, rather than size, draws the eye. At 8 km it highlights the turbines' location within the wider landscape.

Visibility

The *extent of visibility*, meaning how many turbines will be visible and from where, can be accurately measured. The way that wind turbines appear in the landscape, described as *nature of visibility*, depends on the observer's perception of wind turbines and the landscape as well as involving a degree of subjective judgement.

Visibility of wind turbines is described in relation to the following:

- Climatic conditions; views from roads; significant viewpoints; topography; vegetation;

movement; and position of the viewer.

The nature of visibility is then described in the context of the wind farm as follows:

- Relation to skyline; and relation to landform

For any particular viewpoint, the assessment would also include a description of the following:

- Visual composition of a view; the nature of visibility in the surrounding area; and the cumulative effects of existing wind farms.

Widely accepted design principles that are practised within the design professions were used in order to limit the boundaries of subjective judgement about the nature of the wind farm's visibility. A summary of these principles is as follows:

Harmony and Clarity: The eye seeks clarity in a visual pattern and must be able to tell what a design is trying to say. Harmony creates balance and feelings of restfulness.

Regularity of Layout: A grid, for example, organises and gives regularity and continuity to a pattern. A good wind farm layout is well organised, in a grid or other perceivable layout as opposed to ad hoc.

Rhythm and Repetition: Rhythm relates to the regular or harmonious recurrences of lines and shapes. Repetition is one of the most effective ways to create unity in a composition, organising forms and spaces.

Scale: Scale signifies importance. When elements are described as monumental in scale, the actual size of the object is not being described but the feeling it gives by being dominant in its environment.

10.1.3 Design Guidelines

The following considerations on the general location and arrangement of wind farms, gained through reference and research, have been used in the landscape assessment to measure the impact of the development. They were also used to influence the design and layout of the wind farm.

- The location and design of a wind farm should relate to the key characteristics of a landscape.
- The landscape comprises physical, social, experiential and visual characteristics for each potential wind farm site. These and their relative dominance must be assessed and the processes acting upon them.
- A wind farm possesses visual relationships between each turbine, in addition to the landscape as a collective group. This relationship must appear clear and simple in order for a development to seem rational.
- Turbines and the landscape need to form a coherent unit and avoid visual confusion.
- The size of wind turbines should relate to the scale of the surrounding landscape, as well as to the design of the wind farm group, so that they do not appear intimidating.
- Wind turbines should be perceived in a clear, unambiguous way.

10.1.4 Survey Methods

The survey methods used consisted of:

- A desktop study of the Clare County Development Plan 2011-2017 and the Development Plans for the adjacent Co. Kerry and Co. Limerick, including relevant published literature.
- Mapping of key landscape characteristics such as vegetation, major and minor ridgelines, land use designations and settlement areas. This was achieved using OS mapping and on-site visual assessment.
- Site survey to assess key features of the landscape and critical view corridors. The significance of the site and visual dominance within the landscape were recorded.
- Separate zone of theoretical visibility (ZTV) maps were prepared for tower and blade tip heights. The ZTV was based over a 10 km radius and was used to check visibility from surrounding areas. The ZTV map was used as a tool in the assessment process. Its limitations, such as accuracy with a 10 km radius, are acknowledged. Inaccuracies in the ZTV are caused by a number of factors.
 - The calculations used to create the ZTV are very sensitive to small errors in the base data, the viewer location and elevation.
 - Overestimation of the spatial extent of project visibility arises from use of a simple topographic model which takes no account of complex natural and man-made elements in the surrounding landscape.
 - The map represents visibility within a lunar landscape and so depicts a 'worst case' scenario with none of the screening benefits of vegetation being taken into account. Hence, the map is used as a general guide to visibility with screening vegetation being recorded separately.
- Wire Frame Models - three dimensional wire frame models were constructed from key viewpoints within a 10 km radius. These were used to assess the visual relationship of the wind farm to the existing topography and the visual relationships between each turbine.

10.1.5 Definition of Visual Impact

The visual impact of a wind farm depends upon the distance of the observer from the wind farm, with visibility decreasing significantly over 2–20 km. However, given that wind farms are by their nature highly visible elements in the landscape, traditional definitions of visual impact are not directly applicable. With other forms of development, low visibility correlates to low visual impact and the less a development is seen, the less negative the impact.

However, with respect to wind farm, the nature of the visibility is of greater importance than the extent of visibility in determining visual impact, i.e. how a wind farm is seen within the landscape. For example, it depends upon whether it appears balanced within the visual composition of a view, whether it creates a focal point or if it blends into the background.

Hence visual impact is assessed using the following criteria:

- How the wind farm is perceived within the visibility zone with respect to scale, landform and skyline.
- Relationship to land use and human settlements.

- Landscape Character - the impact is assessed in terms of the relationship of the development to the landscape character and landscape characteristics.

The definitions used to determine landscape or visual effects are presented in Tables 10.1 & 10.2. These effects may be adverse (negative), neutral or positive.

Table 10.1: Criteria for Assessment of Magnitude of Effects on Landscape Character

Magnitude	Typical Criteria
Negligible	Very minor loss or alteration to one or more key elements / features / characteristics of the baseline, i.e. pre-development landscape or view and / or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the 'no change' situation.
Low	Minor loss of or alteration to one or more key elements / features / characteristics of the baseline, i.e. pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.
Medium	Partial loss of or alteration to one or more key elements / features / characteristics of the baseline, i.e. pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.
High	Total or major alteration to key elements / features / characteristics of the baseline, i.e. pre-development landscape or view and / or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving environment.

Table 10.2: Definition of Magnitude / Degrees of Visual Effects

Magnitude	Effect
None	No part of the development, or work or activity associated with it, is discernible.
Negligible	Only small part of the proposal are discernible and / or they are at such a distance that they are scarcely appreciated. Consequently they have very little effect on the scene.
Slight	The proposal constitutes only a minor component of the wider view, which might be missed by the casual observer or receptor. Awareness of the proposal does not have a marked effect on the overall quality of the scene.
Moderate	The proposal may form a visible and recognisable new element within the overall scene and may be readily noticed by the observer or receptor.
Substantial	The proposal forms a significant and immediately apparent part of the scene that affects and changes its overall character.
Severe	The proposal becomes the dominant feature of the scene to which other elements become subordinate and it significantly affects and changes its character.

In summary, an understanding of both the landscape character and key landscape characteristics forms the basis for a visual impact of a wind farm development. The assessment is largely based on objective criteria. However, an element of subjective

judgement is also involved.

10.1.6 Physical Setting

The site basically consists of two large, relatively level platforms.

The main station area is at an elevation in the range 5.0-13.5 m OD and it has a shoreline of rock armouring. It is set down below the excavated rock slopes of the station's coal store, which extends into the adjoining ridge. This ridge rises from approximately 20 m OD at the southeast corner of the coal store, northwards to a minimum height of 60 m OD at Killimer Village.

The ash storage area is a now largely filled plateau of pulverised fly ash formed within a bermed enclosure spanning across the former marshland and shallow valley which extends inland from Ballymacrinan Bay in a north-west direction. Filling of ash continues but extensive areas are now revegetated with grass. The average level of filling is approximately 15 m OD.

The Kilrush - Killimer road (N67) runs for approximately 1 km along the shore of Ballymacrinan Bay before turning east to Killimer where it divides the two areas of the station lands. A minor local road directly bounds the ash storage area to the west and north. The residential and farm properties located north and east of the station's coal store are similarly served by minor roads, but these do not bound the site.

The wider setting of the lower Shannon estuary within which Moneypoint Generating Station is set is extensive with somewhat diffuse boundaries. Locally to the north it may be taken as following the low ridge (approximately 60 m OD) at Tullagower some 7 km distant from the station and swinging round east to the Labasheeda peninsula. To the south it is bounded by Knockanore Mountain and by a low ridge running east from Ballylongford, Co. Kerry to Glina in Co. Limerick. To the west lies the Loop Head peninsula, but more locally it is defined by Scatterry Island and Hog Island within the estuary south-west of Kilrush.

Exposure is the most significant feature of the climate. The estuary lies open to the prevailing westerly and south-westerly winds and the orientation of the geological structure described above generally provides scant topographic shelter from such winds.

10.1.7 Landscape Character

The landscape consists of the following *four key characteristics* - physical, social, experiential and visual. These can be defined in terms of topography, landform, land use, scale, exposure, visual quality.

Physical Characteristics (Topography, Landform)

The northern part of the study area is within south Co. Clare with the southern part being within north Co. Kerry and west Co. Limerick. The lower River Shannon Estuary forms a physical and visual division between the northern and southern parts of the study area.

The general land form is generally low to the north and south of the estuary, but becomes distinctively undulating / rolling as one travels further from the water, particularly in northern and north-eastern areas. Frequently, low cliffs define the boundary between the land and River Shannon Estuary. Knockanore Mountain in the southwest and the foothills of Sugar Hill to the southeast are the only significant elevated locations within the study area. Loop Head lies to the west outside of the study area. The lower River Shannon Estuary provides an open expanse of water within the study area and contains Scatterry

Island, Hog Island, Carrig Island and Tarbert Island.

Numerous small streams and rivers rise in higher ground and discharge into the River Shannon. These include the Crompaun River and Cloon River in Co. Clare, the White River and Glencorbly River in Co. Limerick and the Ballyline River in Co. Kerry. The Doonbeg River passes through the northern part of the study area and flows to the Atlantic in the west and the River Galey in the southern part flows into the Cashen River, west of Listowel.

Social (Land use)

Agriculture, particularly pasture, is the dominant land use within the lower undulating parts of the study area. Commercial coniferous forestry is restricted to mainly small patches and is sparse in the southern part of the study area but increases in the northern half on the higher ground. The River Shannon Estuary contains a number of nationally important facilities such as Moneypoint and Tarbert power stations, the port of Foynes, as well as large-scale logistic, manufacturing and associated economic and service activities.

The main settlements within the study area is the town of Kilrush and the smaller towns and villages of Tarbert, Doonbeg, Glin, Ballylongford, Loghill, Labasheeda, Kilmihiil, Cooraclare and Creegh. The seaside town of Kilkee lies to the west outside of the study area. Small villages, individual houses and farm buildings are scattered along regional and local roads.

Scattery Island contains the remains of a monastery, several churches and a round tower. Carrigfoyle Castle is located between Carrig Island and the mainland, on the edge of the River Shannon Estuary.

Experiential (Scale and exposure)

The study area is characterised by three main forms of topography, the undulating lowlands to the north, east and west and south descending towards the River Shannon Estuary, the flat open River Shannon Estuary in the centre and the foothills of Sugar Hill and Knockanore Mountain in the southeast and southwest

The nature of the landscape allows many open views from low hill summits, from the slopes of the foothills and across the estuary. Intermittent and prolonged open views may also be experienced when travelling along roads in the lower lying areas near the River Shannon Estuary. Therefore, the landscape has an open scale when viewed from hill summits in the lowlands and a wide open scale at the River Shannon Estuary, allowing for long distance panoramic views. Open views are also experienced along the ridges and slopes of the foothills of Sugar Hill and Knockanore Mountain.

Visual

The visual quality of the landscape in the vicinity of the site is largely determined by the River Shannon Estuary with its open visual character. The gently undulating landscape within the wider area has been determined by human activity with field patterns, hedgerows, clusters of building, farmyards, patches of coniferous forestry, pockets of deciduous woodland and industrial zones along parts of the shores of the river. The landscape is predominantly rural, with small residential farms creating a relatively uniform pattern of low hedgerows and bank-enclosed fields.

Tree and hedgerow cover is relatively sparse, particularly in the immediate coastal areas

and further north as the ground rises and soils are of lesser quality. Trees are generally confined to occasional belts around some farms and residences. The most notable exceptions are Kilrush Wood, now primarily a conifer plantation, some 2.5 km from the station, the 'Seventeen Acre' mixed deciduous woodland conserved on site at the time of the station's construction and the belts of mature, deciduous trees on the sheltered west side of the Killimer Ferry inlet. Extensive areas of new woodland and tree belts have also been planted by the station at sections of its road frontages both during and since the station's construction.

Moneypoint and Tarbert Generating Stations, each with two tall chimneys, are significant landmarks within the study area. The power stations are approximately 4.5 km apart, on either side of the River Shannon Estuary, and there are overhead transmission lines leading from both in a number of directions.

10.1.8 Landscape Character Assessment

County Clare

The Landscape Character of Co. Clare is described in the Clare County Development Plan 2011-2017, which identified 26 Landscape Character Types and 21 Landscape Character Areas. It also identifies Living Landscape Types and Seascape Character Areas. Regions covered by the study area are outlined below:

Five Landscape Character Types have been identified within the study area as follows:

- FRH – Farmed Rolling Hills: This landscape character type is located in the centre of the study area and contains the Moneypoint site.
- FLR – Farmed Lowland Ridges: This landscape character type is located in the eastern part of the study area.
- CDP – Coastal Plain and Dunes: This landscape character type is located in the north-eastern part of the study area.
- FEF – Flat Estuarine Farmland and Islands: This landscape character type is located in the eastern part of the study area.
- PF – Peninsular Farmland: This area is located in the western part of the study area (only a small part of this landscape type is contained within the study area).

Four Landscape Character Areas (LCA) have been identified within the study area as follows:

- LCA 18 – Shannon Estuary Farmland: This LCA is located along the centre of the study area stretching east, northeast and includes the Moneypoint site.
- LCA 19 – Kilmihil Farmlands: This LCA is located in the north, northeast of the study area.
- LCA 20 – Malbay Coastal Farmland: The southern tip of this LCA is located in the northwest of the study area.
- LCA 21 – Loop Head: This LCA is located to the west of the study area.

The Clare County Development Plan 2011-2017 proposes that future planning policies for rural areas in Co. Clare be integrated by considering the county to comprise three types of Living Landscape Types, as follows:

- Settled Landscapes - All lands not classified as Heritage or Working Landscapes
- Working Landscapes – Those areas within Settled Landscapes that contain pockets of concentrated development or a unique natural resource. The Plan identifies two such landscapes in the County, as follows:
 - The Western Corridor - Ennis to Limerick Working Landscape
 - The Shannon Estuary Working Landscape: All shores and waters between Moneypoint to Ballynacragga Point excluding Clonderalaw Bay.
- Heritage Landscapes – Those areas within the County where sensitive environmental resources are located

The Landscape Character Assessment of Co. Clare identified 12 Seascape Character Areas (SCA), the following two of which partially located within the study area:

- SCA 10 – Lower River Shannon: This SCA is located between Kilcredaun Point and Lynch's Point (east of Moneypoint).
- SCA 11 – River Shannon: This SCA extends from Limerick to east of Moneypoint. It is bounded by Kerry Head to the south and Kilrush farmlands to the north.

County Kerry

The Landscape Character Assessment of Co. Kerry divides the County into Electoral Zones, which are subdivided into visual zones and physical zones. The physical zones have been classified into sensitivity areas indicating their capacity for change. The study area covers the Electoral Area of Listowel.

- Visual Unit L3 – Cashen River: This is located along the south-western boundary of the study, and includes the summit of Knockanore Mountain and some of its southern slopes.
- Visual Unit L4 – Ballylongford Creek: This is located in the south and southwest of the study area.
- Visual Unit L5 – Mouth of the Shannon: This is located in the southwest of the study area.
- Visual Unit L6 – Tarbert Pastures: This is located south of the Moneypoint site across the River Shannon Estuary. The power station on Tarbert Island is a prominent landmark both within and outside this visual unit.
- Visual Unit L7 – Inner River Plain: This is located inland in the south and southeast of the study area.

County Limerick

The Limerick County Development Plan 2010-2016 subdivides the County into different Landscape Character Areas but no landscape sensitivity ratings are contained therein. The following two areas are located within the study area:

- Area 6: Shannon Coastal Zone – Objective EH O12: The Landscape Character Assessment states that views should be protected along the N69 and suggests that development between the road and the estuary be allowed in exceptional circumstances only.

- Area 10: Western Uplands – Objective EH O16: The Landscape Character Assessment discourages the selection of locally prominent sites within the Western Uplands and encourages the use of local landform and landscape features coupled with sensitive landscaping in order to screen development.

10.2 IMPACT OF THE DEVELOPMENT

10.2.1 Introduction

The main parameters that define Visual Impact are as follows:

- Extent of visibility
- Nature of visibility

In areas where Visual Impact is substantial there is also an impact on the landscape character. The impact on the landscape character is assessed with regard to the characteristics that a landscape comprises.

The assessment of the visual character is based on widely accepted design principles practised within the design professions. The Zones of Theoretical Visibility for turbine tower and blade tip height are presented separately (ZTV Maps - Figures 10.2 & 10.3). The extent of visibility is described in the Visual Impact Map - Figure 10.4 and the areas from where the wind farm is visible are indicated in Nature of Visibility Map - Figure 10.5.

Thirteen photomontages illustrate the impact of the wind turbines within the zone of visual influence.

The visual survey of the study area was carried out in August 2010 in mostly overcast conditions with some sunny spells and heavy showers. A further visit was undertaken in March 2011.

10.2.2 Characteristics of the Proposal

Design Objectives

An objective in the design of the wind farm was to locate the turbines in such a way that the visual relationships between each turbine would appear clear and simple, whilst avoiding a strictly linear arrangement.

Relationship to Site, Topography and Landscape

The siting of the wind farm relates to the exposure of the landscape on the shoreline of the River Shannon Estuary and consequent wind speeds. The turbines generally follow the shoreline with turbines T1 and T2 located slightly inland. The curving nature of the shoreline results in the turbines being seen differently from different viewing angles. In some views, the turbines are read as being in a roughly linear arrangement, as in Photomontages 3 & 7. In other views the layout is more irregular in form as in Photomontages 5 & 14.

10.2.3 Zone of Theoretical Visibility

Refer to ZTV Maps - Figures 10.2 & 10.3.

The Zone of Theoretical Visibility has been mapped for a 15 km radius from the site. This map indicates areas where turbines are visible and where they are not visible, and the number of turbines that would be viewed from certain areas. However, this mapping does not take account of vegetative screening or the built environment and hence reflects a

lunar landscape, which for the visual impact assessment process represents the worst case scenario.

Vegetative screening was mapped during the site survey and is taken into account in the visual analysis. In areas where the definition of the precise amount of visibility was critical, photomontages are used. The results are presented in the Visual Impact Map, Figure 10.4, which shows the principal views and sections of roads where there are open or intermittent / glanced views of the wind farm.

10.2.4 Principal Views

The principal views of the wind farm from within the study area will occur within a visual zone of approximately 150 km² primarily to the north, northwest, south and southeast of the site as indicated in Figure 10.4. The extent of visibility is shaped by the surrounding topography.

Outside of this zone, to the east, west, north and southwest of the site, some open and intermittent views of the wind farm will occur within a radius of 10-15 km of the site. Potential views to the south and northeast are largely screened by topography and intervening vegetation.

10.2.5 Impact on the Visual Character

Refer to Figure 10.5.

The ZTV Maps - Figures 10.2 & 10.3 indicate areas from where the turbines are theoretically either fully or partly visible. The site survey revealed screening elements in the landscape and the areas of actual visibility are marked and numbered (1 - 7) on Figure 10.5. The extent and nature of visibility is discussed hereunder.

Area 1: Mainly open and some intermittent views from within 6.5 km of the wind farm

This zone occupies an area of approximately 79 km². Due to the flat topography and generally low vegetation, there are open and intermittent views of the wind farm from many locations within this area. The following five photomontages illustrate the impact within the area.

Photomontage 1: View direction / location: East – Southeast, approximately 2 km from Kilrush, County Clare (Grid reference: E99936, N52732)

This Photomontage is representative of:

- LCA 18 – Shannon Estuary Farmland
- Landscape Character Type FRH – Farmed Rolling Hills
- (Living) Landscape Designation – Heritage Landscape
- Open views along Scenic Road 19
- Settlements in the outskirts of Kilrush

This viewpoint is located along the scenic road between Cappagh and Carrowdotia South which travels directly along the shore of the estuary. This open view looks across the River Shannon Estuary in the foreground and background and towards a landscape with well defined field patterns and low hedgerow boundaries that gently slope down to the shore in the middle distance. There are no trees of significant height in view. Moneypoint

Generating Station with its two 225 m high chimneys and power station buildings is prominently visible within the middle distance as well as overhead transmission line structures.

Assessment of Visual Impact: Four turbines (T1-T4) are fully visible, while turbine T5 is partially hidden by topography and the existing power station buildings. The turbines are relatively regularly spaced in three groups of two and a single turbine. Turbines T3 & T4 form a small group while the remaining three turbines appear as single turbines that are relatively regularly spaced to each other. The blades of turbines T3 and T4 overlap from this viewing angle. It should be noted that this effect changes as one drives along the road. The turbines would be viewed against the sky and form an immediate apparent structure in the landscape and 'surround' Moneypoint Generating Station,. However, the latter would remain the most dominant visual feature within this view. The magnitude of visual change is considered to be **Moderate** for this viewpoint location.

Assessment of Landscape Impact: The existing landscape has been heavily transformed by man-made activity. The relatively flat topography, the use of the land for pasture, the absence of any semi-mature or mature tree vegetation contrasts with the strong vertical elements of Moneypoint Generating Station and the associated overhead transmission line infrastructure. The wind farm adds another layer of vertical structures to the existing view but does not alter the character of the existing view from that of an agricultural landscape containing an industrial features. The landscape impact is therefore considered to be **Low**.

Photomontage 2: View direction / location: Southeast, from housing estate beside N67 in Kilrush, Co. Clare (Grid reference: E99223, N55584)

This Photomontage is representative of the following:

- A series of open views from the hillside within the western part of the town of Kilrush
- LCA 18 – Shannon Estuary Farmland
- Landscape Character Type FRH – Farmed Rolling Hills
- Living Landscape – Settled Landscape

This viewpoint is located within a housing estate in Kilrush beside the N67. Similar views from this road can be experienced for a short distance only when driving along the N67 or the adjacent slip road into the housing estate.

Assessment of Visual Impact: All five turbines are partially visible. The blade tips of turbines T3 & T4 would be visible, but the remaining parts of the turbines would be otherwise hidden by residential houses in the foreground. The turbines would be spaced in an irregular pattern but all appear at similar height above the forest line on the horizon. All turbines are viewed against the sky and form an apparent structure on the horizon. However, the two 225 m high chimneys of Moneypoint Generating Station would remain as most dominant visual component on the horizon line. Overall, the magnitude of visual change is considered to be **Slight** for this viewpoint location.

Assessment of Landscape Impact: The existing landscape is an urban landscape. The chimneys of Moneypoint Generating Station indicate further man-made activities beyond the trees in the distance and form a dominant feature on the horizon line. Therefore, the addition of the wind farm does not alter the character of the landscape to a significant degree. The landscape impact is considered to be **Low**.

Photomontage 3: View direction / location: South, from R473 in the townland of Carrowfree, Co. Clare (Grid reference: E03993, N56387)

This Photomontage is representative of the following:

- A series of open and intermittent views along the R473
- LCA 18 – Shannon Estuary Farmland
- Landscape Character Type FRH – Farmed Rolling Hills
- (Living) Landscape Designation – Settled Landscape

This viewpoint is located on the R473 north of Moneypoint. The view is across gently undulating farmland. Hedge boundaries and patches of woodland are common features across the landscape and clearly define roadsides and field boundaries. Settlement is sparse and consists mainly of single farmsteads. Moneypoint Generating Station with its power station buildings on the horizon is a dominant feature within this view. Existing overhead power lines with different dimensions are additional features of industrial character but are less visually dominant.

Assessment of Visual Impact: All turbines are almost fully visible. The lower sections of the towers are partially screened by topography and intervening vegetation. The turbines would appear in three groups, T1 & T3 and T2 & T4 both to the west of Moneypoint Generating Station, and T5 as a single turbine to the east of the station. Turbine T5 appears isolated and unconnected to the other turbines. The turbines would be partially viewed against the sky, with parts of the towers seen against the distant backdrop of the landscape along the southern shore of the Estuary in Co. Kerry. The visibility of the land mass in the background is highly dependant on weather conditions. The visual impact is considered to be **Moderate**.

Assessment of Landscape Impact: The existing landscape has been transformed by man-made activity. Moneypoint Generating Station and transmission lines contribute an industrial character to the backdrop in an otherwise rural scene. Whilst the turbines are a prominent new feature in the landscape, they are not totally uncharacteristic when set within the existing attributes of the landscape. The landscape impact is therefore considered to be **Low**.

Photomontage 4: View direction / location: Southwest, from junction N67/R486 approximately 250 m north of Killimer Ferry Terminal, Co. Clare (Grid reference: E06462, N52615)

This Photomontage is representative of the following:

- A series of open and intermittent views along the R473
- LCA 18 – Shannon Estuary Farmland
- Landscape Character Type FRH – Farmed Rolling Hills
- (Living) Landscape Designation – Heritage Landscape

This viewing location is at the access road to Killimer Ferry Terminal. The viewer looks across a green field towards a mature deciduous forest in the townland of Feagahroge in the middle distance and towards the shore of the River Shannon Estuary. The chimneys at Moneypoint Generating Station and parts of power station buildings rise up dominantly

beyond the forest on the horizon. No settlements are eminent within this viewshed.

Assessment of Visual Impact: Turbines T5 is partially visible, while turbines T1–T4 are mainly visible by their blades. Most parts of their towers are obscured by topography and existing vegetation in the foreground. Turbine T1 - T4 form a group while turbine T5 appears as a single structure disconnected from the others. The spacing between turbines T1 – T4 is regular. The turbines are viewed against the sky and therefore visibility is dependant on weather conditions. The turbines, particularly turbine T5, will form a recognisable new feature within the wider view, but they do not alter the overall character of the scene. The visual impact is therefore considered to be **Moderate**.

Assessment of Landscape Impact: The existing landscape with the green field in the foreground, the land sloping down to the shore and the extensive deciduous forest provides a distinctive character to this location. It appears to be less affected by human activity than surrounding areas, but it also contains roadside signage, hedge boundaries, metal poles and the two chimneys of Moneypoint Generating Station. The wind farm will be an apparent new feature within the landscape but, taking into account the existing industrial development, the landscape impact is considered to be **Medium**.

Photomontage 5: View direction / location: West, from Car Ferry half way between Tarbert and Killimer on the River Shannon, Co. Clare (Grid reference: E07870, N49788)

This Photomontage is representative of the following:

- Open views across the River Shannon when using the Killimer - Tarbert Ferry

The viewer has an open view across the water towards Moneypoint Generating Station, the townland of Carrowdotia South and Killimer. The landscape is shaped by human activity, with field patterns and low hedgerow boundaries. Moneypoint Generating Station with its ship unloaders and power station buildings are dominant industrial features in this view. Pylons run along the horizon but are only partly visible.

Assessment of Visual Impact: Turbines T3 – T5 will be almost fully visible, the base of some towers being partially hidden by topography. The towers of turbine T1 & T2 are also partially hidden by topography. The wind farm is spaced rather irregularly and forms two groups (T3 & T4 and T1, T2 & T5). All turbines will be viewed against the sky, except turbine T5 which would be partially seen against the chimneys of Moneypoint Generating Station. The turbines form an immediately recognisable new element within the overall scene. The magnitude of change will be **Moderate Adverse** for this viewpoint.

Assessment of Landscape Impact: Parts of the landscape have been heavily transformed by man-made activity. The power station and its buildings bring an industrial feature to the primarily agricultural landscape along the shoreline of the Shannon. The wind farm adds another layer to this Shannon Estuary Working Landscape (as described in the County Clare Development Plan 2011-2017) and alters the existing landscape slightly. However, it is not uncharacteristic, when set within the attributes of the receiving landscape. The landscape impact is considered to be **Medium**.

Photomontage 14: View direction / location: Southeast towards Moneypoint from N68, approximately 1 km northeast of Kilrush (Grid reference: E 00763, N56035)

This Photomontage is representative of the following:

- A series of open and intermittent views along the N68

- Landscape Character Area 18 – Shannon Estuary Farmland
- Landscape Character Type – Farmed Rolling Hills
- (Living) Landscape Designation – Settled Landscape

The viewer has an open view across a pastoral landscape in the foreground and towards a large area of woodland in the background. Some residential houses are embedded in existing vegetation in the middle distance. The landscape is shaped by human activity, with field patterns and low hedgerow boundaries. The power station chimneys at Moneypoint form a landmark in this view and mark an industrial development beyond the woodland.

Assessment of Visual Impact: Turbines T1–T 4 will be visible by their blades, while turbine T5 will be visible by its blade tips only. Intervening topography and vegetation will obscure the remaining parts of the development. Turbines T1, T2 & T4 form a group, while turbines T1 & T5 are seen as separate elements. All turbines will be viewed against the sky. The turbines will be recognisable structures on the horizon but will not be obvious elements within the wider view. The visual impact is therefore considered to be **Slight Adverse**.

Assessment of Landscape Impact: The viewpoint is located within a farmed landscape with low density residential occupation. The existing mature woodland suggests an almost remote and rather unspoiled character. Nevertheless, the observer is located near the outskirts of Kilrush and the distinct chimneys of Moneypoint Generating Station on the horizon add an industrial layer to the scene. The addition of wind turbines would not conflict with the existing attributes of the receiving landscape. The magnitude of landscape impact is considered **Low**.

Photomontage 15: View direction / location: Southeast towards Moneypoint from the N67 (Scenic Route No. 19) (Grid reference: E02230, N52469)

This Photomontage is representative of the following:

- Landscape Character Area 18 – Shannon Estuary Farmland
- Landscape Character Type – Farmed Rolling Hills
- (Living) Landscape Designation – Working Landscape
- Open views along Scenic Road 19 close to Moneypoint Generating Station

This viewpoint is located on the N67, designated as Scenic Route No. 19 in the Clare County Development Plan 2011-2017, and offers open views along the Shannon Estuary and across to Moneypoint Generating Station which is in close proximity. The landscape has been heavily transformed by human activity in this view. The power station with its two chimneys, main and ancillary buildings, ship unloaders, man-made berms and rock armoured shoreline dominate the scene and confirm the Living Landscape Character Type – Working Landscape as defined in Development Plan.

Assessment of Visual Impact: Turbines T1–T4 will be fully visible nearby. Turbine T5 will be visible in the background but its tower will be partially hidden by Moneypoint's power station buildings. The turbines appear as a single unit, despite turbine T5 being located in the background. The turbines are regularly spaced and will mainly be viewed against the sky, except the base of turbines T1–T4 which will be seen against the

landscape in the background and against the power station buildings. Sections of the blades of turbine T2 will also be seen against the chimneys. The turbines will form immediately apparent new elements within the overall scene and will underline the domination of vertical industrial structures in this view. Due to their colour and therefore 'clean' appearance they would stand in contrast to the existing darkened structures of Moneypoint Generating Station, which still would draw the main attention in this view, despite the presence of the wind farm in the foreground. The turbines will be dominant features in the scene but would not significantly affect and change the overall character of the view, as it has already been transformed into an industrial character by previous developments. The wind farm could be considered as actually enhancing the existing view as the visually stark vertical dominance of Moneypoint Generating Station would be somewhat reduced as the focus of the observer would be distracted by the proposed development. The visual impact is therefore considered **Significant Beneficial**.

Assessment of Landscape Impact: The landscape within this view has been heavily transformed by man-made activity. The existing industrial power generating features and the absence of any significant vegetation confirm the zoning as a Working Landscape. The introduction of wind turbines would add prominent features but they would not be substantially uncharacteristic when set within the attributes of the receiving landscape. The landscape impact is therefore considered **Medium**.

Area 2: Mainly intermittent and some open views of the wind farm approximately 3-8 km from the wind farm site

This zone occupies an area of approximately 32 km² on the southern side of the Estuary. The following photomontage illustrates the impact within the area.

Photomontage 6: View direction / location: Northeast, from scenic route (K-1) southeast of Carrig Island overlooking Ballylongford Bay, Co. Kerry (Grid reference: E98999, N47142)

This Photomontage is representative of the following:

- A series of open and intermittent views along this scenic route
- Electoral Area of Listowel / Visual Unit L4 – Ballylongford Creek

The viewpoint is located on the scenic route along the western side of Ballylongford Bay. The viewer looks across wetland and the River Shannon towards Co. Clare and Moneypoint Generating Station. The wetland in the foreground is a natural landscape, while pasture land use is predominant in the middle distance on slightly higher ground. The Co. Clare landscape contains undulating farmland with clusters of settlements and the industrial Working Landscape at Moneypoint Generating Station.

Assessment of Visual Impact: All turbines are fully visible. Overall, the turbines would appear in two groups, T1-T4 and T5 as a single turbines. Turbines T2 & T3 overlap in this viewpoint. Parts of the towers will be viewed against the landscape in the background before the upper part of the towers break the skyline. The turbines will form a recognisable part of the scene and add further vertical structures to the existing vertical elements of Moneypoint Generating Station. The wind farm will increase the extent of visible built features along the shoreline from this viewpoint. The visual impact is considered to be **Moderate Adverse**.

Assessment of Landscape Impact: Moneypoint Generating Station has industrialised

parts of the shoreline in this view and added a dominant man-made feature to a landscape that had previously been shaped by agriculture and small scale settlement. The addition of the wind farm brings new man-made features to the view and widens the impact of built features on landscape character. The wind turbines symbolise a clean source of energy within the landscape as opposed to the industrial character of the conventional power station. The landscape impact is considered to be **Medium**.

Area 3: Distant open and intermittent views approximately 8 – 15 km from the wind farm site

This zone occupies an area of approximately 38 km² to the southwest of the site. The following photomontage illustrates the impact within the area.

Photomontage 7: View direction / location: Northeast, from scenic route in the townland of Beal, Co. Kerry (Grid reference: E 89417, N47709)

This Photomontage is representative of the following:

- A series of mostly intermittent and some open views along this scenic route
- Electoral Area of Listowel / Visual Unit L5 – Mouth of the Shannon

This viewpoint is located along a scenic route in the north-western tip of Co. Kerry. It overlooks pasture land enclosed with stone hedgebanks and the dune landscape to the left of the view. The landscape contains a cluster of houses and farm buildings and existing small scale overhead transmission lines. The wider view takes in the River Shannon Estuary and the south shore of Co. Clare, with Moneypoint Generating Station visible in the distance.

Assessment of Visual Impact: Turbines T1-T4 will be fully visible, while turbines T5 will be partially screened by topography, existing vegetation and built structures in this view. The turbines will appear in a linear arrangement and will be spaced in regular distances from each other, except turbine T5 which would stand at a greater distance from the others. Similarly to Photomontage 6, parts of the towers will be viewed against the landscape in the background with the upper part of the towers breaking the skyline. Due to the significant distance from the site, the turbines will be a minor component of the wider view. Although recognisable, they will not have a distinct effect on the overall quality of the scene. The visual impact is considered to be **Slight to Moderate**.

Assessment of Landscape Impact: The landscape in the foreground has been shaped by human activities with the exception of the sand dunes along the coast. The turbines will be perceived as a new element in the landscape but, due to the distance and their setting, will not affect the overall landscape character in this area. While affecting the content of the view north-eastwards from this location, the turbines will be seen distantly in the context of existing large built features at Moneypoint. It should be noted that the visibility of the turbines in this photomontage has been digitally enhanced and that due to the significant distance from the site, visibility of the proposal from this location would be highly dependant on weather conditions. The landscape impact is considered to be **Low**.

Area 4: Distant open and intermittent views but many areas with no views due to topography and vegetation approximately 8-17 km from the wind farm

This zone occupies an area of approximately 57 km² to the northwest of the site. The following two photomontages illustrate the impact within the area.

Photomontage 8: View direction / location: Southeast, from N67 in the townland of Garraun, Co. Clare (Grid reference: E93187, N59013)

This Photomontage is representative of the following:

- A series of open and intermittent views along this National Road
- LCA 21 – Loop Head
- Landscape Character Type FEF – Flat Estuarine Farmland and Islands
- (Living) Landscape Designation – Heritage Landscape

This viewpoint is located north of Poulmasherry Bay along the N67 overlooking the bay in a south-eastern direction. Agricultural pasture with scrubby boundaries and patches of woodland define the foreground which slopes down towards the bay. Settlement structures are located along the eastern shore of Poulmasherry Bay with undulating agricultural pasture land in the background. The chimneys of Moneypoint Generating Station are a recognisable landmark on the horizon in clear weather, but due to the distance do not dominate the view.

Assessment of Visual Impact: All turbines will be visible, with the turbine towers visible to different extents, being partially hidden by topography and existing vegetation. The turbines appear as groups of three (T1, T2 & T5) and two (T3 & T4). Turbines within the group of three are regularly spaced along the horizon. Due to hazy weather conditions during the site visit the turbines are seen against the sky in this photomontage, but will most likely be seen partially against landscape during clearer conditions. The wind farm will be a recognisable new element within the overall scene in clear conditions. The visual impact is considered to be **Moderate**.

Assessment of Landscape Impact: The view across Poulmasherry Bay is attractive and includes some areas of natural vegetation. The wider landscape has been transformed by human activities including agriculture, infrastructure and settlement. The wind farm adds another layer of human activity to this view and adds more vertical elements to those already existing at Moneypoint Generating Station. The wind farm is a small element in the wide open views available from this part of Co. Clare and is not uncharacteristic when set within the elements of the receiving landscape. The landscape impact is considered to be **Low**.

Photomontage 9: View direction / location: Southeast, approximately 805m south of Doonbeg, Co. Clare (Grid reference: E96589, N64478)

This Photomontage is representative of the following:

- A series of open views along this secondary road
- Cumulative impact
- LCA 21 – Loop Head
- Landscape Character Type CPD – Coastal Plain and Dunes
- (Living) Landscape Designation– Settled Landscape

This viewpoint is located within a flat landscape of wet grassland in the foreground, emerging scrub vegetation and coniferous plantation in the middle distance and agricultural pasture in the background. Single houses or farms appear on the slopes of

the hill in the background to the left in this view. The existing wind farm at Tullabrack in the middle distance and the chimneys of Moneypoint Generating Station on the distant horizon are the only vertical structures in this view.

Assessment of Visual Impact: All turbine towers are hidden by topography and existing vegetation leaving the blades visible against the sky. Due to the significant distance from the wind farm, its visibility will be highly dependent on weather conditions. When the turbines are visible, they will be seen from this location in conjunction with the existing turbines at Tullabrack, resulting in cumulative impact in combination. The cumulative visual impact is considered to be slight. Higher cumulative impact will arise from the permitted turbines at Moanmore (extension of Tullabrack Wind Farm) as indicated in the photomontage. (Cumulative effects are described in more detail elsewhere.) The wind farm at Moneypoint will be a minor component in the wider view and will not change the overall quality of the scene. The visual impact is considered to be **Slight**.

Assessment of Landscape Impact: The landscape in this view is open, consisting mainly of low vegetation and bog. There are some areas of commercial forestry. Tullabrack Wind Farm has brought a new character of energy infrastructure to the landscape and this will be extended with the addition of the turbines at Moanmore and Moneypoint. Due to existing and permitted wind farms in the foreground, the additional turbines will not be an uncharacteristic element within the landscape. The landscape impact is considered to be **Negligible**.

Area 5: Mainly intermittent and some open views approximately 6–12 km from the wind farm but many areas with no views due to topography and vegetation

This zone occupies an area of approximately 8 km² to the northeast of the site. The following photomontage illustrates the impact within the area.

Photomontage 10: View direction / location: Southwest, from R485 approximately 1 km north of the village Drumdigus at a T-Junction, Co. Clare (Grid reference: E11356, N58037)

This Photomontage is representative of the following:

- A series of intermittent and some open views along the R485
- LCA 18 – Shannon Estuary Farmland
- Landscape Character Type FRH – Farmed Rolling Hills
- (Living) Landscape Designation – Settled Landscape

This viewpoint overlooks undulating hills with agricultural pasture and some commercial coniferous plantation. The field pattern with hedgerow boundaries, some of them with mature trees, and patches of deciduous woodland define the view. The area is sparsely occupied with single houses or farms. The chimneys of Moneypoint Generating Station in the background form a clear vertical landmark on the horizon. Further existing vertical structures are overhead transmission lines with pylons along the horizon, smaller scale power infrastructure in the middle distance and overhead lines in the foreground viewed against the sky.

Assessment of Visual Impact: Views such as shown in Photomontage 10 are available for a limited number of views along the road network in the area northeast of the site as indicated in Figure 10.5. Turbines T2 – T4 would be visible by their blade tips only, their

towers being hidden by topography and existing vegetation. Turbine T1 & T5 would be visible by their blades and parts of their tower. The turbines form two separate groups on the horizon, with turbine T5 appearing as a single element, detached from the other turbines. All turbines would be viewed against the sky and would be a minor component in the wider view. Due to the distance from the site, visibility would be highly dependent on weather conditions. The visual impact is considered to be **Slight**.

Assessment of Landscape Impact: The landscape has been shaped by human activities visible in agricultural patterns and forestry as well as houses and the chimneys at Moneypoint. The wind farm will not be an uncharacteristic element when viewed within the attributes of the existing landscape. The landscape impact is considered to be **Low**.

Area 6: Mainly open and some intermittent views approximately 6-13 km from the wind farm

This zone occupies an area of approximately 42 km² to the southeast of the site. The following two photomontages illustrate the impact within the area.

Photomontage 11: View direction / location: Northwest, from the N69, a scenic road (L-1) approximately 1.2 km northeast of Glin, Co. Limerick (Grid reference: E14197, N48322)

This Photomontage is representative of the following:

- A series of open views along the N69 which is designated as scenic road in this section
- LCA 6 – Shannon Coastal Zone
- Similar views from the shore within the village of Glin

This view looking across the River Shannon Estuary includes the existing power stations at Tarbert and Moneypoint with their chimneys and buildings. The Co. Clare landscape on the opposite side of the estuary contains undulating topography with agricultural pasture, defined by field patterns and separated by hedgerows and patches of woodland. Existing settlement on the Co. Clare side is very sparse and includes single farmyards.

Assessment of Visual Impact: Turbines T3 – T5 will be almost fully visible, although sections of the lower part of the towers will be obscured by topography and existing buildings of Moneypoint Generating Station. The towers of turbines T1 & T2 will be partially hidden by topography. The turbines are irregularly spaced from this angle. Turbine T4 will stand in front of turbine T3, causing some visual confusion due to overlapping blade movement. However, this effect would be experienced for a short distance only when travelling along the N69. All turbines will be viewed against the sky and will be recognisable as new vertical elements in the landscape. The wind farm integrates into the industrial character of the scene. The visual impact is considered to be **Moderate**.

Assessment of Landscape Impact: The broad open view to the northwest along the River Shannon Estuary and adjacent shores is mainly rural in character with a more industrial character concentrated at the locations of the two power stations. While the vertical industrial character is in contrast to the flat nature of the river the addition of the wind farm is not uncharacteristic when seen within the attributes of the receiving landscape. The landscape impact is considered to be **Low**.

Photomontage 12: View direction / location: Northwest, from a scenic road (L-1) in the townland of Ballycullane Upper, Co. Limerick (Grid reference: E10304, N45028)

This Photomontage is representative of the following:

- A series of open views along secondary roads, which are designated as scenic in this area
- LCA 6 – Shannon Coastal Zone
- Similar views from the shore within the village of Glin

This wide open view from an elevated area looks towards the northern part of Co. Kerry, Tarbert and Tarbert Generating Station on Tarbert Island. The overall landscape consists of undulating hills descending towards the shore, agricultural pasture and field patterns bordered by hedgerows and areas of mature woodland. North of Tarbert, mature woodland extends towards Tarbert Island.

Similar agricultural land use is evident across the River Shannon in Co. Clare. Kilrush is visible in the distance together with Inishbig and parts of Scattery Island. The settlement structure consists mainly of scattered houses or farms, clusters of houses at Tarbert and increasing density of houses towards Kilrush. Existing overhead transmission lines connect in the middle distance to Tarbert Generating Station, which is the dominant landmark on the southern shore of the Estuary in this view. Moneypoint Generating Station in Co. Clare forms the dominant landmark on the Estuary's northern shore. The Ferry Terminal at Tarbert Island and the ferries operating between there and Killimer can be seen on the right hand side of the photograph.

Assessment of Visual Impact: Turbines T3-T5 are fully visible, while the towers of turbines T1 & T2 are partially hidden by the ship unloaders and power station buildings at Moneypoint Generating Station. Turbines T3-T5 are located along the shoreline, while turbine T1 & T3 would form a small cluster due to overlapping blades, resulting in some visual confusion from this viewpoint. The turbines will be viewed against the land and only their blades (T1, T2 & T5) or blade tips (T3 & T4) would break the skyline. Minor cumulative impact would occur in conjunction with the existing Tullabrack Wind Farm and the permitted additional turbines at Moanmore Wind Farm, although these two wind farms are at a significant distance from this viewpoint. Cumulative effects are described in more detail elsewhere. The wind farm at Moneypoint will form an immediately apparent new feature within the landscape but when seen together with the existing power stations it does not change the overall character of the view. The proposal adds another layer of visible vertical elements and increases the extent of industrial features along the northern shoreline of the Estuary. The visual impact is considered to be **Moderate**.

Assessment of Landscape Impact: The existing landscape is a mixture of agriculture, settlements and industry as well as areas of woodland and the open expanse of the Estuary. The existing chimneys and buildings of the power stations at Moneypoint and Tarbert form dominant features in the landscape. The wind farm will add another layer of prominent vertical structures to the existing view but will not alter the character of the existing landscape from that of an agricultural landscape containing industrial / power features. The landscape impact is considered to be **Medium**.

Area 7: Open distant views between 11–14 km but many areas with no views due to topography and vegetation

This zone occupies an area of approximately 14 km² to the south of the site. The following photomontage illustrates the impact within the area.

Photomontage 13: View direction / location: North, from local road, west of Guiney's Cross Roads, Co. Kerry (Grid reference: E01163, N37935)

This Photomontage is representative of the following:

- A series of intermittent views along this secondary road
- Electoral Area of Listowel / Visual Unit L7 – Inner River Plain
- Settlements (Local Farmsteads)

This viewpoint looks across agricultural land with hedgerow boundaries, patches of woodland and clusters of houses and farms. A number of overhead transmission lines pass through the landscape in the foreground and continue into the distance. The top of the chimneys at Moneypoint Generating Station appear above the ridgeline on the horizon.

Assessment of Visual Impact: The blades of turbines T3 & T5 will be visible above the brow of the hill along the horizon, while parts of the towers and their blades will also be visible for turbines T1, T2 & T4. The turbines are irregularly spaced along the horizon. Some visual confusion will occur between turbines T1 & T3 due to overlapping blades. All turbines would be visible against the sky. Due to significant distance from the observer, their visibility will be highly dependant on weather conditions. The turbines will form a minor part of the overall scene. Awareness of the development would not have a marked effect on the overall quality of the scene. The visual impact is considered to be **Slight**.

Assessment of Landscape Impact: The landscape in the foreground contains pastoral elements with associated farm buildings and residential houses. Existing overhead transmission line infrastructure in the foreground and the chimneys of Moneypoint Generating Station on the horizon underline the human shaped character of this view. The wind farm development will form only a minor part in the wider view. The landscape impact is considered to be **Low**. Visibility towards the wind farm may increase during the winter months but the extent of visibility would remain minor and would not increase the impact on landscape character.

10.2.6 Cumulative Effects

The extent of visibility is described in the Visual Impact Map (Figure 10.4) and the areas from where the wind farm is visible are indicated in Nature of Visibility Map (Figure 10.5).

The definitions presented in Table 10.3 are used to determine cumulative effects on visual impacts.

Table 10.3: Definition of Cumulative Impacts

Definition	Effect
In Combination	Where two or more features are seen together at the same time from the same place, in the same (arc of) view where their visual effects are combined.

Definition	Effect
In Succession	Where two or more features are present in views from the same place (viewpoint) but cannot be seen at the same time, together because they are not in the same arc view – the observer has to turn to see new sectors of view whereupon the other features unfold in succession.
In Sequence	Where two or more features are not present in views from the same place (viewpoint) and cannot, therefore, ever be seen at the same time, even if the observer moved round the arc of view, the observer has to move to another viewpoint to see the second or more of them, so they will then appear in sequence. The frequency of occurrence in the sequence may be highly variable, ranging from frequently sequential when the features keep appearing regularly and with short time lapses between (clearly speed of travel influences this as well as distance between the viewpoints) down to occasionally sequential where there may be long time lapses between appearances, because the observer is moving very slowly and / or there are large distances between the viewpoints (even if not between the features).
Perceived:	Where two or more features are present but one or more is never seen by the observer, for example, because they are screened, or the observer is unable or unwilling to attend a viewpoint from where they would be seen. However, the observer is aware that others are there because, for example, they may have read or heard about them or seen signs of them; this is an apprehended or perceived effect but can be strongly felt; it could also, nevertheless, be mistaken because the observer's information or interpretation of it is wrong (David Tyldesley for SNH at PL – Proposed Wind Farm, An Suidhe, Inveraray, Argyll, November 2002).

Site surveys were carried out in August 2010 and in March 2011 to establish the actual visibility from roads, i.e. a survey of restricting roadside vegetation and/or built structures. The findings of this survey are described hereunder.

Moneypoint and Moanmore / Tullabrack Wind Farm

Tullabrack Wind Farm comprising seven wind turbines is located approximately 4 km north of Kilrush and has been operational since late-2004. Turbines comprise 65 m high towers and 33 m long blades. A six turbine extension to this development, which is known as Moanmore Wind Farm, comprising 85 m high towers and 35.5 m long blades, was granted planning permission in 2010. The combined development is referred to herein as Moanmore / Tullabrack Wind Farm

The seven existing turbines at Moanmore / Tullabrack are laid out over a distance of approximately 1.8 km with the permitted six additional turbines being to the north of the existing turbines and laid out over a distance of approximately 1.5 km. All existing and permitted turbines are arranged in a northwest - southeast orientation in an irregular layout, within a very gently undulating landscape at an elevation between 15–30 m OD.

Moneypoint and Moanmore / Tullabrack are approximately 10 km apart, being separated by undulating hills and intervening vegetation.

Photomontages 9, 12 & 13 illustrate the cumulative impact of Moneypoint Wind Farm, showing the existing wind turbines at Tullabrack and the permitted additional turbines at Moanmore. There are a number of locations within the study area from where the wind farm at Moneypoint and the Moanmore / Tullabrack Wind Farm will be simultaneously

visible. The main areas for simultaneous visibility are to the north, northwest (Photomontage 9), to the west, from elevated areas to the south, southwest and southeast (Photomontage 12) of the site. In these views the wind farm at Moneypoint will form a separate visual unit. Potential visibility as illustrated in Photomontage 13 is unlikely due to the effects of distance between the observer and the wind farm development.

Site surveys were carried out in August 2010 and in March 2011 to establish the actual visibility from roads, i.e. a survey of restricting roadside vegetation and/or built structures. The findings of this survey are described hereunder.

Visibility occurs in combination in views from the southeast, southwest and north-northwest. Open views in combination can be experienced when travelling from the southwest towards southeast in Co. Kerry. It should be noted that these views are highly dependent on weather conditions due to the significant distance between the viewer and Moanmore / Tullabrack Wind Farm. Intervening topography also obscures parts of the turbines (Photomontage 12). Moanmore / Tullabrack becomes increasingly intermittently visible and is fully screened by topography and intervening vegetation in eastern areas and in closer proximity to the wind farm at Moneypoint.

Potential views from locations west of Kilrush and Poulmasherry Bay will be in succession due to the significant distance between the wind farms. The separation of the wind farms means that cumulative effects in sequence are possible.

Overall, the cumulative visual impact is Slight as there is significant separation between the wind farms. In locations where Moanmore / Tullabrack Wind Farm is clearly visible in the middle distance, the wind farm at Moneypoint is only a minor component on the horizon, particularly when viewed from north and north-western areas (Photomontage 9).

Moneypoint and Beale Hill Wind Farm

The four turbines at Beale Hill, Co. Kerry are located approximately 17.5 km southwest of Moneypoint on the undulating slopes of Knockanore Mountain which descend to the River Shannon Estuary. The turbines are laid out over a south – northwest orientation in an irregular layout. The two wind farms are separated by undulating hills and the River Shannon Estuary.

The layout and topographical separation of the Beale Hill and Moneypoint wind farms results in their visibility as two detached units in long distance views mainly from the west and northwest. The nature of the visual impact is in combination, although views in succession could potentially be experienced from locations to the northwest from higher ground and potentially from the east along the Estuary in very clear weather conditions. While outside the study area, open long distance views in combination and succession of both wind farms can be experienced from the beach at Carrigaholt and some intermittent views in succession along the secondary road towards Doonaha. The cumulative visual impact is **Slight** due to the long distance between the two wind farms.

Cumulative Impact from N67 and N68 within the study area

There will be potential cumulative impact **in succession, combination and in sequence** on views from the N67 and N68 arising from Moneypoint and Moanmore / Tullabrack wind farms. Moanmore and Tullabrack will generally be perceived as a single unit due to their close proximity to each other, while the viewer would have to turn in order to see the wind farm at Moneypoint due to the significant distance between Moanmore/Tullabrack and Moneypoint. The cumulative impact on views from National Roads is considered to

be **Slight** (Photomontage 9).

Cumulative Impact from Regional Roads within the study area

There will be potential cumulative impact in **succession, combination and in sequence** on views from the R484, R473, R486, R483, R487, R485, R552, R524 and R551 arising from all proposed, permitted and existing wind farms. Views are somewhat restricted due to undulating landscape, intervening vegetation and the significant distance between the wind farms. Views will occur mainly in areas to the east, southwest, south and northeast and from the Regional Roads that pass through the centre of the study area, i.e. R473 and R483. In these areas, cumulative effects in sequence will depend on the area observed and will vary from frequently to occasionally. The cumulative impact on the landscape is considered to be **Low to Medium**. The wind farms will be recognisable features along Regional Roads particularly in areas between Moneypoint and Moanmore / Tullabrack Wind Farm. However, sometimes they will only be visible on the horizon and as minor feature in the wider landscape.

Cumulative Impact on The Shannon Way (within 15 km study area)

There will be cumulative effects in **combination, succession and in sequence** arising from Moneypoint, Moanmore, Tullabrack and Beale Hill Wind Farm for intermittent views and some open views most likely from higher ground, for example from Knockanore Mountain. The cumulative impact on the landscape would be **Low** due to the setting of wind farm at Moneypoint within an existing industrialised area and also to the separation between Moneypoint and Moanmore / Tullabrack Wind Farm. Beale Hill Wind Farm can only be seen in succession or in sequence with the other wind farms located within in the study area.

Conclusions

The main cumulative impacts arising from the proposed wind farm will impact mainly on longer distance views from areas to the northwest, west, southwest, south and southeast and some areas to the east of the application site.

The cumulative impacts arising from the existing, permitted and proposed wind farms are generally low, given the setting of the wind farm at Moneypoint within the existing attributes of the surrounding landscape and the distance between Moneypoint and other wind farms. Overcast conditions would reduce the possibility of views in succession and combination, thus reducing cumulative impact.

10.2.7 Summary of Impact on Visual Character

The main **near distance views** of the wind farm, within the study area, occur from within Areas 1 & 2, as indicated on Figure 10.5, mostly within a 7 km radius around the site and covering an area of approximately 100 km². The visual impact of the wind farm is illustrated in Photomontages 1-6, 14 & 15 and is considered to range from **slight to significant beneficial** with higher potential visual impact on views from locations close to the proposed development. The wind farm will not be visible from all locations within this area, as some screening is provided by existing vegetation and the undulating land profile.

Middle distance views, mostly within 6–11 km around the site can be experienced within Areas 5 & 6, as indicated in Figure 10.5, covering an area of approximately 50 km². The nature of visual impact is indicated in Photomontages 10-12. The visual impact ranges

from **slight to moderate**. The undulating landscape and intervening vegetation limit visibility of the wind farm in some areas.

Long distance views, from 11–15 km distance of Moneypoint occur from within Areas 3, 4 & 7 covering an area of approximately 108 km². The visual impact is shown on Photomontages 7-9 & 13 and ranges from **slight to moderate**. Due to the distance of these views from the site, the visibility would greatly depend on the weather and resulting sky conditions.

Beyond the principal visual zone, within Areas 4-6, turbines are visible from stretches of mainly county roads but also from parts of regional and national roads, as indicated on Figure 10.5. There are some open views available from the outskirts of Doonbeg, Kilrush, Kilmihi, Glin and Ballylongford. Outside of the study area, some very long distance views are available from west of Doonbeg, northeast of Kilkee and Carrigaholt. Parts of Areas 3 & 7 will experience intermittent views of the wind farm with many potential views screened by topography and intervening vegetation, as indicated in Photomontages 13 and on Figure 10.4.

There are no or very few views from low-lying inland areas mainly to the north, northeast and southeast of the site with topography and vegetation providing screening within the landscape, as indicated on Figure 10.4.

10.2.8 Impact on Landscape Character Areas

The turbines are proposed within an area described as the Shannon Estuary Working Landscape (Living Landscapes, Clare County Development Plan 2011-2017), within the Farmed Rolling Hills Landscape Character Type and Shannon Estuary Farmland Landscape Character Area.

There may be an impact on landscape character when there is visual impact arising from the development. The wind farm has the potential to impact on the landscape character in Areas 1-7 as described above. The nature of the impacts relate to the nature and extent of visibility. The landscape impacts within these areas are generally **low to medium**, with the highest impacts on areas in the immediate vicinity of the site, particularly the townlands of Carrowdotia South and North.

The wind farm extends the electricity generation facilities at Moneypoint and adds a new layer to the existing layers of energy production in the townland of Carrowdotia. The turbines with their sculptural white appearance would stand in contrast to the existing facilities and symbolise a greener source of energy production in this area.

Wind turbines indicate human impact, as do the power stations at Moneypoint and Tarbert, geometric outlines of field boundaries and commercial forestry. The land within the study area is used intensively and exploitation of wind resources is an activity that does not conflict with the prominent land uses.

The wind turbines are mainly located along the shore contours of the River Shannon Estuary at elevations of 5-15 m OD. Their arrangement is related to the topographical setting and natural changes in levels.

Visually, the impact on landscape character will be medium where close and open views occur as indicated on Figure 10.4. Wind turbines are strong vertical elements and they can dominate the landscape when viewed from a close distance. However, Moneypoint Generating Station's chimneys and ship unloaders as tall vertical elements already dominate and will remain as dominating features in the landscape (Photomontages 1, 6 &

12) . The significantly lower height of the wind farm, and the simple and vertical form of the turbines, results in a clear and unconfusing image (Photomontages 3 & 7).

10.2.9 Impact on Scenic Routes / Views and Prospects, Walking Routes & Scenic Drives

Co. Clare Scenic Road No. 19 - Coast road southeast of Cappagh to Carrowdotia South: Figures 10.2 & 10.3 (ZTV Maps) indicate potential visibility in most areas along this scenic route. Photomontages 1& 5 show examples of the potential visibility. The visual impact is considered to be moderate (Photomontage 1) due to the presence of the existing Moneypoint Generating Station and overhead transmission lines. Significant visual impact could occur when in close proximity to Moneypoint as shown in Photomontage 15. The scale of the turbines and the existing chimneys of the Generating Station would dominate the view.

Co. Clare Scenic Road No. 20 - R473 from outside Labasheeda (Townland of Ballyartney) to T-junction before Kildysert: Figures 10.2 & 10.3 (ZTV Maps) indicate potential visibility in most areas along this scenic route. However, site survey revealed that most potential views of the wind farm are screened by intervening vegetation and long distance views towards the proposed wind farm will be intermittent along the route. The visual impact is considered to be slight.

Scenic routes within 5 km outside of the study area are as follows:

Co. Clare Scenic Route No. 16 - R487 from Kilfearagh to T-Junction before Breaghva: There may be very long distance views of the wind farm from intermittent points along the road, but the majority of this scenic road will not experience visual impact.

Co. Clare Route No. 17 - R487 from outside Carrigaholt to Loop Head: There may be very long distance views of the wind farm from Carrigaholt but remaining sections of this scenic road will not experience visual impact.

Co. Clare Route No. 18 - Along coast road from Carrigaholt to Doonaha: Very long distance views of the wind farm would be experienced from the road along Carrigaholt beach, and when driving towards Doonaha. Apart from these sections, there would be no impact on this route. The visual impact is considered to be slight.

Co. Clare Route No. 30 - Local road from R487 junction at Carrownaweelaun along the coast road to Kilkee: There will be no visual impact on this scenic road.

Co. Clare Route No. 33 - Local road from N67 Junction at Corbally to N67 junction at Bealaha: Very long distance views of the wind farm could be experienced on the southern slopes of the hill in the townland of Corbally. The visual impact is considered to be negligible to slight due to the effects of distance.

Co. Kerry K1 - From Carrig along Ballylongford Creek crossing the bridge to Carrig Island, looking east and northeast overlooking the estuary and to Carrigafoyle Castle: Figures 10.2 & 10.3 (ZTV Maps) indicate potential open and intermittent views of and the nature of visibility is shown in Photomontage 6. The visual impact is considered to be moderate.

Co. Kerry K2 - Road from Killomeerhoe north to Larha, looking east: As indicated in Figures 10.2 & 10.3 (ZTV Maps), potential long distance views would be possible along this scenic route. The visual impact is considered to be slight.

Co. Kerry K3 - From the townland of Acres along the coast road to the townland of Leansaghane, overlooking the Lower Shannon Estuary to the northeast, north and west: Figures 10.2 & 10.3 (ZTV Maps) indicate potential open and intermittent views and the nature of visibility is shown in Photomontage 7. The visual impact is considered to be slight to moderate.

Co. Limerick L1 - Shannon Estuary from Foynes to Glin, which is incorporated into the River Shannon Estuary Integrated coastal Management Zone: Figures 10.2 & 10.3 (ZTV Maps) indicate potential open and intermittent views and the nature of visibility is indicated in Photomontages 11 & 12. Open views of the wind farm will be experienced from parts of this scenic route particularly from elevated sections and sections directly located along the River Shannon. Intervening vegetation and topography obscures views from many other part of the routes. The visual impact is considered to be moderate.

The Shannon Way

There will be potential open and intermittent views of the wind farm from the Shannon Way Walking Route within the more elevated south-western and southern part of the study area. Potential views are regularly interrupted by intervening vegetation. The visual impact will therefore be slight to moderate.

The Shannon Estuary Drive

The majority of potential open and intermittent view along this route will be experienced within the Principal Visual Zone on the N69, N67 and R486. Outside the Principal Visual Zone views towards the proposed Moneypoint Wind Farm will become increasingly intermittent due to topography and intervening vegetation. The overall visual impact is moderate considering the already existing visual impact of Moneypoint and Tarbert Generating Station on this route.

10.2.10 Impact on Built-Up Areas

There would be views of the wind farm from elevated areas on the outskirts of Kilrush as indicated in Photomontage 2 but no views from the town centre. Open views towards the wind farm can also be experienced from the outskirts of and from the shore road in Glin.

No views were identified from Labasheeda, Tarbert, Kilkee, Cooraclare and Creegh, although there may be views from the upper floors of buildings facing in the direction of the site as potential visibility is indicated for some of these settlements on Figures 10.2 & 10.3.

Very long distance views of the wind farm could be experienced from the outskirts of Doonbeg as demonstrated in Photomontage 9 and from Doonaha, as well as from townlands southwest of Newtonsandes Moyvane, Co. Kerry as indicated in Photomontage 13.

Potential intermittent views of the wind farm would be experienced from the outskirts of Ballylongford.

10.2.11 Impact on Roads

National Roads

N67 – The wind farm would be visible along the majority of this route within the Principal Visual Zone as indicated in Figure 10.4. The visibility greatly reduces outside the Principal Visual Zone and becomes intermittent due to the undulating nature of the landscape and

extent of intervening vegetation as demonstrated in Photomontage 8. Long distance views will be possible along the north-western border of the study area, west of Doonbeg.

N68 – Most open and intermittent views would be experienced from within the Principal Visual Zone as shown in Figure 10.4. Outside of this zone, isolated intermittent views would be experienced while the majority of views would be screened by topography (as indicated in Figures 10.2 & 10.3) and intervening vegetation.

N69 – Open and intermittent views occur within the Principal Visual Zone, while several intermittent and some open views would be experienced outside this zone but still within the study area (refer to Photomontage 11). Views within the southern study area are isolated due to intervening topography (as indicated in Figures 10.2 & 10.3) and existing vegetation.

Regional Roads

R473 – Stretches of road would experience open and intermittent views within the Principal Visual Zone as indicated in Figure 10.4 and demonstrated in Photomontage 3. Limited open and intermittent views would be experienced from eastern areas. These views are mainly from elevated areas or through gaps within existing roadside vegetation.

R483 – Mainly intermittent views would be experienced between Cooraclare and Kilrush. The majority of potential views are screened by topography (Figures 10.2 & 10.3) and intervening vegetation.

R484 – Few intermittent and a short stretch of an open view would occur along this Regional Road mainly in the vicinity of Kilmihil and between Doonbeg and Creagh. The majority of potential views are screened by topography and existing vegetation.

R485 – Mainly intermittent views from the northeast would be experienced from this road as demonstrated in Photomontage 10.

R486 – There would be open views within close proximity of the proposed wind farm within the Principal Visual Zone. Topography and intervening vegetation will obscure most potential views from road sections further to the east

R487 – Some isolated long distance and intermittent views would occur along a section northwest of Doonaha but the majority of the road will not experience visual impact resulting from the wind farm at Moneypoint.

R488 – Some isolated long distance and open views could occur particularly before joining the Scenic Road No. 18 along Carrigaholt beach.

R524 – Intermittent views would be experienced south of Glin. Topography and intervening roadside vegetation would screen views from the road further south within the study area.

R551 – The proposed wind farm would be viewed intermittently along the majority of the road within the study area. In places, views would be restricted by clusters of intervening vegetation or by topography.

R552 – The proposed wind farm would be intermittently visible from a few sections of this road. Views are generally restricted by clusters of roadside vegetation or by topography.

There are no known views from the following: R523, R553, R554

County Roads

The majority of open views from county roads occur from within the Principal Visual Zone (Figure 10.4). The nature of this visibility is indicated on Photomontages 1-6, 12, 14 & 15 and visual impacts range from significant, at close proximity to the wind farm, to slight as one moves away from the site. The turbines will also be visible from county roads within Areas 3-7, as shown on Figure 10.5, with negligible to moderate impacts. Long distance views outside of the principal visual zone would mainly be experienced from the northwest, east and southwest of the wind farm as shown in Photomontages 7-9 & 13.

10.3 MITIGATION

Wind turbines are by their nature highly visible elements and cannot be easily screened. Their function dictates that they be located on exposed sites. However, in some cases, the topography of the site can be used in order to screen the development from sensitive viewpoints.

Mitigation measures were therefore considered at the initial stage in the layout and design of the turbines.

Siting, Design and Layout

The proposed layout was based on two principles:

- To meet the planning constraints in relation to preservation of visual amenities
- To improve the nature of visibility.

The principal objectives in the layout were:

- To produce a clear and simple layout that was visually unified.
- To minimise visual confusion.
- To provide visual balance and harmony. Harmony and balance create clarity.
- To provide visual unity.

The size of the wind farm is confined and the arrangement of the turbines is related to the landform. Whilst the turbines have a presence within the immediate principal visual zone, the scale of the development does not destroy the spatial relationships of the landscape.

Colour & Appearance

In the majority of views the turbines will be seen against the sky. A matt white finish is proposed, as this colour acknowledges the human made and sculptural image of wind turbines. The colour white is also associated with purity and neutrality and is related to the traditional location of white houses within the landscape. The quality of white also means that whatever the weather conditions or nature of the surrounding landscape characteristics, the turbines would never aesthetically clash in colour.

The turbines will carry no external advertising or lettering except for statutory notices on the tower door.

Sunlight Reflection

The surface coating on the wind turbine blades will be a matt, non-reflecting finish. This will ensure that there will be no flashing or glinting when the rotating blades reflect direct sunlight.

Decommissioning

Ultimate decommissioning will involve removal of the turbines and the Electrical Transformer Station, although foundations that are below ground may be left in place. Cranepads and access tracks will be removed as appropriate and the areas reinstated.

10.4 CONCLUSIONS

In conclusion, the main views of the wind farm are from the Estuary and from lowland areas within 7 km to the north, northwest, south, southeast and east of the proposed wind farm. Elevated areas 8-15 km southwest and southeast of the study area will have long distance views. The Principal Visual Zone and areas with open and intermittent views are indicated on Figure 10.4.

It is acknowledged that the presence of wind turbines in the landscape will inevitably modify the existing character, but, given the already industrial character of the landscape surrounding Moneypoint Generating Station, the wind farm is not uncharacteristic when set within the attributes of the receiving landscape. The wind farm site is located within an area described as the Shannon Estuary Working Landscape in the Co. Clare Landscape Character Assessment, acknowledging the existing industrial / electricity generation character of the site. Therefore, the resulting landscape impact will generally be low to medium.

The DoEHLG Wind Energy Planning Guidelines (2006) have been complied with in terms of layout and siting in relation to shorelines. The Guidelines recommend that turbines should follow the form of the shoreline to minimise visual impact. There will be no significant cumulative impact arising from the proposed wind farm, due to the distance between the site and the existing and permitted wind farms in Co. Clare and Co. Kerry.

The Wind Energy Strategy in the Clare County Development Plan 2011-2017 identifies and classifies areas suitable for wind farm development. Moneypoint Wind Farm is located in an area which is categorised as 'Acceptable in Principle', subject to criteria in relation to siting and visual impact. It is concluded herein that there are no significantly adverse landscape or visual impacts arising from the proposed development.

KEY

- Proposed Moneypoint wind farm
- Existing wind farm at Tullabrack
- Existing wind farm at Beale Hill
- Permitted wind farm at Moanmore (Extension of Tullabrack Wind Farm)
- County boundaries
- Photomontage location (PM 1-15)
- Significant vegetation
- Kilometres distance from centre of site
- The Shannon Way as outlined in the Kerry County Development Plan 2009-2015
- Scenic Routes as outlined in Clare County Development Plan 2011-2017
- Protected Views and Prospects as described in Limerick County Development Plan 2010-2016
- Protected Views and Prospects as outlined in Kerry County Development Plan 2009-2015

Planning/Nature Conservation Designations according to National Parks and Wildlife Service (NPWS)

- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

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PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT, COUNTY CLARE

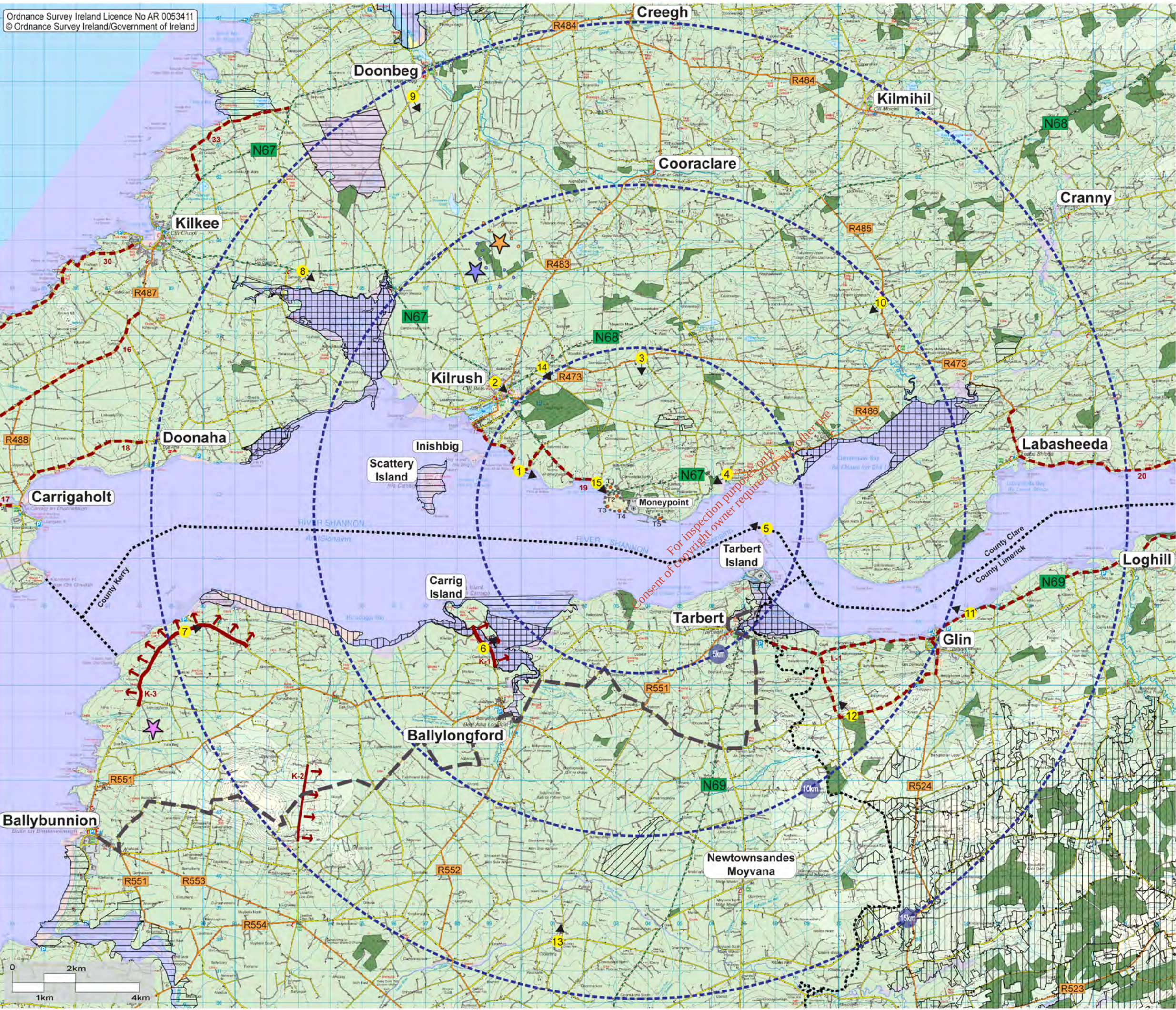
DESIGNATIONS AND PHOTOMONTAGE LOCATIONS

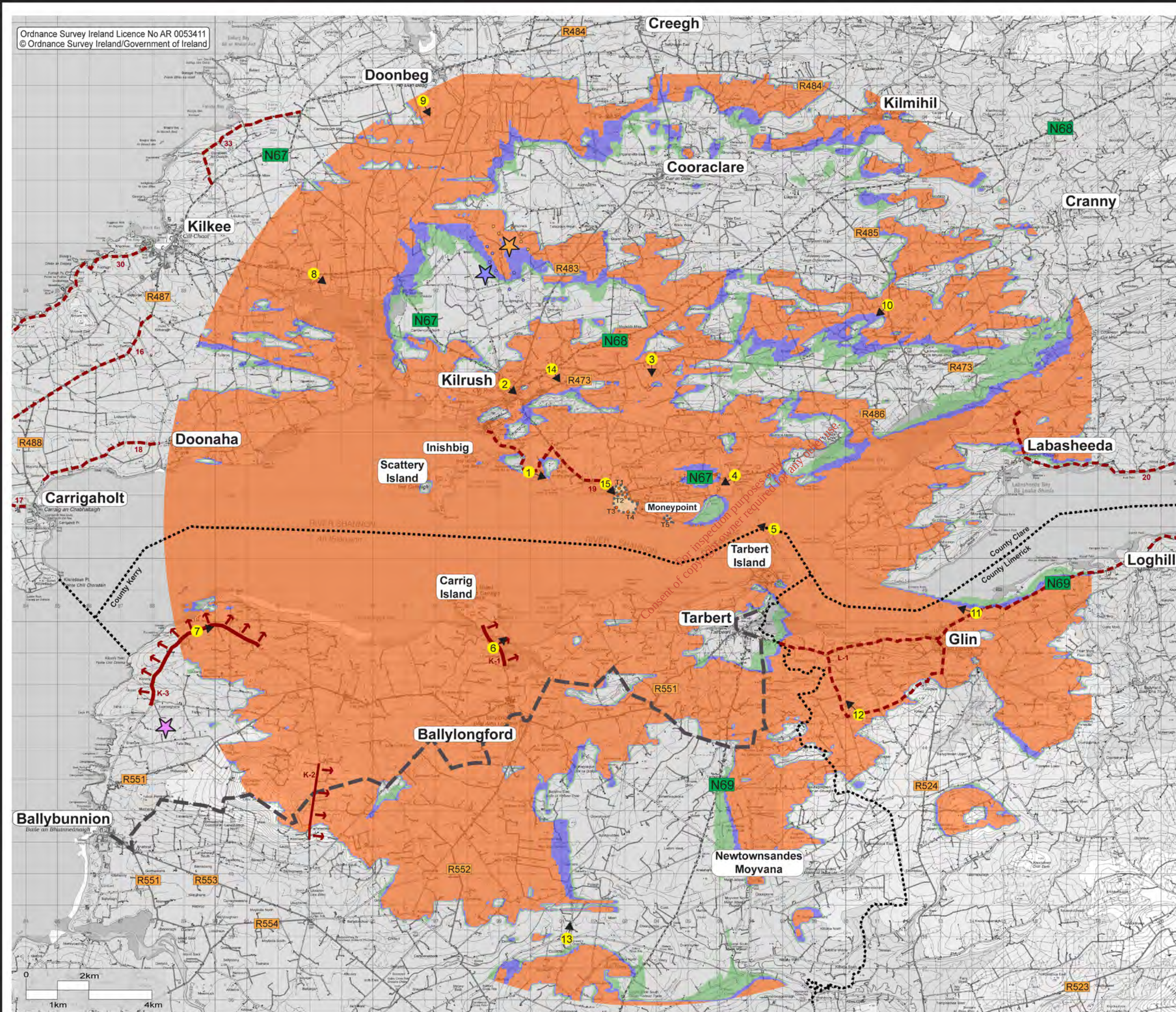
FIGURE 10.1

June 2011
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KEY

- Proposed Moneypoint wind farm
- Existing wind farm at Tullabrack
- Existing wind farm at Beale Hill
- Permitted wind farm at Moanmore (Extension of Tullabrack Wind Farm)
- County boundaries
- Photomontage location (PM 1-15)
- The Shannon Way as outlined in the Kerry County Development Plan 2009-2015
- Scenic Routes as outlined in Clare County Development Plan 2011-2017
- Protected Views and Prospects as described in Limerick County Development Plan 2010-2016
- Protected Views and Prospects as outlined in Kerry County Development Plan 2009-2015

Zone of theoretical visibility

Number of visible turbines

- 1 to 2 visible
- 3 to 4 visible
- 5 visible

The zone of theoretical visibility has been mapped for as approximately 15km radius. This map indicates areas where turbines are visible, where they are not visible, and numbers of turbines visible.

However in areas where turbines are visible the precise amount of visibility is not illustrated e.g. areas from which only part of one turbine is visible appear in the same colour code as areas from which all of one turbine is visible.

This mapping does not take account of vegetative screening and hence reflects a lunar landscape, which for the visual impact assessment process represents the "worst case scenario".

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PROPOSED WIND ENERGY
PROJECT AT MONEYPPOINT,
COUNTY CLARE

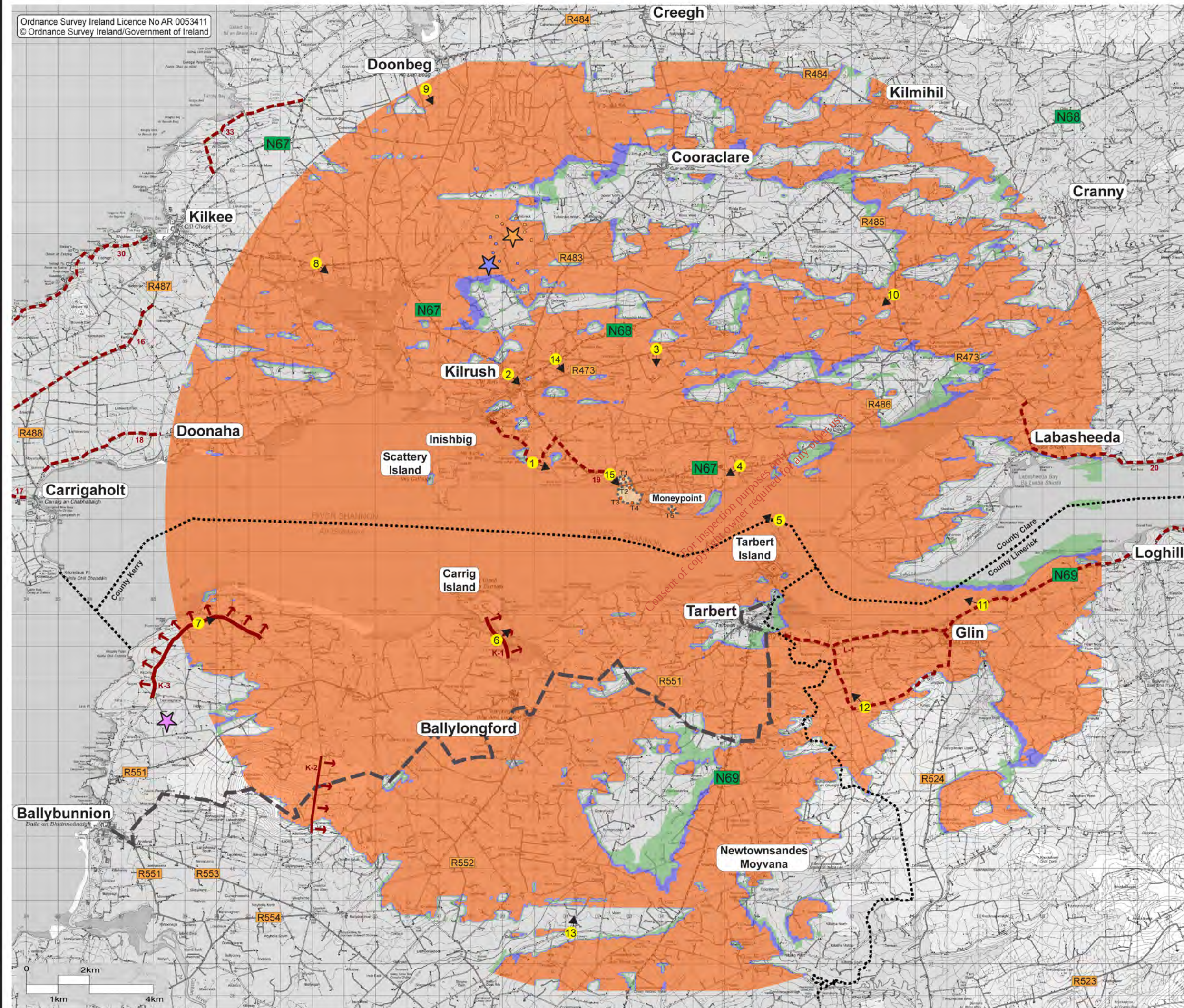
ZONE OF THEORETICAL
VISIBILITY
HUB HEIGHT: MAXIMUM 100m

FIGURE 10.2

June 2011

D129792

Drawn: MS - Checked: JS



KEY

- Proposed Moneypoint wind farm
- Existing wind farm at Tullabrack
- Existing wind farm at Beale Hill
- Permitted wind farm at Moanmore (Extension of Tullabrack Wind Farm)
- County boundaries
- Photomontage location (PM 1-15)
- The Shannon Way as outlined in the Kerry County Development Plan 2009-2015
- Scenic Routes as outlined in Clare County Development Plan 2011-2017
- Protected Views and Prospects as described in Limerick County Development Plan 2010-2016
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Zone of theoretical visibility

Number of visible turbines

- 1 to 2 visible
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However in areas where turbines are visible the precise amount of visibility is not illustrated e.g. areas from which only part of one turbine is visible appear in the same colour code as areas from which all of one turbine is visible.

This mapping does not take account of vegetative screening and hence reflects a lunar landscape, which for the visual impact assessment process represents the "worst case scenario".

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**PROPOSED WIND ENERGY
PROJECT AT MONEYPPOINT,
COUNTY CLARE**

**ZONE OF THEORETICAL
VISIBILITY
TIP HEIGHT: MAXIMUM 152m**

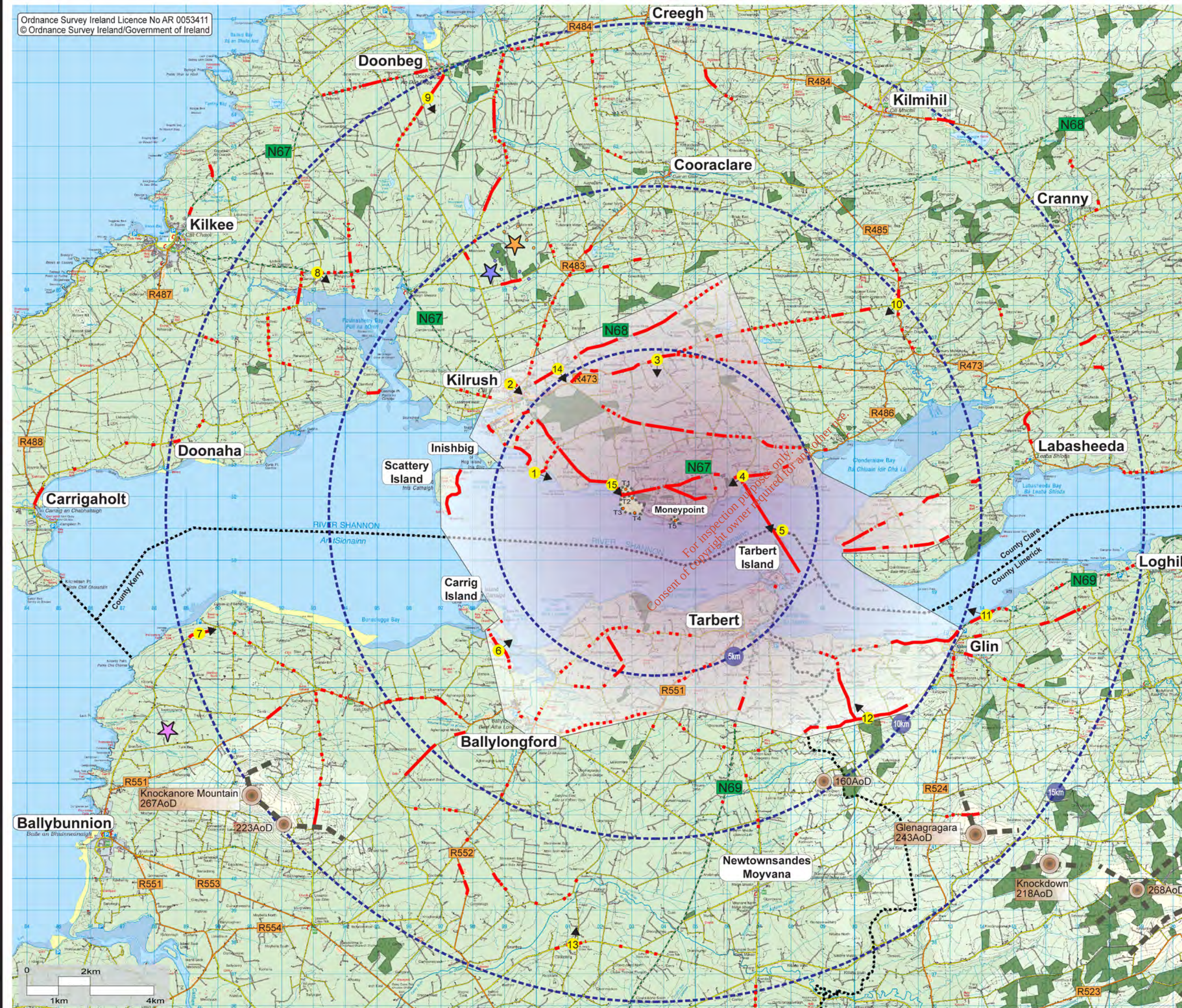
FIGURE 10.3

June 2011
D129792

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KEY

- Proposed Moneypoint wind farm
- Existing wind farm at Tullabrack
- Existing wind farm at Beale Hill
- Permitted wind farm at Moanmore (Extension of Tullabrack Wind Farm)
- County boundaries
- Photomontage location (PM 1-15)
- Kilometres distance from centre of site
- High points over 200m AoD
- Ridge line
- Potential intermittent views of the proposed wind farm from roads
- Potential open views of the proposed wind farm from roads
- Principal visual zone
- Significant vegetation



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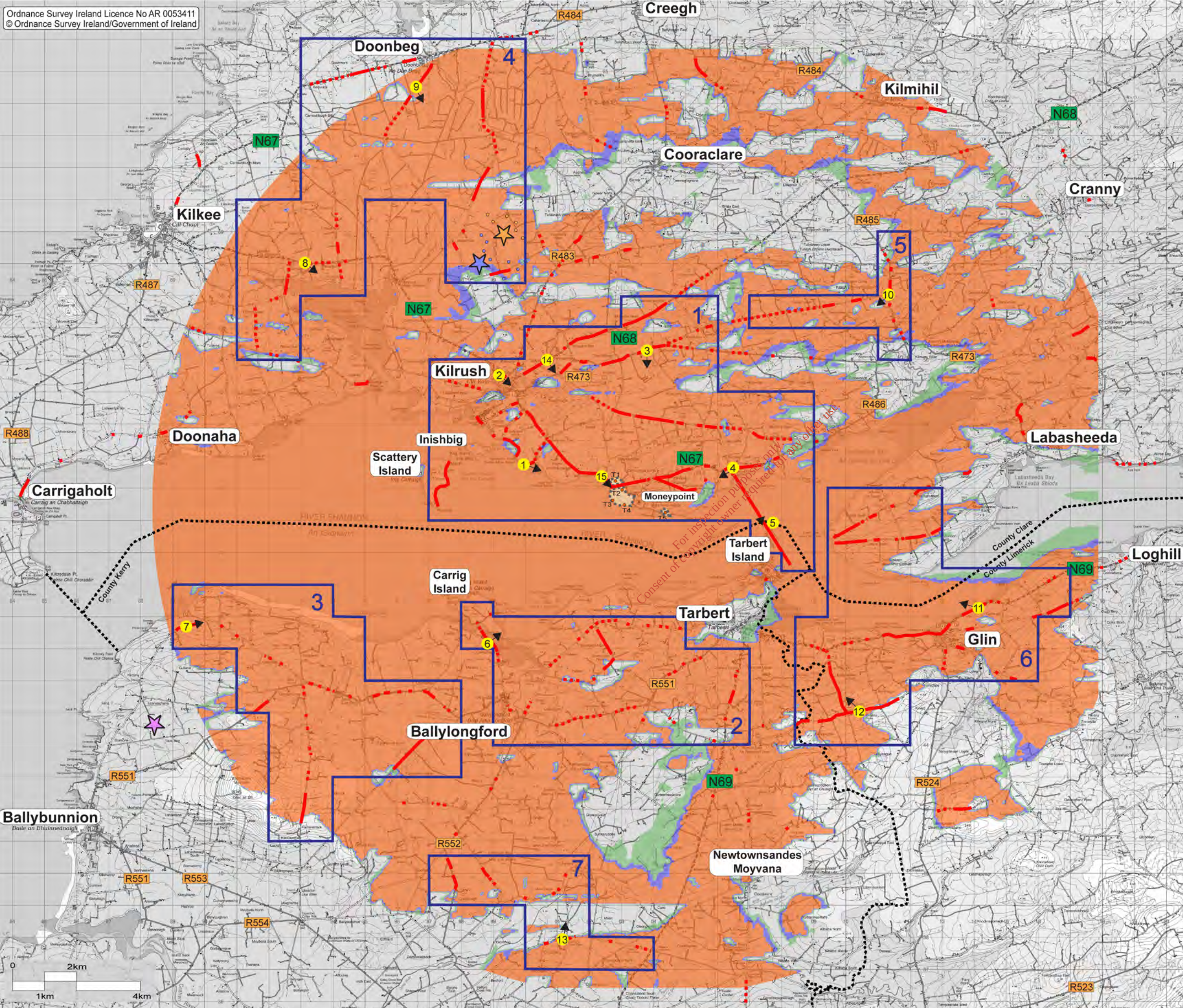
PROPOSED WIND ENERGY
PROJECT AT MONEYPPOINT,
COUNTY CLARE

VISUAL IMPACT MAP

FIGURE 10.4

June 2011
D129792

Drawn: MS - Checked: JS



KEY

- Proposed Moneypoint wind farm
- Existing wind farm at Tullabrack
- Existing wind farm at Beale Hill
- Permitted wind farm at Moanmore (Extension of Tullabrack Wind Farm)
- County boundaries
- Photomontage location (PM 1-15)
- 1-7 Critical areas of visibility

AREA 1: Mainly open and some intermittent views from within 6.5km of the wind farm
Views of wind farm with moderate to substantial visual impact, e.g. Photomontages 1-5 & 14-15

AREA 2: Mainly intermittent and some open views of the wind farm between 3 to 8km distance
Views with moderate visual impact, e.g. Photomontage 6

AREA 3: Distant open and intermittent views approximately 8 to 15km from the wind farm
Views with slight to moderate visual impact, e.g. Photomontage 7

AREA 4: Distant open and intermittent views between 8 to 17km distance but many areas with no views due to topography and vegetation
Views with slight to moderate visual impact, e.g. Photomontage 8 & 9

AREA 5: Mainly intermittent and some open views between 6 to 12km distance but many areas with no views due to topography and vegetation
Views with moderate visual impact, e.g. Photomontage 10

AREA 6: Mainly open and some intermittent views between 6 to 13km distance
Open and some distant views with slight to moderate visual impact, e.g. Photomontage 11 & 12

AREA 7: Open distant views between 11 to 14km distance but many areas with no views due to topography and vegetation
Limited/isolated open distant views with slight visual impact, e.g. Photomontage 13

Zone of theoretical visibility

Number of visible turbines

- 1 to 2 visible
- 3 to 4 visible
- 5 visible

URS

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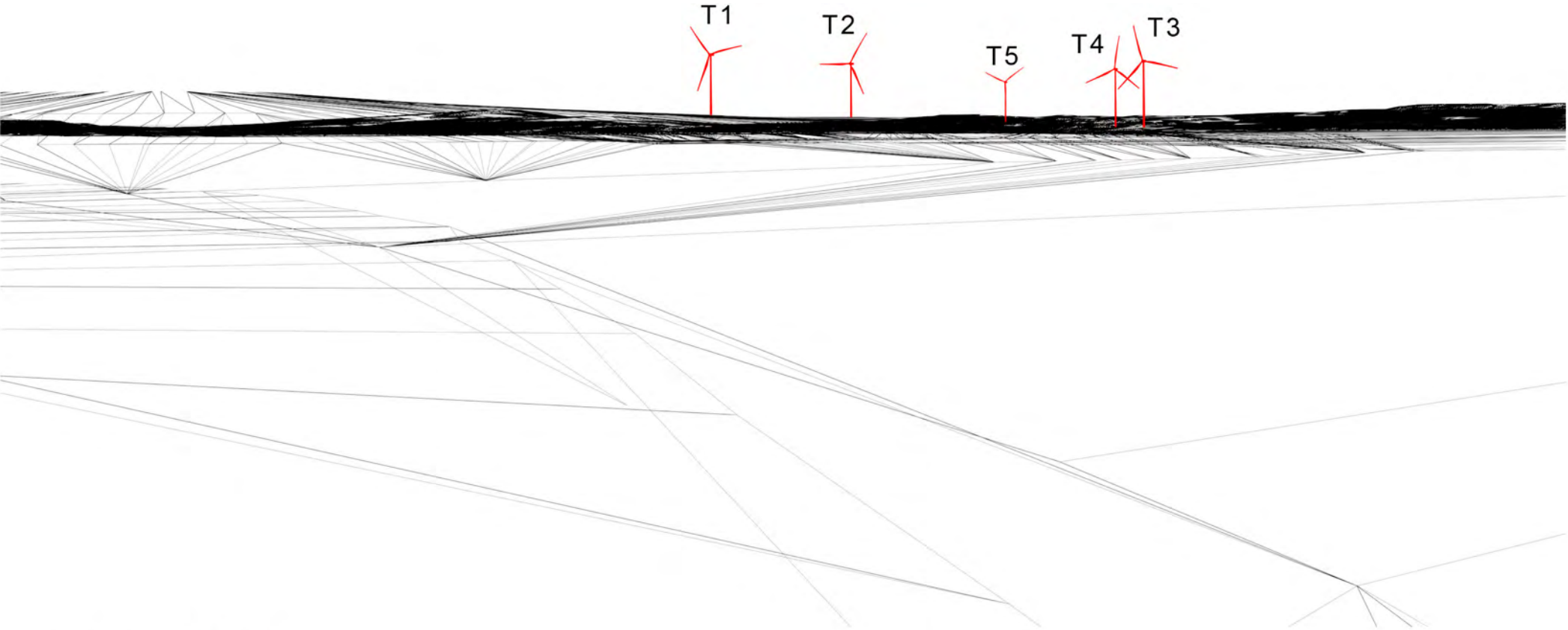
PROPOSED WIND ENERGY
PROJECT AT MONEYPPOINT,
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NATURE OF VISIBILITY

FIGURE 10.5 June 2011
D129792
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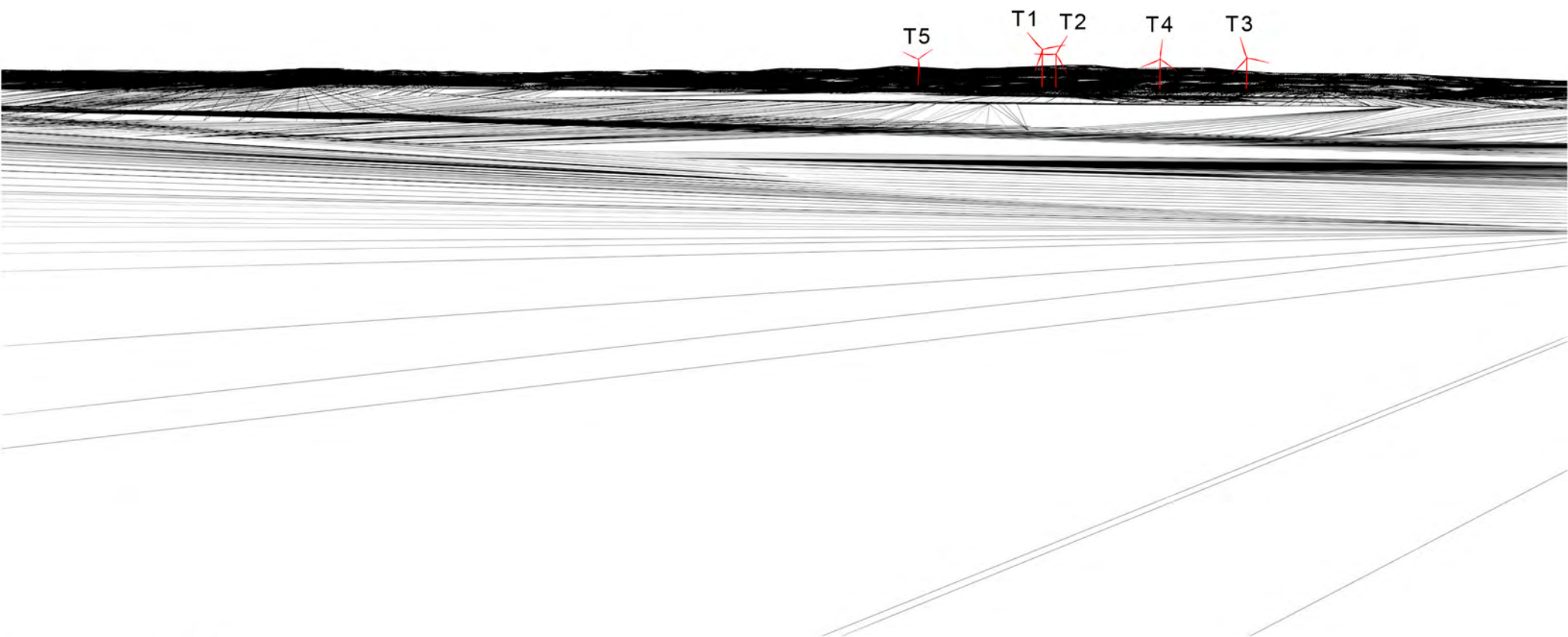
Photomontage 1
View southeast from Scenic Road No.19 towards Moneypoint approximately 2km southeast of Kilrush

Date photo taken:	06.08.2010	Turbine blade tip height:	152m
Time photo taken:	8:30 AM	Number of turbines visible:	5 of 5
Viewpoint location:	E99936 N52732	Distance to nearest turbine:	2,943m (T1)
Viewpoint elevation:	10m	Arc of view:	39.6 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
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Photomontage 2
View southeast towards Moneypoint from housing estate beside N67 in Kilrush (hillside in western part of town)

Date photo taken:	06.08.2010	Turbine blade tip height:	152m
Time photo taken:	8:48 AM	Number of turbines visible:	5 of 5
Viewpoint location:	E99223 N55584	Distance to nearest turbine:	4,964m (T1)
Viewpoint elevation:	36m	Arc of view:	39.6 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

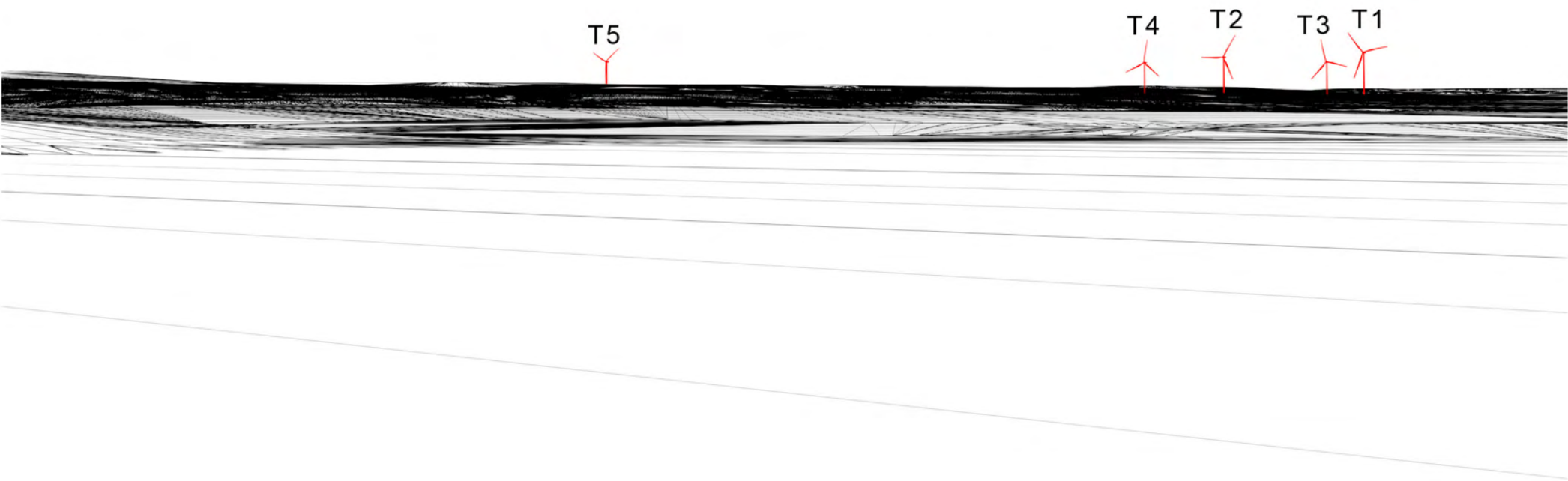
PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
COUNTY CLARE

JUNE 2011 D129792





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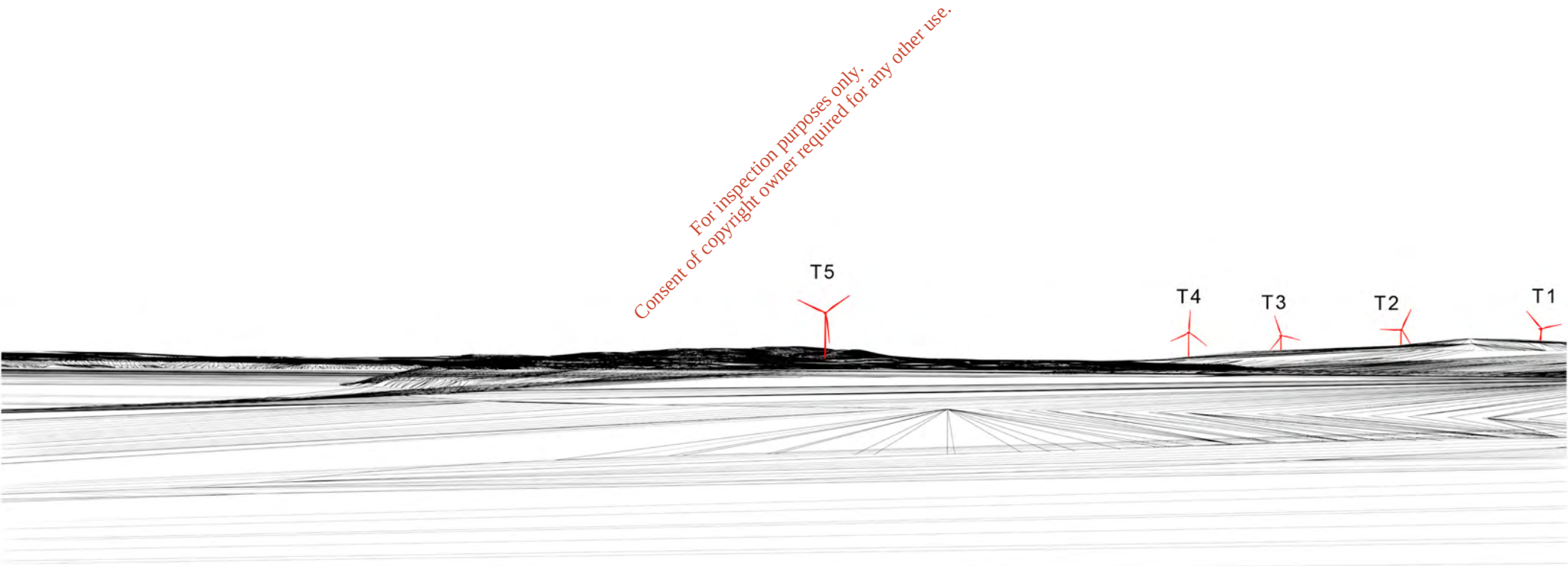
Photomontage 3
View south towards Moneypoint from R473 in the townland of Carrowfree

Date photo taken:	05.08.2010	Turbine blade tip height:	152m
Time photo taken:	12:43 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E03993 N56387	Distance to nearest turbine:	4,362m (T1)
Viewpoint elevation:	49m	Arc of view:	39.6 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
COUNTY CLARE

JUNE 2011 D129792







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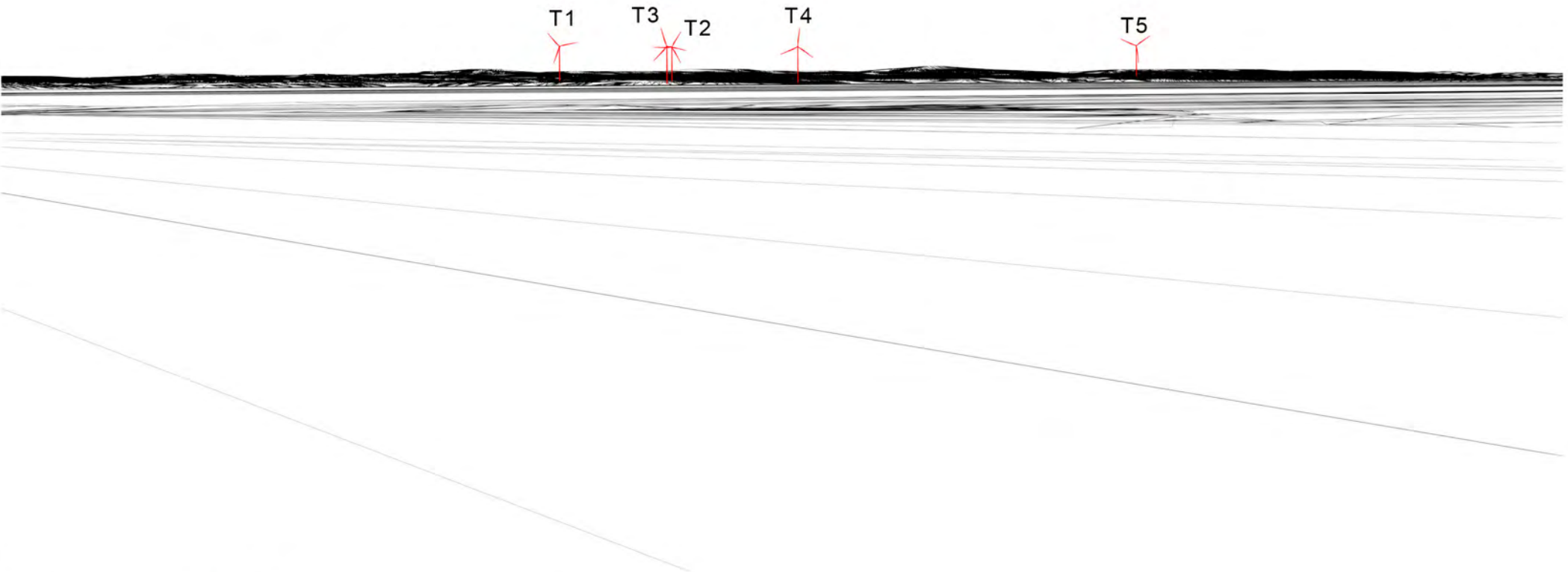


Photomontage 5
View west towards proposed wind farm from Car Ferry half way between Tarbert and Killimer Ferry Terminal on the River Shannon

Date photo taken:	04.08.2010	Turbine blade tip height:	152m
Time photo taken:	7:40 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E07870 N49788	Distance to nearest turbine:	3,853m (T5)
Viewpoint elevation:	10m	Arc of view:	39.6 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm



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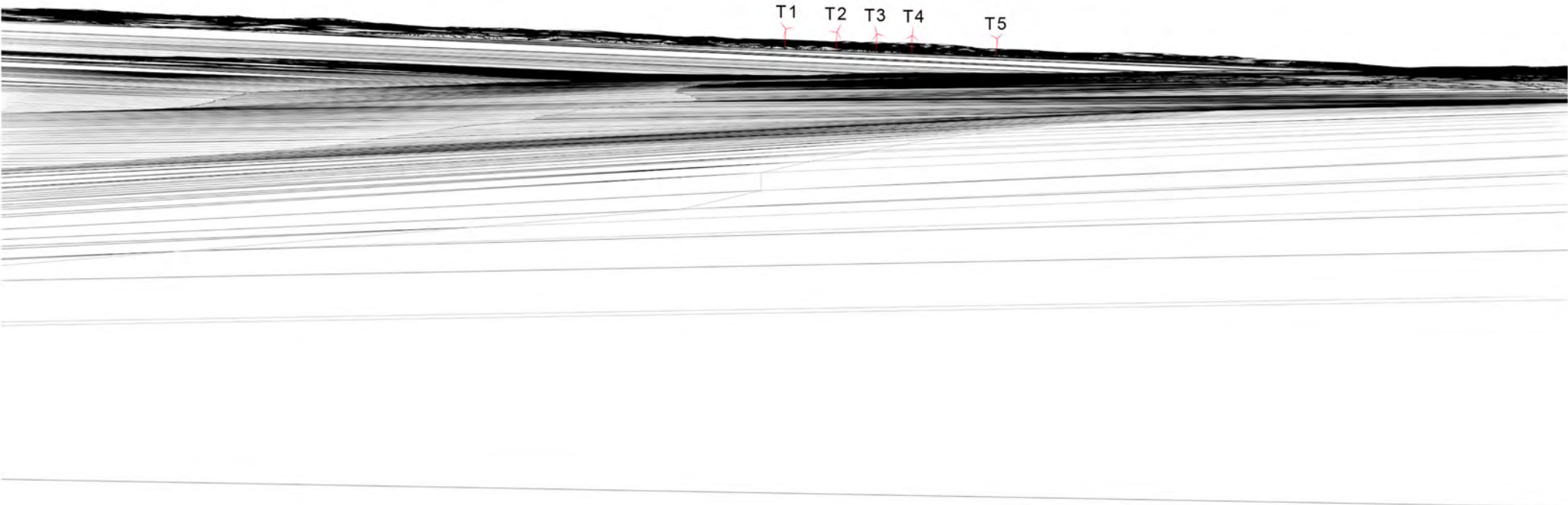
Photomontage 6

View northeast towards proposed wind farm from Scenic Route K-1, southeast of Carrig Island overlooking Ballylongford Bay, Co. Kerry

Date photo taken:	04.08.2010	Turbine blade tip height:	152m
Time photo taken:	2:48 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E98999 N47142	Distance to nearest turbine:	5,843m (T3)
Viewpoint elevation:	6m	Arc of view:	39.6 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm



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Photomontage 7
View northeast towards Moneypoint from Scenic Route K-3 in the townland of Beal, Co. Kerry

Date photo taken:	04.08.2010	Turbine blade tip height:	152m
Time photo taken:	10:45 AM	Number of turbines visible:	5 of 5
Viewpoint location:	E89417 N47709	Distance to nearest turbine:	13,942m (T3)
Viewpoint elevation:	34m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

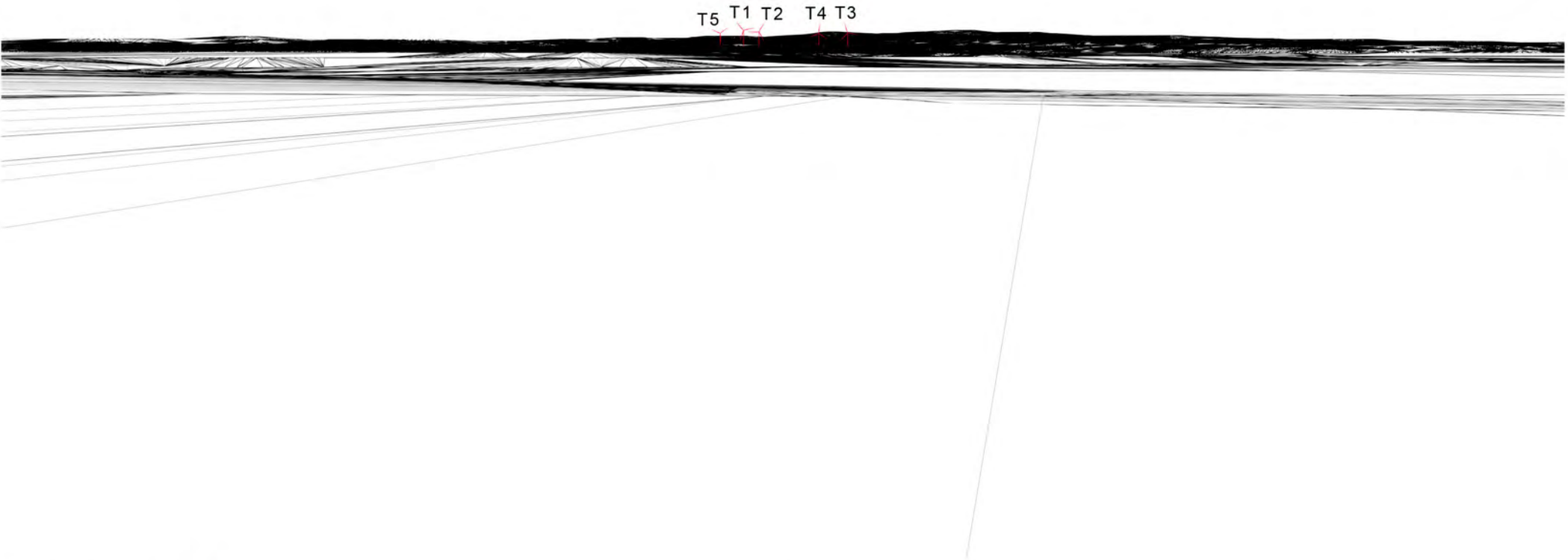
PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
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Photomontage 8
View southeast towards Moneypoint from N67 in the townland of Garraun

Date photo taken:	05.08.2010	Turbine blade tip height:	152m
Time photo taken:	5:42 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E93187 N59013	Distance to nearest turbine:	11,854m (T1)
Viewpoint elevation:	28m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
COUNTY CLARE

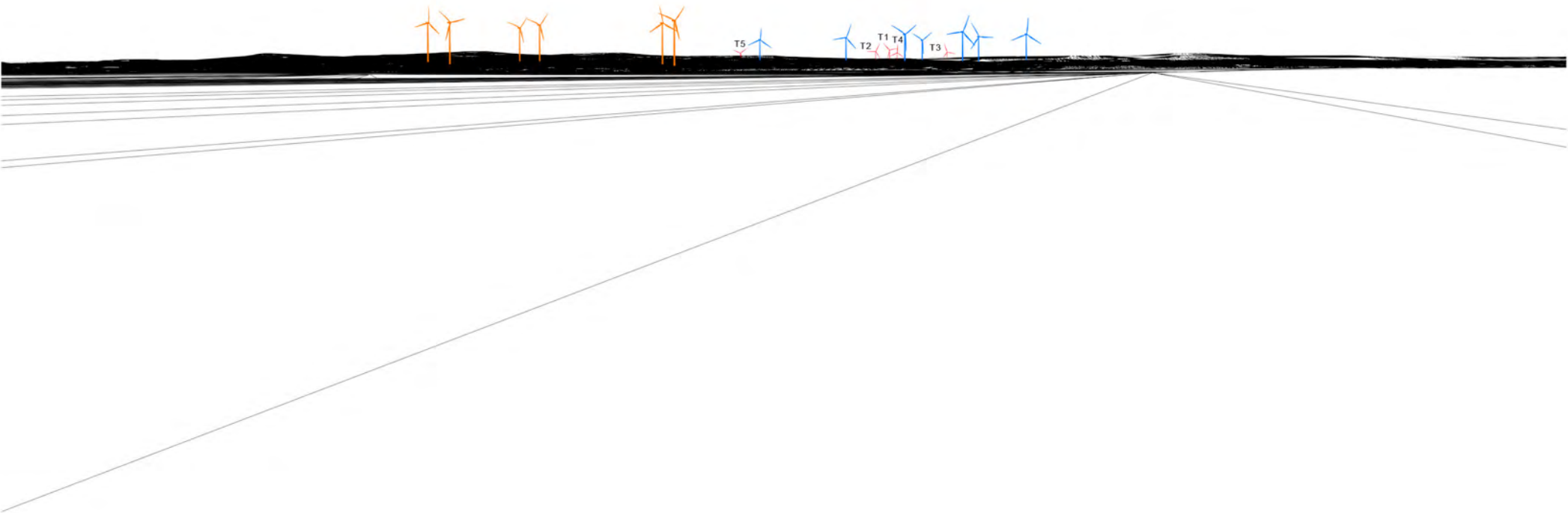
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Proposed Moneypoint Wind Farm
Permitted Moanmore Wind Farm (Extention to Tullabrack Wind Farm)
Existing Tullabrack Wind Farm

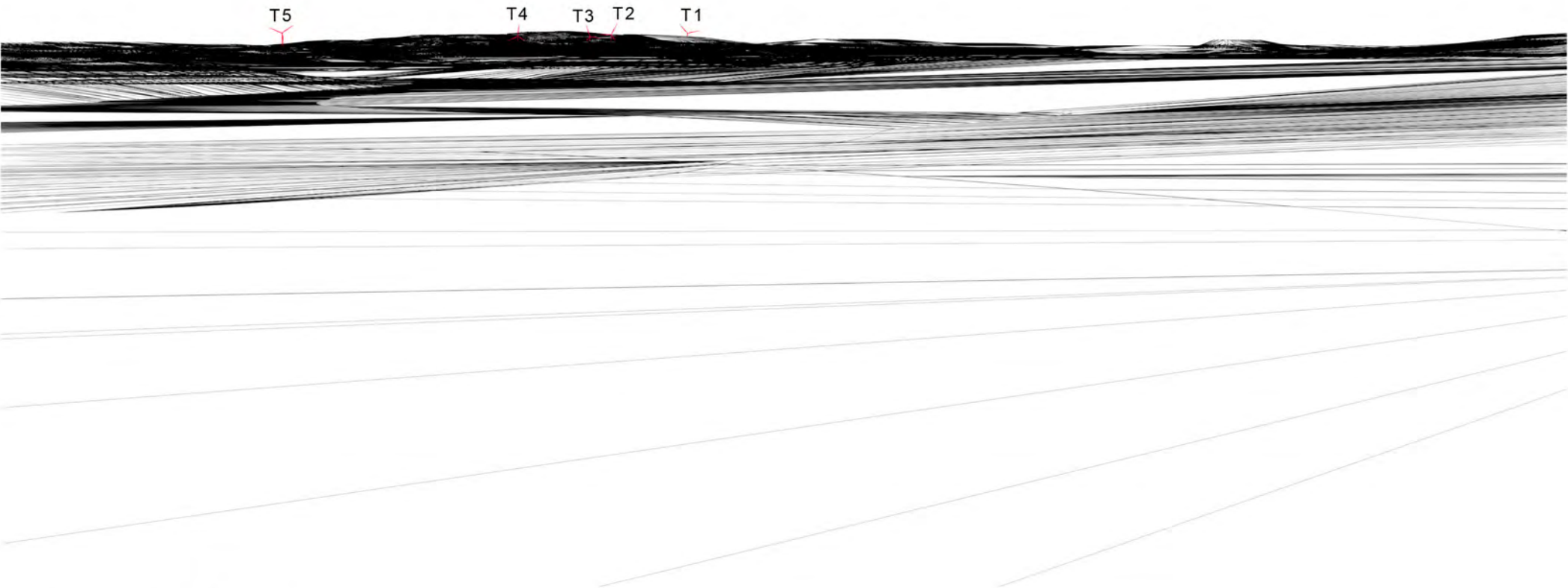


Photomontage 9
View southeast towards Moneypoint approximately 850m south of Doonbeg

Date photo taken:	05.08.2010	Turbine blade tip height:	152m
Time photo taken:	7:32 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E96589 N64478	Distance to nearest turbine:	13,785m (T1)
Viewpoint elevation:	16m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm



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Photomontage 10

View southeast towards proposed wind farm from R485 approximately 1km north of the village Drumdigus at a T-Junction

Date photo taken:	04.08.2010	Turbine blade tip height:	152m
Time photo taken:	10:18 AM	Number of turbines visible:	5 of 5
Viewpoint location:	E11356 N58037	Distance to nearest turbine:	9,794m (T5)
Viewpoint elevation:	35m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

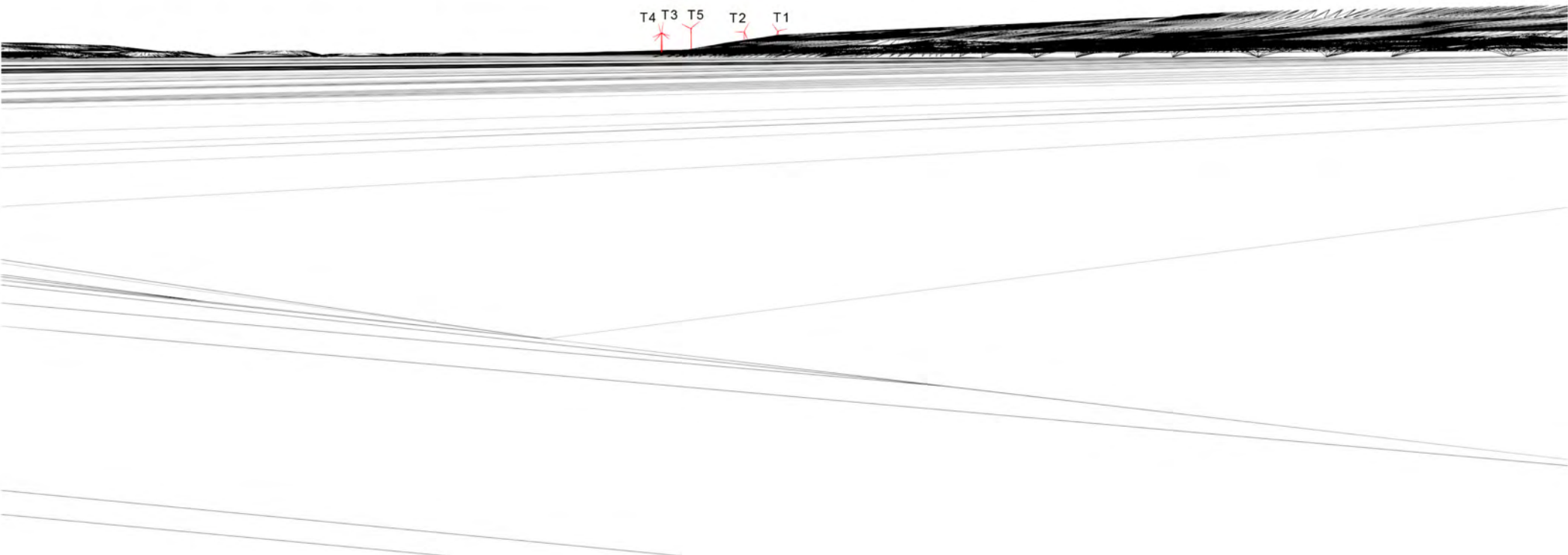
PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
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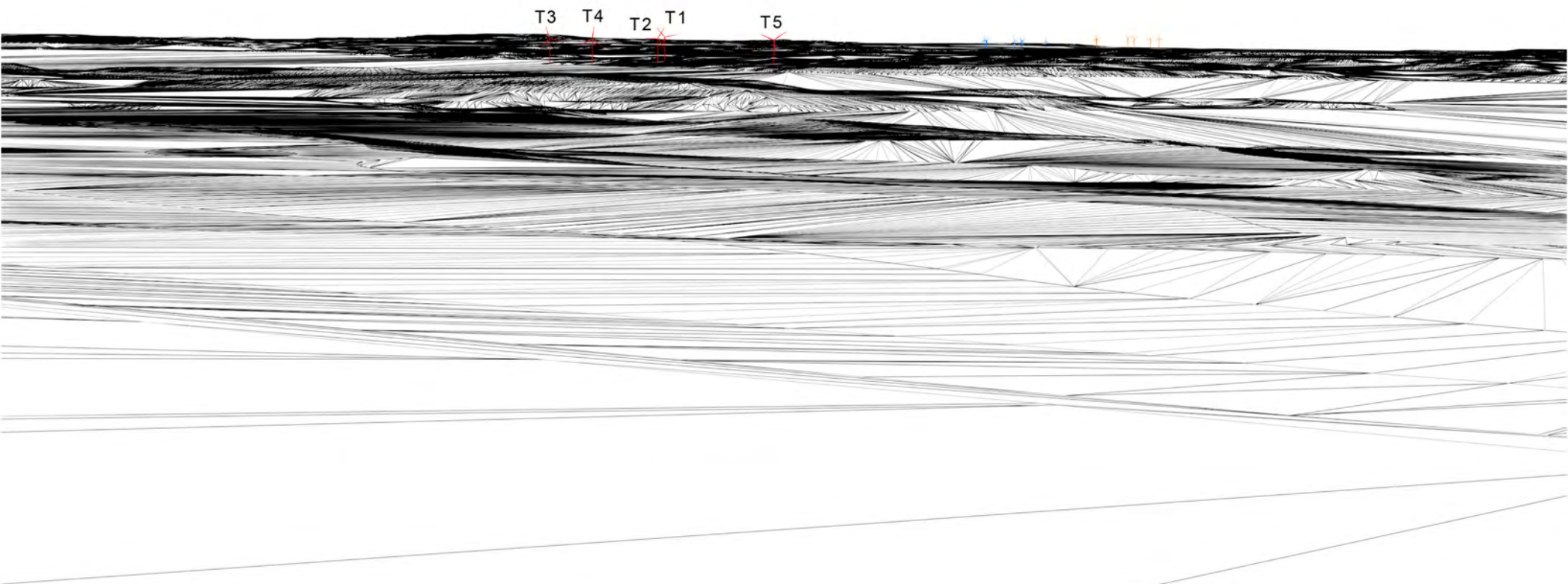
Photomontage 11
View northwest towards Moneypoint from the N69 (Scenic Route L-1) approximately 1.2km northeast of Glin, Co. Limerick



Turbine visibility digitally enhanced

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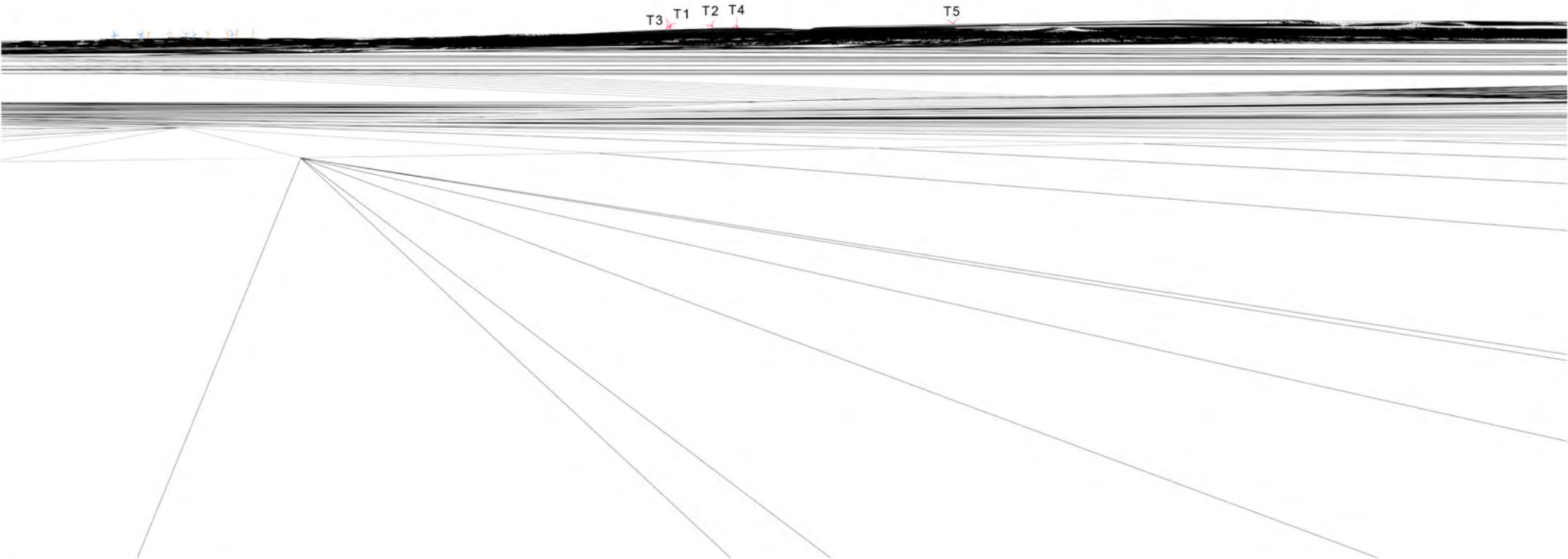
Proposed Moneypoint Wind Farm
Permitted Moanmore Wind Farm (Extention to Tullabrack Wind Farm)
Existing Tullabrack Wind Farm



Photomontage 12
View northwest towards proposed wind farm from Scenic Route L-1 in the townland of Ballycullane Upper, Co. Limerick



Proposed Moneypoint Wind Farm
Permitted Moanmore Wind Farm (Extention to Tullabrack Wind Farm)
Existing Tullabrack Wind Farm



Photomontage 13
View north towards Moneypoint from local road, west of Guiney's Cross Roads, Co. Kerry

Date photo taken:	04.08.2010	Turbine blade tip height:	152m
Time photo taken:	11:41 AM	Number of turbines visible:	5 of 5
Viewpoint location:	E01163 N37935	Distance to nearest turbine:	13,728m (T5)
Viewpoint elevation:	45m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

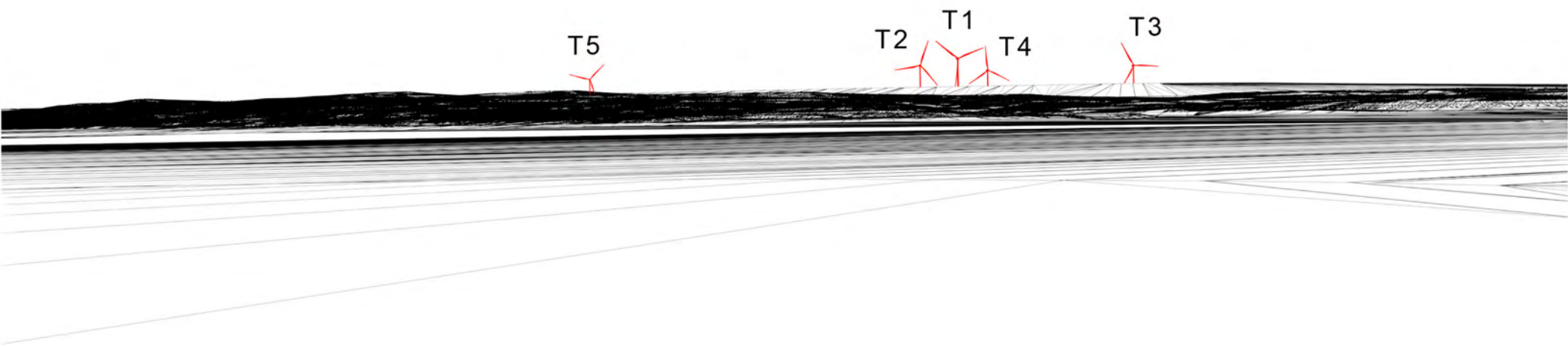
PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
COUNTY CLARE

JUNE 2011 D129792





Turbine visibility digitally enhanced



Photomontage 14

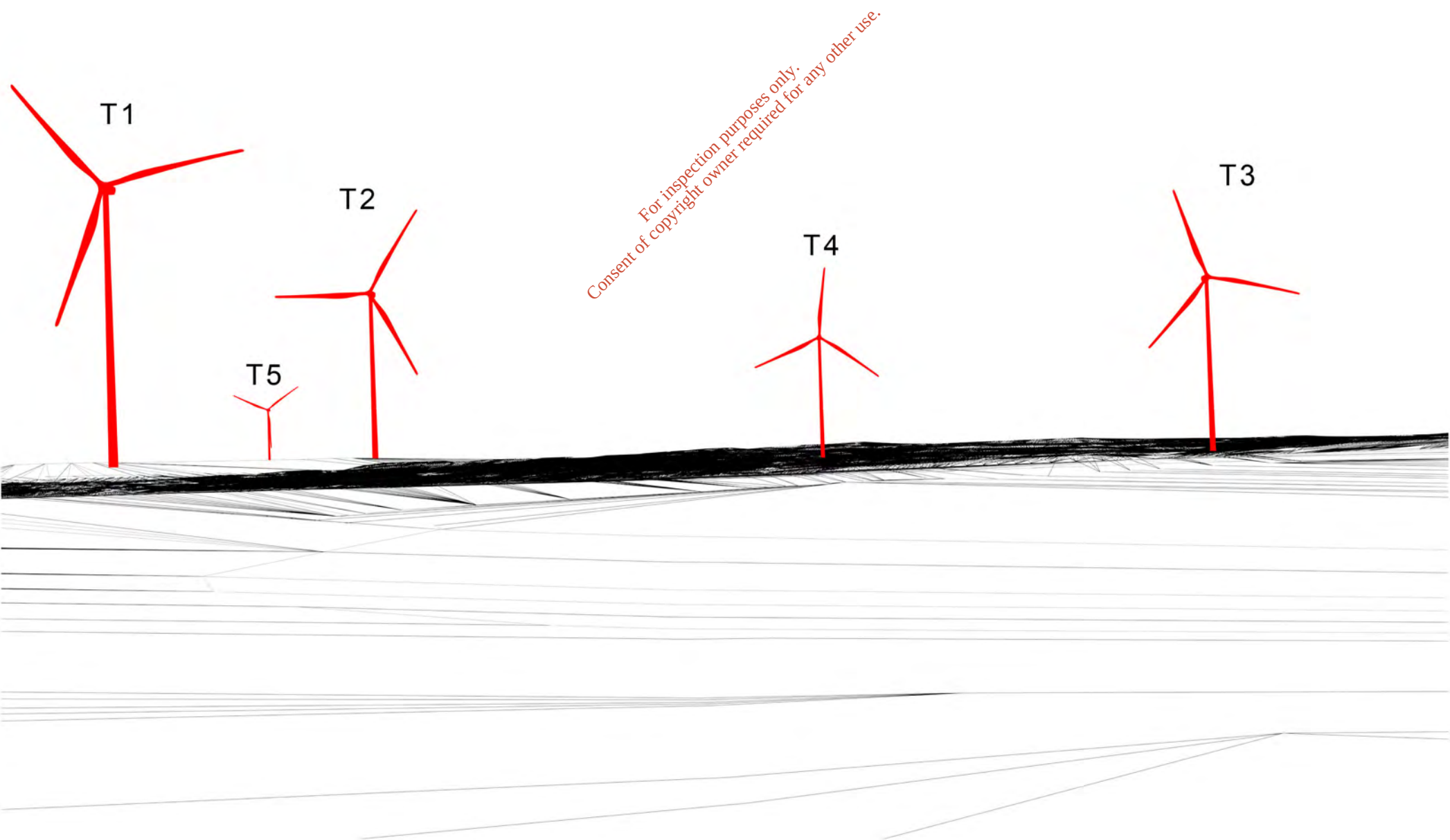
View southeast towards Moneypoint from N68, approximately 1km northeast of Kilrush

Date photo taken:	02.03.2011	Turbine blade tip height:	152m
Time photo taken:	12:50 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E00763 N56035	Distance to nearest turbine:	4,363m (T1)
Viewpoint elevation:	22m	Arc of view:	36.2 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

PROPOSED WIND ENERGY PROJECT AT MONEYPPOINT
COUNTY CLARE



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Photomontage 15 (panoramic)
View southeast towards Moneypoint from N67 (Scenic Route No. 19)

Date photo taken:	02.03.2011	Turbine blade tip height:	152m
Time photo taken:	14:35 PM	Number of turbines visible:	5 of 5
Viewpoint location:	E02230 N52469	Distance to nearest turbine:	647m (T1)
Viewpoint elevation:	2m	Arc of view:	45.8 deg.
Height of camera above ground:	1.5m	Recommended viewing distance:	Approximately 30-50cm

11. AIR QUALITY AND CLIMATE

11.1 RECEIVING ENVIRONMENT

11.1.1 Atmospheric Emissions

Greenhouse Gases

There is now a general recognition that industrial air emissions can have serious impacts on health, ecology and climate. Without the earth's atmosphere, the average global temperature would be -19 °C approximately. However, due to the effect of this atmosphere, which selectively absorbs and re-radiates solar energy, the earth's temperature is 33 °C warmer. This natural "Greenhouse Effect", which is vital to life on earth, is determined by the concentration of the so-called greenhouse gases in the atmosphere.

Ireland is subject to several conventions and protocols that place limits on and force reductions in these emissions.

Ireland's commitment on greenhouse gases under the Kyoto Protocol, as determined by Decision 2005/166/EC, is to limit the increase in emissions in the 2008-2012 commitment period to 13% above base year emissions. The baseline emissions total for Ireland is calculated as the sum of CO₂, CH₄ and N₂O emissions in 1990 and the contribution from fluorinated gases in 1995.

The baseline value in CO₂ equivalent was established at 55.6 Mt and results in total allowable emissions of approximately 314.2 Mt over the commitment period, which equates to the average of 62.8 per annum. Compliance with the Kyoto Protocol limit is achieved by ensuring that Ireland's total emissions in the period 2008-2012, adjusted for any offsets from activities under Article 3.3 and the surrender of any purchased Kyoto Protocol credits, are below 314.2 Mt at the end of the five-year period

In 2009, total emissions of greenhouse gases (excluding the Land Use Land-Use Change and Forestry sector) in Ireland were 62.4 Mt, which is 13.8% higher than emissions in 1990. However, the total for 2009 is 10.5% lower than the level of 69.7 Mt in 2001 when emissions reached a maximum following a period of unprecedented economic growth.

There are major concerns on the mechanisms and cost of adhering to the above limit. Countries not fulfilling their obligations will be forced to purchase carbon credits on an open market from compliant countries.

Fuel combustion in the Energy sector is the principal source of emissions in Ireland, accounting for 66.5% of total emissions in 2009, and major increases in fuel use have driven the increase in emissions up to 2009 from a 57% contribution in 1990. The increase in emissions from electricity production has been 15.1%. The emissions from agriculture, the other main source category, increased during the 1990s but have decreased to below 1990 levels in 2009 as a result of falling livestock numbers since 1998 due to reform of the Common Agricultural Policy (CAP). See Figures 11.1 & 11.2.

Other Emissions

Long-range atmospheric transport of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) can contribute to regional problems of acidification and eutrophication of soils and waters and to air pollution over a wide area. SO₂ and NO_x emissions are transported over long

distances and undergo chemical transformations in the atmosphere. The Government has entered into agreements at EU and international level to control national emissions of SO₂ and NO_x. These agreements specify obligations to reduce total emissions of these gases.

Various industrial sectors, including power generation, have been assigned specific emissions targets for NO_x and SO₂ by Government.

Moneypoint Generating Station's Environmental Retrofit Project included the following main elements:

- Installation of Flue Gas Desulphurisation (FGD) equipment on each boiler to reduce emissions of SO₂.
- Installation of Selective Catalytic Reduction (SCR) equipment to reduce NO_x emissions.

The approximate annual emissions reductions that have been achieved at Moneypoint with the completion of the station's Environmental Retrofit Project are shown in Table 11.1.

Table 11.1: Environmental Retrofit Project – Annual Emission Reductions

Sulphur Dioxide (SO ₂)	Oxides of Nitrogen (NO _x)	Particulates (t)
~ 20,000 t	~ 20,000 t	~ 300 t

11.1.2 Air Quality

Air quality in the environs of Moneypoint has been the focus of ongoing monitoring and assessment since the late-1970s. This has always indicated that air quality in the area is good and well within quality standards required by legislation. Operating in compliance with its IPPC Licence, Moneypoint's emissions to atmosphere are discharged via two 225 m high chimneys whose design was based on achieving adequate dispersion of emissions.

Modelling and monitoring data indicate that the station's emissions do not have any significant impact on ambient air quality in relation to SO₂ and NO_x, which complies with national air quality standards by a large margin.

There are also three sites situated within the station grounds at Moneypoint to assess the localised impact of dust emissions arising from coal and ash handling operations. Airborne particulate sampling using ISO deposit gauges has been carried out on a monthly basis since 1989. For the most recent five-year period Table 11.2 presents average dust deposition rates based on results derived from dust monitors located in strategic points around the station.

Table 11.2: Dust Deposition 2006 – 2010 (mg/m²/day)

Year	2006	2007	2008	2009	2010
Average	50	70	86	75	69

In relation to possible nuisance impact on the surrounding community, the deposition rates recorded are well below the value of 100 - 150 mg/m²/day that is commonly used for

setting limit values at the boundary fence for licensing of quarrying and mining activities. Indeed, dust deposition rates of 25 - 50 mg/m²/day may be recorded in remote locations in Ireland due to the presence of windblown soil and peat and also from miscellaneous agricultural activities.

11.2 IMPACT OF THE DEVELOPMENT

11.2.1 Atmospheric Emissions

Electricity generation by wind turbines does not lead to environmental emissions. The wind farm will have no emissions to atmosphere and thus no adverse impact on general air quality or climate.

Moneypoint Wind Farm will generate up to approximately 45,000,000 kWh (units) of electricity per annum. Figures published by the Commission for Energy Regulation (CER)² indicate that the 2010 average CO₂ for the All-Ireland grid (average including all generating technologies such as coal, gas, oil, peat, CHP and wind) was 0.519 t/ MWhr.

The development of Moneypoint Wind Farm will lead typically to an annual reduction of 23,350 t of CO₂ annually.

In addition to its position regarding CO₂, Ireland also has binding international commitments to meet targets for emissions of air pollutants including SO₂ and NO_x. The development of Moneypoint Wind Farm will also assist in achieving reductions in these emissions from the electricity generation sector.

11.2.2 Air Quality and Dust

Operation of the turbines will not lead to airborne dust being created from either the coal stockpiles in the coal yard, the ash deposited in the ash storage area or landfilled FGD by-product on station lands.

A wind turbine does not operate in the manner of a fan and create strong wind currents. On the contrary, the operation of a wind turbine extracts energy from the wind, leading to a reduced wind speed downwind of the turbines.

Operation of the turbines will not lead to any alteration in the pattern of dispersion of emissions from the station's chimneys at Moneypoint. Ambient conditions with respect to SO₂ and NO_x will be unaffected.

11.3 MITIGATION

No mitigation of impacts is required.

11.4 CONCLUSION

The proposed development will not result in significant adverse environmental impacts.

² Fuel Mix Disclosure and CO₂ Emissions 2010, CER (July 2011)

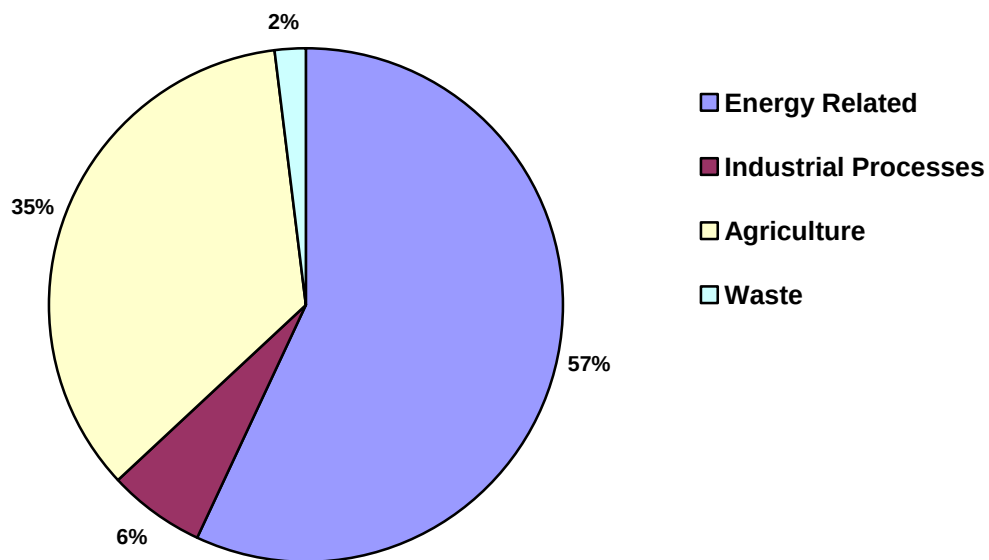


Figure 11.1: Greenhouse Gas Emissions by Sector - 1990

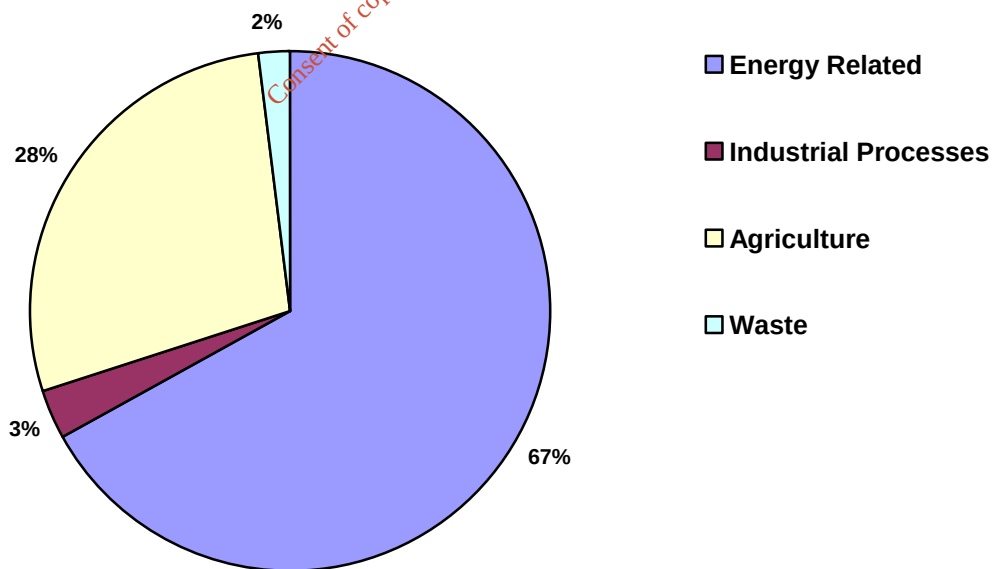


Figure 11.2: Greenhouse Gas Emissions by Sector - 2009

12. SOILS & WATERS

12.1 RECEIVING ENVIRONMENT

12.1.1 Geology & Hydrogeology

The Geological Survey of Ireland (GSI) Sheet No. 17, Geology of the Shannon Estuary, indicates the site to be underlain by Carboniferous Namurian Central Clare Group, which consists of cyclothermic sandstones, siltstones, mudstones and occasional coal seams.

The site was developed by extensive cut and fill operations. Significant volumes of rockfill were deposited to reclaim an area of approximately 30 ha from the Shannon Estuary, principally at the south-western part of the site. As a result of the cut and fill operations, the upper soil stratum consists of Made Ground of rockfill, overlying natural sediments and soils where these were not removed. There is variable depth to bedrock, with some areas having only very limited cover and other areas having significant thickness of Made Ground, some overlying natural overburden.

Where natural overburden is encountered, it comprises silts and sands, perhaps with gravel horizons, associated with fluvial, marine and littoral environments in the area of the original foreshore. These sediments may be underlain by glacial deposits, such as boulder clay, or rest directly on the bedrock.

There are no special geological or geomorphological features on the site.

Because of the rockfill nature of a significant part of the site and the saline nature of the water in the Shannon Estuary, it is possible that some saline waters have intruded beneath the site, notably at the locations of turbines T3 and T4. Tidal influence on the groundwater level is also expected, at least near the shoreline, due to the proximity of the Shannon.

The GSI has indicated the presence of wells in the general area. However, these are not of interest in light of their distance from the power station and the direction of groundwater flow. GSI data suggests that the site lies in a locally productive area, with regard to the groundwater resource. However, bored wells at the site that are up to 150 m deep provide no potential significant abstractions.

12.1.2 Surface Waters

The River Shannon is Ireland's major river. The main channel of the Shannon Estuary extends for approximately 105 km from the limit of the tidal rise at the Ardnacrusha power station to the mouth, which is bounded by Loop Head and Kerry Head. Measurements undertaken at Foynes have shown that sea water makes up some 88% of the water mix within the estuary at that point.

The Moneypoint site is located within the Shannon International River Basin District (SHIRBD) as defined under the European Communities (Water Policy) Regulations, 2003. This is the enabling legislation of the EC Water Framework Directive. The SHIRBD covers the natural drainage basin of the Shannon itself, stretching from the its source to the tip of the Dingle peninsula. A full description of the river basin and its characteristics as well as the WFD objectives can be found on www.wfdireland.ie and on www.shirbd.com.

An objective of SHIRBD Management Plan to maintain water status for High and Good

status waters and to restore all waters to at least Good status by 2015.

As described in Section 8 – Ecology, the Shannon Estuary is an SAC for the protection of a range of significant habitats and species listed for protection.

Under the terms of its IPPC Licence, ESB Moneypoint has ten licensed aqueous emission points, which include those listed in Table 12.1, discharging to the Shannon Estuary.

Table 12.1: Discharges to Surface Waters

Ref	Description	Ref	Description
SW1	Ash Disposal Area – Surface Drain	SW7	Surface Drain No. 6
SW2	Surface Drain No. 2	SW8	Cooling Water Outfall
SW3	Foul Drain No. 1	SW9	Coalyard Surface Drain
SW4	Surface Drain No. 3	SW10	Foul Drain No. 2
SW4A	Band Screen Wash Water	SW13	Surface Drain No. 8
SW5	Surface Drain No. 4	SW14	Lagoon Drain
SW6	Surface Drain No. 5		

Monitoring of the above emission points is carried out in accordance with Schedule 2(iii) of Moneypoint's IPPC licence.

The marine environment at Moneypoint has been the subject of multiple investigations over time that have established a wealth of knowledge concerning ecological aspects of the SAC in the vicinity of the site. These have included the following:

- Intertidal and Oceanographic Survey; AquaFact International Services (1992)
- An Assessment of the Intertidal Environment in the Vicinity of the ESB Generating Plant at Moneypoint Co. Clare; AquaFact International Services (1993)
- A Report to the ESB on Plankton Studies in the Vicinity of the Outfall, Moneypoint, Co. Clare; Aqua-Fact International Services (1999)

All of these have demonstrated the continuing healthy state of the marine environment in the vicinity of Moneypoint site.

12.2 IMPACT OF THE DEVELOPMENT

12.2.1 Geology & Hydrogeology

Turbines will be located as follows:

- Turbine T1 is in the ash storage area which was a naturally occurring valley into which significant quantities of ash have been placed since the initial development of the station. The top of the turbine foundation will correspond with the finished ground elevation in this area. The crane hard-standing of approximately 20 m x 40 m will be excavated to a depth of approximately 900 mm for replacement with a combination of coarse granular fill and fine gravel.
- Turbines T2 is in the area where the pre-development conditions of the Moneypoint site remain, with rock close to the surface. It is expected that excavations to a depth

of approximately 2.5 m will be involved to prepare the ground for construction of the turbine foundation. The crane hard-standing of approximately 20 m x 40 m will be excavated to a depth of approximately 900 mm for replacement with a combination of coarse granular fill and fine gravel.

- Turbines T3 and T4 are in the area of Made Ground of rockfill placed during reclamation of this part of the power station site during its development. It is expected that foundations here will be piled. The crane hard-standings of approximately 20 m x 40 m will be constructed by excavating the coarse granular fill to a depth of approximately 300 mm and replacing it with fine gravel.
- Turbine T5 is at the lower part of the coal store where ground conditions represent the reduced formation level arising from the significant excavations that took place here in development of the power station site. Rock will be excavated to a finished depth of approximately 2.5 m below the existing surface. The existing surface is already suitable to act as a crane hard-standing.

The excavations involved in the wind farm will have no significant impact on the geology of these areas.

The hydrology of the site is already a highly modified one where the excavations for wind turbine foundations have no potential to impact on groundwaters.

12.2.2 Surface Waters

The nature and extent of the development will involve no redirection of surface water runoff at the site. The development does not result in any additional surface water run-off.

The wind farm development will not alter the nature, composition, volume or location of existing discharges from the site.

Turbines T3 and T4 are the turbines that will be located closest to the Estuary. There will be no alteration to the shoreline at these locations and no impacts on the SAC. In the development of Landfill B for the storage of FGD by-product, the main access road within the site will be located closer to the shoreline here. As illustrated in the typical cross-section shown in Figure 12.1, turbines T3 & T4 will be located on the landward side of the access road. This separation from the Estuary provides a suitable buffer zone to the SAC.

Additional rock protection in this area is already approved to provide protection to vehicles on the access from wind blown spray and water possibly breaking over the existing rock armouring during severe stormy weather conditions.

12.3 MITIGATION

Standard pollution control measures will be observed during construction.

No other mitigation of impacts is required.

12.4 CONCLUSIONS

The proposed development will not result in significant environmental impacts.

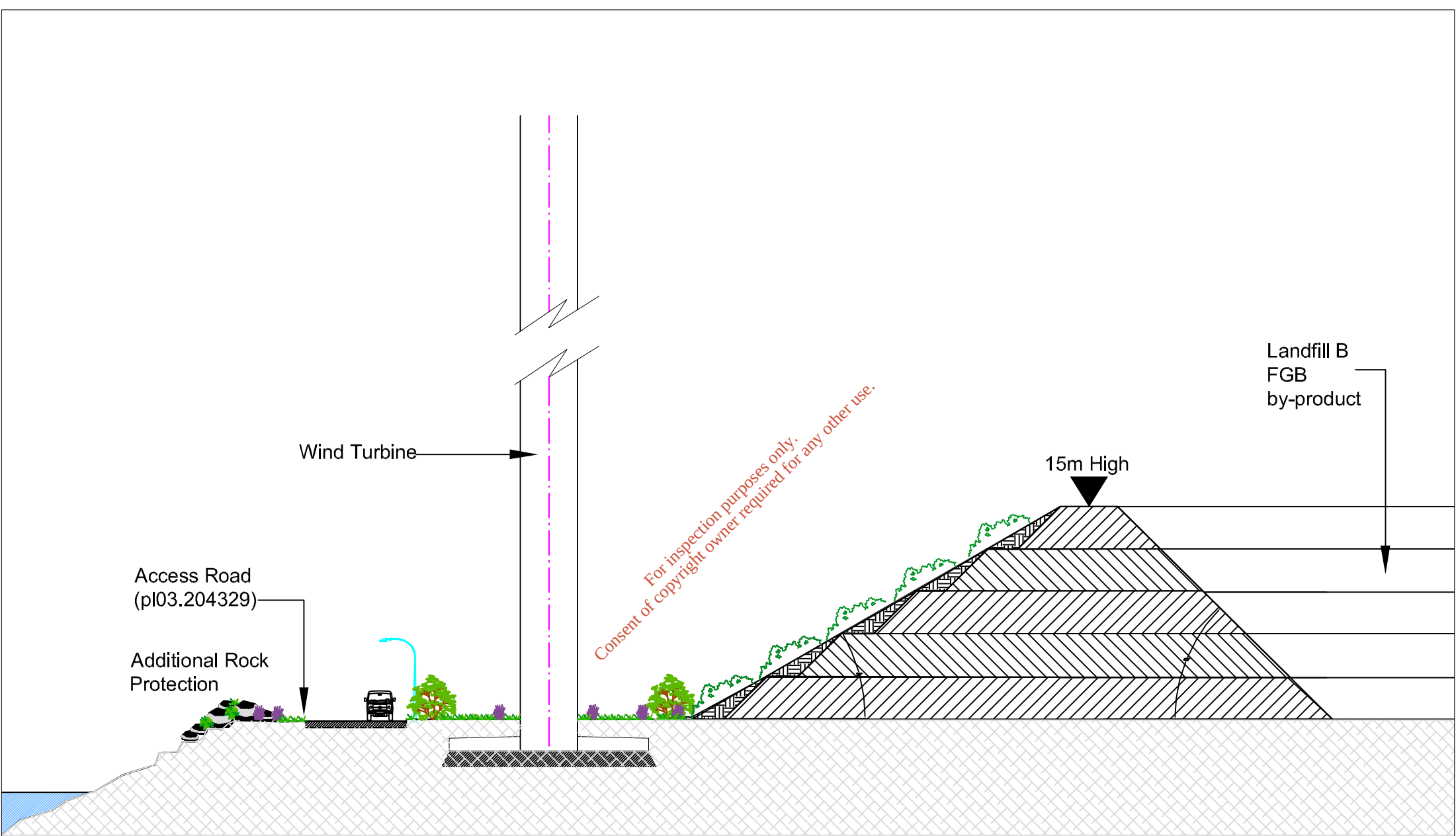


Figure 12.1 : Cross-Section at Turbines T3 & T4

13. ROADS & TRAFFIC

13.1 RECEIVING ENVIRONMENT

The receiving environment reflects the presence of Moneypoint Generating Station since its first unit was commissioned in 1985.

Access to the Moneypoint area is via the N67 Killimer - Kilrush and the N68 Kilrush – Ennis National Secondary Routes. Immediate access to the site is from the N67, which is an important route that links Co. Clare and Co. Kerry via the Killimer - Tarbert car ferry service. Beyond the National Secondary Routes the locality has a network of roads that serves a rural community that is reliant mainly on agriculture. The roads are thus used by this community for domestic and agricultural purposes.

The most recent traffic data (for the years 2000 – 2004) from the National Roads Authority (NRA) in terms of Annual Average Daily Traffic (AADT) for the N67 and N68 is shown in Table 13.1. This is an indicative traffic volume for a 24-hour period calculated on the basis of short-term traffic counts, using expansion factors (An Foras Forbartha RT201, 1978). It includes traffic in both directions and shows the amount of overall traffic that comprised Heavy Commercial Vehicles (HCV).

Table 13.1: NRA Traffic Data

Year	N67 Killimer - Kilrush		N68 Kilrush - Ennis	
	Total Vehicles	HCV	Total Vehicles	HCV
2000	2,541	280	3,957	396
2001	2,697	224	4,199	315
2002	2,802	231	-	-
2003	1,705	123	4,836	363
2004	1,794	149	5,090	382

The data indicates that traffic on the roads in the vicinity of the site is very much less than their design capacity. Due to the cyclical nature of the Killimer - Tarbert car ferry service, traffic on the N67 close to the power station tends to peak coinciding with ferry times.

Station Related Traffic

The principal sources of traffic arising from the presence of the station are the following:

- **Staff Transport:** It is estimated that about 300 cars are associated with staff transport during weekdays and 90 at weekends
- **Ash Transport:** Exports of ash from the site are not uniformly distributed throughout the year and they peak in the summer months. Up to 30 truckloads leave the site each day during this time.
- **Consumables:** Station operations have a requirement for various consumables whose delivery accounts for approximately 50 truckloads daily including six of lime and two of urea.

- **Other Activities:** Contractors may be engaged from time to time and there is a steady pattern of business visitors. These are estimated to account for 50 vehicles per day. An increase in the number of casual visitors at weekends is compensated by a reduction in the number of business visitors.

The combined effect of the above during weekdays is shown in Table 13.2 where peaks in all categories of station related traffic have been assumed to coincide.

Table 13.2: Traffic Associated with Generating Station

Source	Cars	Trucks	Vehicle-Movements
Staff Movement	235	-	470
Ash Transport	-	30	60
Consumables	-	50	100
Other Activities	35	15	100
TOTAL	270	95	730

The combined effect is approximately 750 vehicle-movement per day during weekdays, with this increasing marginally during periods of major plant overhauls.

13.2 IMPACT OF THE DEVELOPMENT

The existing site entrance will be used and creation of new access from the public road will not arise. Transport within the site will be via the approved road network.

Access requirements can be divided into three distinct phases, namely project construction comprising assembly and erection, project operation comprising routine inspection and maintenance, and project decommissioning.

13.2.1 Project Construction

The Moneypoint site has the advantage of an existing highly developed site infrastructure that significantly reduces the requirement for deliveries of materials in order to undertake the development.

Traffic associated with the construction phase essentially comprises three types, as follows:

- **Construction staff:** There will be a small increase in movements of private cars and vans at the beginning and end of each day as the workforce arrives at and departs from the site.
- **Deliveries of concrete and other materials:** The total was calculated to give the number of HCV movements to and from the site during the construction period.
- **Exceptional loads:** The total number was calculated on the basis of the installation of five turbines.

The vehicles requiring access during the civil engineering and earthworks phase will include tracked excavators, dump trucks, fixed or articulated haulage trucks and mobile cranes. Commercial traffic movements are likely to be spread throughout the working day and there will be a small increase in private car movements at the beginning and end of the day as the workforce arrives at and departs from the site.

Concrete & Reinforcement

The major requirement for ready mixed concrete will be for construction of the five turbine bases. This will be sourced from a local ready mixed concrete supplier and up to three concrete pumps will be employed in placing this concrete. Concrete will also be required for the minor works within the existing 110 kV Electrical Transformer Station and for the single-storey Control Building within it. Miscellaneous other requirements will also arise.

Concrete and associated steel reinforcement will entail up to approximately 250 deliveries. This includes an allowance of 25% over calculated deliveries for turbine foundation to cover miscellaneous uses within the site.

The general area is well served by suitable sources of these materials.

Stone Fill Material

In most wind farm developments crushed stone fill material is required for construction of access tracks within the site and a requirement also arises for the crane pad at each turbine.

At Moneypoint only a very limited requirement will arise, as the full extent of the site to the south of the public road already comprises a hardstand surface deriving from the historic site development works. Similar site development works didn't occur within the ash storage area to the north of the public road. While the surface here is well compacted and is expected to be adequate for access and craneage during construction of the single turbine located here, on a precautionary basis it is assumed that a total of up to 4,000 m³ of stone fill and gravel material will be required here and elsewhere. It is noted that should a need for stone fill material occur, this will be likely be available from excess material at excavations for the other turbine foundations elsewhere within the site.

Electrical Equipment & Building Materials

Miscellaneous building materials will be required for the construction of the wind farm, notably blockwork, shuttering, etc. for the Control Building.

Miscellaneous electrical equipment such as transformers and switchgear will be needed in the Electrical Transformer Station and electrical cabling will be required for the underground connection of individual turbines to the substation.

Deliveries of miscellaneous other items will also arise and a total of about 100 deliveries is assumed.

Sand Backfilling

Power and control cabling within the site will be laid in cable trenches, which generally follow the edge of the site roads. Trenches will be backfilled with sand.

Total requirements for sand backfilling are expected to amount to approximately 300 m³, being the equivalent of about 30 loads.

Cranes

It will be a matter for the contractor, selected on the basis of open competitive tendering, to determine the number and type of cranes that will be employed on the site for turbine erection. However, based on experience in the construction of other wind farm, it is envisaged that a heavy lifting capacity (approximately 1,000 t) main crane and a smaller capacity (approximately 350 t) crane will work in tandem. It is likely that two smaller

cranes will be engaged in assembly of the heavy lifting capacity main crane.

Summary of Construction Traffic Movements

The total number of heavy vehicle movements involved in the construction of the wind farm has been calculated and is as shown in Table 13.3.

Table 13.3: Construction Traffic

Material	Concrete & Steel	Sand	Cranes	Misc.	Stone	Total
Loads	250	30	10	100	300	690

Assessment of Impacts

On the basis of the above worst case scenario, the total number of heavy traffic movements on and off the site will be approximately 1,400, when account is taken of the return of empty delivery vehicles. For a 6-month construction period and activity limited to week-days, the additional average daily traffic is less than 12 HCVs.

Even if figures are doubled to reflect peak construction activity and peak construction employment, this level represents a temporary indiscernible increase on existing station related traffic. Furthermore, this peak will be for a short duration only and is within the capacity of the existing road network.

There will be no effects thereafter, but the following inevitable short-term effects, which will be temporary and short lived, will arise during construction:

- With the calculated level of additional traffic being so low, there will be a minimum of inconvenience to other road users.
- The increased vehicle movements will be so low that there will be no discernible increased traffic noise at residences situated on the delivery routes.

Averaging the total vehicle movements over the full construction period may not produce a realistic pattern of road usage. Rather than occurring uniformly throughout the construction period, traffic movements will peak on the five non-consecutive days on which concrete for turbine foundations will be delivered. Each foundation will involve 35-40 deliveries or up to 80 vehicle movements.

For most of the construction period the number of truck movements per day will be less than the maximum assessed above. The peak will occur on five occasions only during the construction period and no long-term impacts will be created.

There will be no impact on the network of local minor roads.

The impacts arising will be short-term effects that will be confined to the network of major routes. These impacts will be during the construction period and there will be no effects thereafter.

13.2.2 Wind Turbines

Moneypoint has its own barge landing facility, which was used extensively for delivery of heavy loads during construction of the power station. It was used similarly in the recently completed Environmental Retrofit Project.

It is expected that this facility will be used for delivery of turbine components. This will be

either by direct delivery to the site or by delivery to a convenient port with transshipment from there by barge.

However, on a precautionary basis, delivery of components by road is assumed in the assessment of impacts.

For delivery by road, each turbine would involve about 13 loads using articulated haulage trucks. Deliveries will likely comprise towers (5), blades (3), nacelle (2), hub (1) and small parts (2). It is envisaged that the likely approximate composition of the significant components will be as presented in Table 13.3. The total number of loads involved in turbine deliveries would thus be approximately 65.

Table 13.3: Summary of Turbine Component Details

Component	Weight (t)	Dimension (m)
Base tower	50 t	13.3 m x 4.2 - 3.8 m diameter
4 th Section	45 t	20.3 m x 3.8 - 3.5 m diameter
3 rd Section	30 t	20.5 m x 3.5 - 3.1 m diameter
2 nd Section	27 t	20.5 m x 3.1 - 2.8 m diameter
Top Section	30 t	23.2 m x 2.8 - 2.5 m diameter
Nacelle	60-80 t	10 m x 3.0 m x 3.75 m
Blades (3)	6 t	50 m x 3.5 m at Root

A typical delivery of wind turbine tower components is shown in Figure 13.1.

Potential Traffic Routes

The assessment of a suitable delivery route for wind turbine components involves the following:

- Identification of suitable port facilities – principally the availability of off-loading equipment and sizeable laydown area.
- Assessment of the delivery route from port to site entrance in relation to vertical and horizontal road alignment.
- Assessment of the delivery route from port to site entrance in relation to road (and bridge / culvert) strength and running width.

The project is currently at a stage where the contract for the supply of turbines to the project is not yet in place. In accordance with EU procurement rules, the contract will be open to international competition and it will be a matter for the chosen contractor to determine the most suitable route to the site, if road haulage is proposed.

Although the turbine blades are relatively light it is the blade delivery that typically defines both vertical and horizontal alignment requirements. Blade trailers are extendable and invariably have rear wheel steer with the capability of being operated automatically during regular road use, or manually during slow walking pace manoeuvring.

While multiple blade load trailers may be preferred, this means that blades can have no overhang and the trailer unit must extend to the full length of the blade. In this instance, the possibility of tighter turning circles and avoidance of grounding indicate the use of a

trailer with shortened wheel base and blade overhang.

While definitive details cannot be provided at this time with regard the proposed haulage route if transportation by road is chosen, in reality there are few realistic options available. To that end, O'Neill Transport in conjunction with Wind Prospect Ireland Ltd were commissioned to review the transport requirements associated with delivery of turbines by road.

The aim of the review was to examine the existing road infrastructure, assess its suitability and identify a proposed delivery route to the site that would be suitable for abnormal loads associated with turbine component delivery vehicles.

For the purposes of the transport assessment, it was assumed that delivery is possible from the chosen port facility to the M18 at Ennis. Detailed analysis of the route was from N85 Skehanagh Roundabout in Ennis to the site entrance to Moneypoint Wind Farm.

The report identified necessary remedial works along a proposed delivery route and a drive over survey of the route was conducted. Topographical surveys followed to review potential constraints associated with access and to undertake Swept Path Analysis (SPA) of these constraints using Autotrack software to determine the actual extent of any widening / junction improvements that may be required. The potential route is shown in Figure 13.2.

An overall unrestricted minimum width of 4 m is required along the carriageway of the potential delivery route. Where this is not already available, in the main this can be achieved by trimming trees and hedges. Elsewhere, minor road widening will be required, but again this can be achieved in the main within the road margins without encroaching on private lands. The two locations where the most significant requirements for improvements arise due to restricted turning are as follows:

- Turn from the N68 onto local road at Ballymacurtaun
- Turn from local road onto the N67 at Moneypoint

Any local road improvements, albeit that they may be limited in extent, will ultimately benefit the local population through enhanced safety of the road network.

Traffic management measures that may be employed to mitigate the impacts of long loads during road transport have the potential to cause some inconvenience for other road users but this will be temporary and for a short period only.

13.2.3 Project Operation

Wind Farm Maintenance

Wind farms are designed to operate largely unattended and during the operational phase the wind farm will normally be unmanned. Each turbine will have its own in-built supervision and control system that will be capable of starting the turbine, monitoring its operation and shutting down the turbine in the case of fault conditions.

Supervisory operational and monitoring activities will be carried out remotely with the aid of computers connected via a telephone modem link.

Visits will be necessary to carry out routine inspection and preventive maintenance. A light vehicle will be required for routine access, occurring about once weekly, and in the event of any unscheduled fault conditions. In the unlikely event of a major component failure, a mobile crane will be required on site.

The additional traffic will be so low and so infrequent as to be indistinguishable from other station related traffic.

Road Safety

By their very nature wind turbines are significant features in the landscape and the turbines at Moneypoint will be visible intermittently from local roads. It is acknowledged that moving turbine blades may draw the eye of any motorists and any such distraction could be considered a potential safety hazard. However, there is no evidence from Ireland or elsewhere to indicate that wind turbine towers or moving wind turbine blades endanger public safety by reason of traffic hazard.

Fast moving objects in the field of view or on the horizon are much more likely to cause distraction to motorists than wind turbine blades. These move slowly and steadily, rotating at a speed of one revolution every 3 – 5 seconds. Instances of fast moving objects include views from the public road of aircraft take-offs and landings at airports; trains crossing roads at bridges or running on tracks parallel to roadways; traffic crossing road overbridges and on parallel, higher, lower or crossing roads at sophisticated motorway interchanges. Horses and other animals are also liable to move quickly in the field of view. There is no indication that such phenomena impact adversely on road safety.

There are many instances in Ireland and elsewhere of tall structures being located much closer to the public road than is proposed at Moneypoint, all with no apparent distraction to motorists. There is no recorded instance where the presence of a wind turbine in the field of vision was cited as a contributory factor in a road accident. Nor is there any recorded instance where the presence of a wind turbine in the field of vision was cited as having a negative impact on road safety.

The DoEHLG Wind Energy Planning Guidelines (Section 5.8) note as follows:

In general, turbines may distract motorists when they are being constructed or when they are new. Over time the turbines become part of the landscape and in general do not cause any significant distraction to motorists.

The Guidelines also advise regarding safety aspects in developing the layout of the wind farm, as follows:

Although wind turbines erected in accordance with standard engineering practice are stable structures, best practice indicates that it is advisable to achieve a safety set back from National and Regional roads and railways of a distance equal to the height of the turbine and blade.

The layout of the proposal at Moneypoint is based on fully meeting the above.

13.2.4 Project Decommissioning

Short-term effects will arise during decommissioning. The relatively low level of current use of the road accessing the site means that only a limited number of existing road users will be impacted. Any impact that does arise will be temporary and short lived.

Vehicle movements over the decommissioning period will be much less than those of the construction period, given that the major elements of traffic movements involving stone and concrete deliveries will not arise.

The dismantling of the wind turbines will involve the use of mobile cranes and their removal will entail a similar number of loads to turbine delivery during construction.

Alternatively, turbine blades, for example, may be cut into shorter sections before being loaded onto conventional flatbed trucks.

13.3 MITIGATION

If deliveries of turbine components involve road transport, the appropriate authorities will be notified of the movement of long and abnormal loads. Appropriate traffic management measures will be agreed in advance and it is expected that these would include the following.

- Placing warning notices to advise other road users of the presence of slow moving vehicles.
- Using lead warning vehicles and using police escorts where required.
- Undertaking deliveries at times that minimise the impact on other road users and resting in safe lay-bys to reduce any traffic congestion.
- Closing extendable transporter vehicles on return journeys.

Otherwise, no mitigation of impacts is foreseen.

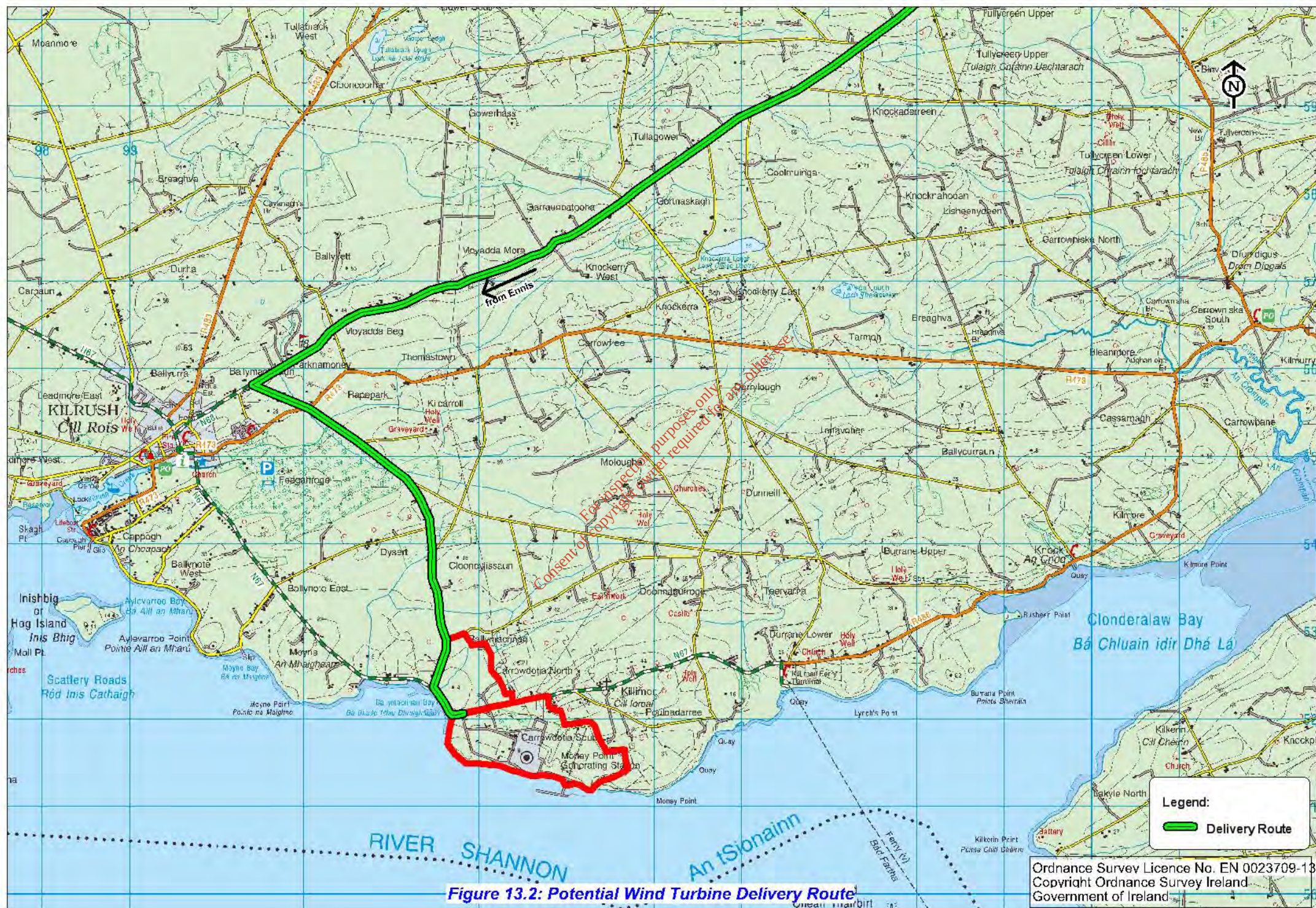
13.4 CONCLUSIONS

A low-level impact will arise during the construction period but none thereafter.

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Figure 13.1: Typical Delivery of Wind Turbine Tower Components



14. MATERIAL ASSETS

14.1 TOURISM

14.1.1 Receiving Environment

Tourism is considered as being of vital importance to the national economy and is now regarded as one of the greatest potential wealth creators and employers at national level. Its importance is enhanced by the employment it can generate in areas that lack opportunity for other kinds of development. Tourism increased rapidly in Ireland in the past decade as indicated by the numbers of overseas visitors to Ireland, as shown in Table 14.1. A recent decline in numbers is mainly attributed to by the global economic downturn and an unfavourable exchange rates with the Euro.

Table 14.1: Overseas Visits (Thousands) to Ireland

Year	2002	2003	2004	2005	2006	2007	2008	2009
Number	6,065	6,369	6,574	6,977	7,709	8,012	7,839	6,927

In 2009, out-of-state tourist expenditure, including spending by visitors from Northern Ireland, amounted to €3.4 billion. With a further €0.5 billion spent by overseas visitors on fares to Irish carriers, total foreign exchange earnings were €3.9 billion. Domestic tourism expenditure amounted to €1.4 billion making tourism in total a €5.3 billion industry in 2009 and probably Ireland's most important indigenous industry.

The official count by the Central Statistics Office (CSO) of direct employment in 'Accommodation and food service activities', a category which includes hotels, restaurants, bars, canteens and catering, was 123,300 in 2009 (6.4% of total employment). Drawing on an alternative approach, an estimate of all jobs in the tourism and hospitality industry based on a Fáilte Ireland survey of businesses (full-time, part-time, seasonal / casual and not confined to 'main' job) indicates total employment in the sector at approximately 190,000. This estimate includes an additional category of tourism services and attractions which is not covered by the CSO.

Further potential is anticipated and tourism is a priority sector for development by the Government. Maximising the potential of the tourism section and economic diversification are recognised as critical in helping to achieve the critical mass of population in rural areas that have been suffering from population decline.

The majority of tourism growth has occurred in a number of the larger urban centres, being partly due to the emergence of convenient, frequent and affordable air access to these centres. This in turn has resulted in a fundamental shift in consumer preferences towards short city breaks at the expense of more long-stay rural-based holidays.

Co Clare has one of the best-developed tourism infrastructures among counties along the west coast. It has a significant resource in the form of Shannon Airport as it acts as a key gateway into the western region.

Historically, tourism has been a major industry in Co Clare and the county is well endowed in terms of the quality of its landscape, its physical cultural heritage and recreational resources. The quality of the open countryside is an important part of the attraction of the area to tourism.

The county has a diversity of visitor attractions and, in terms of visitor numbers, the main attraction is Bunratty Castle and Folk Park. Others include the Burren, the Atlantic Coast, Lough Derg, Lahinch, Kilkee, Doolin, Ballyvaughan, Lisdoonvarna, Killaloe, Mountcallan, Mountshannon, Ennis, the Cliffs of Moher, Craggaunowen, Ailwee Cave and various cultural festivals.

Local Interest

There are no major tourist attractions in the Moneypoint area and it has not been identified in the Clare County Development Plan 2011 – 2017 as being of particular importance for tourism. Moyne Bay caravan park is an established tourist development in the area, some 3 km west of the station.

Moneypoint lies on the N67 Killimer - Kilrush road, which is a significant access route for tourists travelling between major tourist destinations in Co. Clare and Co. Kerry. The coast road south east of Cappagh to Carrowdotia South is identified as Scenic Route No. 19 in Clare County Development Plan 2011-2017.

Moneypoint Generating Station is conscious of its position as one of the largest power stations within the ESB system and of the uniqueness of many of its facilities. The station has strong links with local schools and national universities, and site tours are a regular feature when organised in advance.

14.1.2 Impact of the Development

General

The issue of how wind farm affect tourism has long been an issue that has divided opinion and promoted debate. A poll carried out by MORI Scotland, an independent research agency, interviewed tourists visiting Argyll and Bute, the area in Scotland having the greatest concentration of wind farm. Responses by interviewees to various questions were as outlined in Tables 14.1 & 14.2.

When asked whether the presence of the wind farm had a positive or negative effect, less than one in ten (8%) felt it had a negative effect.

Table 14.1: Response to Question - What effect if any would you say the presence of that/these wind farm(s) has had on your impression of Argyll as a place to visit?

Completely Positive	Generally Positive	Equally Positive / Negative	Generally Negative	Completely Negative	Don't Know
15%	28%	43%	7%	1%	6%

Asked whether a presence of wind farm in Argyll, made any difference to the likelihood of them visiting the area, the majority (91%) maintained that it made no difference.

Table 14.2: Response to Question - Has the presence of wind farm in Argyll made you any more or less likely to visit the area in future, or has it made no difference?

More Likely	No difference	Less Likely	Don't Know
4%	91%	2%	3%

In general, it appeared that although the majority of tourists visited areas in which wind

farms are located, many were unaware of their existence. The research indicated that wind farms were not seen as having a detrimental effect on tourist visits.

This attitude was mirrored in Sustainable Energy Ireland's report Attitudes Towards Windfarm and Wind Energy in Ireland, which provided the results of an independent study of the Irish public's attitude towards the development of wind energy. One of the main findings was that those with direct experience of wind farm in their locality do not in general consider that they have had any adverse impact on the scenic beauty of the area or on tourism.

Various tourism strategies highlight the importance of showcasing Ireland as an environmentally clean country. Wind farms can contribute to this by indicating a commitment to renewable energy and a cleaner environment. Public attitude is that the presence of a wind farm adds interest to an area, associates the area with clean, green energy or presents the area as progressive and sustainable.

Local Interest

Because it is not a significant tourism area in its own right, the wind farm development will not have any significant adverse impacts on local tourism.

While it is used by tourists, this section of the N67 is of no special tourism merit in its own right. Visitors principally enjoy the attractions of Co Clare further west along the N68 at Kilrush, Kilkee and Milltown Malbay. While the wind turbines at Moneypoint will be visible to tourists, no tourist amenity will be affected.

Significant development is already a feature here along the N67 due to the presence of Moneypoint Generating Station. Furthermore, the area is one of two designated Working Landscapes in the Clare County Development Plan 2011-2017.

As part of ESB's public relations and environmental awareness education policy, Moneypoint Wind Farm development will provide a significant opportunity to present public information to visitors on the technology and economy of wind energy. The presence of a wind farm at a conventional fossil fuel thermal power station will provide a unique backdrop in this regard and will present an opportunity to view an integrated holistic approach to solving the nation's need for electrical energy.

14.1.3 Mitigation

There is no general mitigation of impacts for tourism.

14.1.4 Conclusions

The proposed development will not result in significant adverse impacts.

14.2 ENERGY SUPPLY

14.2.1 Existing Environment

Electricity Supplies and Economy

Demand for electricity is a key indicator of performance and growth in the national economy, with growth in demand for electricity actually surpassing national economic growth. Sustained economic growth requires that additional electricity generating capacity be installed on a continuing basis.

The development of Irish society and its economy has, as in the case of many other countries, relied heavily on the exploitation of apparently abundant, affordable and widely

available energy supplies and the services they provide. Such services are intrinsic to the operation of a modern economy with its needs for warmth and comfort, power and light, and mobility and communications.

The last two decades have seen significant growth in demand for electricity. Peak demand was 2,460 MW in 1990/91 and reached 5,035 MW in 2006. Further growth is expected in the long term.

While reliable high efficiency plant operating at base load is also required, some of this demand will be met from renewable and alternative forms of electricity production, such as wind, in line with Government strategy.

The production of electricity by conventional thermal power plants requires the use of fossil fuels and Ireland has a very high energy import dependency.

14.2.2 Impact of the Development

The proposal 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. It will ensure that local and regional economic development is not constrained by shortfalls in the availability of electric power.

The availability of wind energy coincides well with periods of peak electricity demand. Demand often peaks on cold windy winter days - just when wind turbines are at their most productive. Wind energy is low risk in that the small unit size of each individual wind turbine relative to the overall electricity system reduces the impact of technical failure compared with larger generating units. While energy output from a wind farm is variable, electricity demand itself is constantly fluctuating and supply and demand must be matched on a minute to minute basis, 24 hours of the day, every day of the year.

It is anticipated that the wind farm will generate about 45,000,000 kWh of electricity annually. While this is very modest in comparison with the output of Moneypoint Generating Station, based on estimates by the Sustainable Energy Authority of Ireland estimates that each additional MW of installed wind capacity generates in one year the equivalent electricity consumed by 525 average homes for the same period, the installed capacity will be capable of generating electricity that is the equivalent to the annual consumption of almost 8,000 homes in perpetuity.

The production of electricity by the wind farm will not involve fuel consumption. Each additional MW of installed wind capacity removes the need to import fossil fuels. Table 14.4 indicates the annual savings in fossil fuel imports in tonnes of oil or coal equivalent, which are universally used terms to compare different energy units, resulting from Moneypoint Wind Farm. (Average conventional power plant efficiencies of 40% are assumed.)

Table 14.4: Avoided Fuel Imports

Fuel	Avoided Consumption / MW	Annual Savings
Oil Equivalent	560 t	8,400 t
Coal Equivalent	797 t	12,000 t

A common assertion by opponents of wind power is that as much energy is consumed in manufacturing and installing wind turbines as they subsequently produce. Energy balance

is the comparison of energy used in manufacture with the energy produced by a wind turbine or power station. This can be expressed in terms of energy 'pay back' time, i.e. the time needed to generate the equivalent amount of energy used in manufacturing the wind turbine or power station. The average wind farm will pay back the energy used in its manufacture within 3-5 months of commencement of operation.³

This means that over an operating life of 20-25 years an onshore turbine is expected to recover multiples of the input energy required. This takes account of energy associated with maintenance of the wind farm, as well as the losses that are inherently part of electricity transmission and distribution systems.

14.2.3 Mitigation

No mitigation of impacts is required.

14.2.4 Conclusions

The proposed development will have positive effects and will not result in significant adverse environmental impacts.

14.3 AIR NAVIGATION

14.3.1 Existing Environment

Current tall structures at the site include the following:

- The station main building is approximately 64.5 m high (top 70 m OD).
- Two ship unloaders on the station's jetty are approximately 90 m high in the upright position (top 96 m OD).
- The station's two reinforced concrete chimneys are 225 m high (top 230 m OD).

14.3.2 Impact of the Development

The land profile is such that the turbine at the highest elevation is turbine T1 located within the ash storage area. The ground elevation here is 15.6 m OD. All wind turbines will be founded at existing ground level and at a maximum of 100 m tall the top of the most elevated stationary turbine tower will be at 115.6 m OD. Taking into account the maximum overall turbine dimension of 152 m from ground level to tip of blade in the fully upright position, the highest point will be 167.6 m OD.

Thus, the turbines will be very low relative to the chimneys, which are already provided with obstacle lighting to ensure that they do not pose a danger to air navigation.

All requirements of the Irish Aviation Authority and the Department of Defence will be implemented in full. The wind farm will have no implications for air navigation nor impact on the safety of air traffic.

14.3.3 Mitigation

The proposed development will not result in significant adverse impacts.

³ Milborrow, Dispelling the Myths of Energy Payback Time, as published in Windstats, Vol. 11, No 2 (Spring 1998).

14.4 TELEVISION AND COMMUNICATIONS SIGNALS

14.4.1 Receiving Environment

Some evidence exists that in certain circumstances, wind turbines, more particularly the rotation of the blades, can adversely affect communication systems that use electromagnetic waves as the transmission medium, e.g. television, radio and microwave links.

14.4.2 Impact of the Development

Scattering effects have been associated with television reception in the vicinity of some wind turbines, causing double imaging on the television screen. The most significant effect, at a domestic level, is straightforward involving a possible flicker effect caused by the moving rotor, particularly on television signals. In practice, the majority of these difficulties arise where structures such as wind turbines are located in a region where there is a relatively weak signal.

The most significant potential effect, in terms of numbers of households affected, is where the wind farm is directly in line with the transmitter radio path. In practice, the majority of these difficulties arise where structures such as wind turbines are located in a region where there is a relatively weak signal.

There are two potential and different effects depending on the location of the receiver to the wind farm:

- **Shadowed houses:** The majority of the issues are related to receivers 'shadowed' directly behind the wind farm where the main signal passes through the wind farm. In these locations the turbine rotor can create a degree of signal scattering which causes loss of picture detail, loss of colour and buzz on sound.
- **Viewers to the side:** The effects are likely to be periodic reflections from the blades, giving rise to a delayed image or ghost image on the screen which is liable to flicker as the blades rotate.

These problems are predominantly associated with turbines having metal or carbon-fibre blades. Modern turbines, such as the type proposed, have blades manufactured from fibreglass composite materials and the problem of scattering are much less likely to arise. There are already large structures within the power station at Moneypoint that do not impact on TV or radio reception.

It is believed that the presence of the wind farm will not create any loss of broadcast amenity to local residences.

14.4.3 Mitigation

In the event that the wind farm development leads to interference with television reception, in collaboration with the appropriate bodies, all necessary measures will be undertaken to fully eliminate the impact. There are two potential methods of mitigation, as follows:

- ESB Wind Development will enter a protocol agreement with RTÉ concerning Moneypoint Wind Farm. The standard protocol agreement includes a remedial mechanism for any loss of broadcast amenity that might be suffered by residents as a result of the wind farm development.

- ESB Wind Development will commission an independent survey of television reception in the locality prior to erection of the wind turbines. This will establish the baseline position against which any apparent subsequent impacts will be evaluated.

ESB Wind Development undertakes to fully remedy any interference with broadcast reception that is attributable to the wind farm development.

14.4.4 Conclusions

The proposed development will not result in significant adverse environmental impacts.

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15. CULTURAL HERITAGE

15.1 RECEIVING ENVIRONMENT

The current land profile of the site is a man-made one that was created at the time of construction of the power station by site development works, which involved in excess of 3,5000,000 m³ of earth moving leading to remodelling of the site's topography. The coal yard was formed by excavating rock from the hill at its northern and eastern boundaries and the excavated rock was used to reclaim and level the site towards the estuary, where an additional 24 ha of land were created.

In addition, the ash storage area has been transformed by the deposition of significant volumes of ash there since the station was commissioned and its subsequent restoration to grassland as sections within it have reached their final level.

Archaeology

There are no protected structures within the meaning of the Planning and Development Act, 2000 (as amended) within the power station lands. A number of recorded archaeological sites in the townland of Carrowdotia South, as listed in Table 15.1 and shown in Figure 15.1, have been identified. These are classified as Enclosures.

Table 15.1: Surrounding Archaeological Sites

Site Reference	CH1	CH2	CH3	CH4	CH5
Site & Monuments Record (SMR)	CL067:041	CL067:042	CL067:043	CL067:050	CL067:051

History

The place-name Carrowdotia comes from the Gaelic "Ceathrú Dóite" or "Burnt Quarter". There are no historical events associated with the site that have the ability to be impacted upon.

Architectural Heritage

There are no protected structures within the meaning of the Planning and Development Act, 2000 situated on the station site. The power station buildings at Moneypoint are not considered to be of interest from an architectural heritage perspective. However, there are a number of structures located in the general area, as listed in Table 15.2 and shown in Figure 15.1.

Table 15.2: Surrounding Architectural Heritage Sites

Site Reference	Description
CH6	Two modern agricultural barns, with steel and concrete walls and corrugated roofs.
CH7	Two-storey cottage with chimneys at each gable.
CH8	Modern (1980.s) two-storey dwelling orientated east-west with front facing north; single-storey extension to east.

Site Reference	Description
CH9	Two-storey dwelling orientated with single storey extension to east.
CH10	Single-storey bungalow; three bay with off-centre recessed entrance; garage incorporated into western end.
CH11	Two-storey cottage with rear extension.
CH12:	Single-storey gable-ended cottage with attic-room

15.2 IMPACT OF THE DEVELOPMENT

With the exception of turbine T2, all of the works associated with the wind farm development will take place in the remodelled / filled areas of the power station lands. Turbine T2 itself will be located in an area now having a substantial depth of fill.

The nature of the site is such that the excavation of buried or hidden features in these areas cannot arise during construction. There is no potential for disturbance of sites that are as yet undiscovered. Areas of archaeological interest in the vicinity of the site will be unaffected and undisturbed by the wind farm.

There are no historic events associated within the development areas.

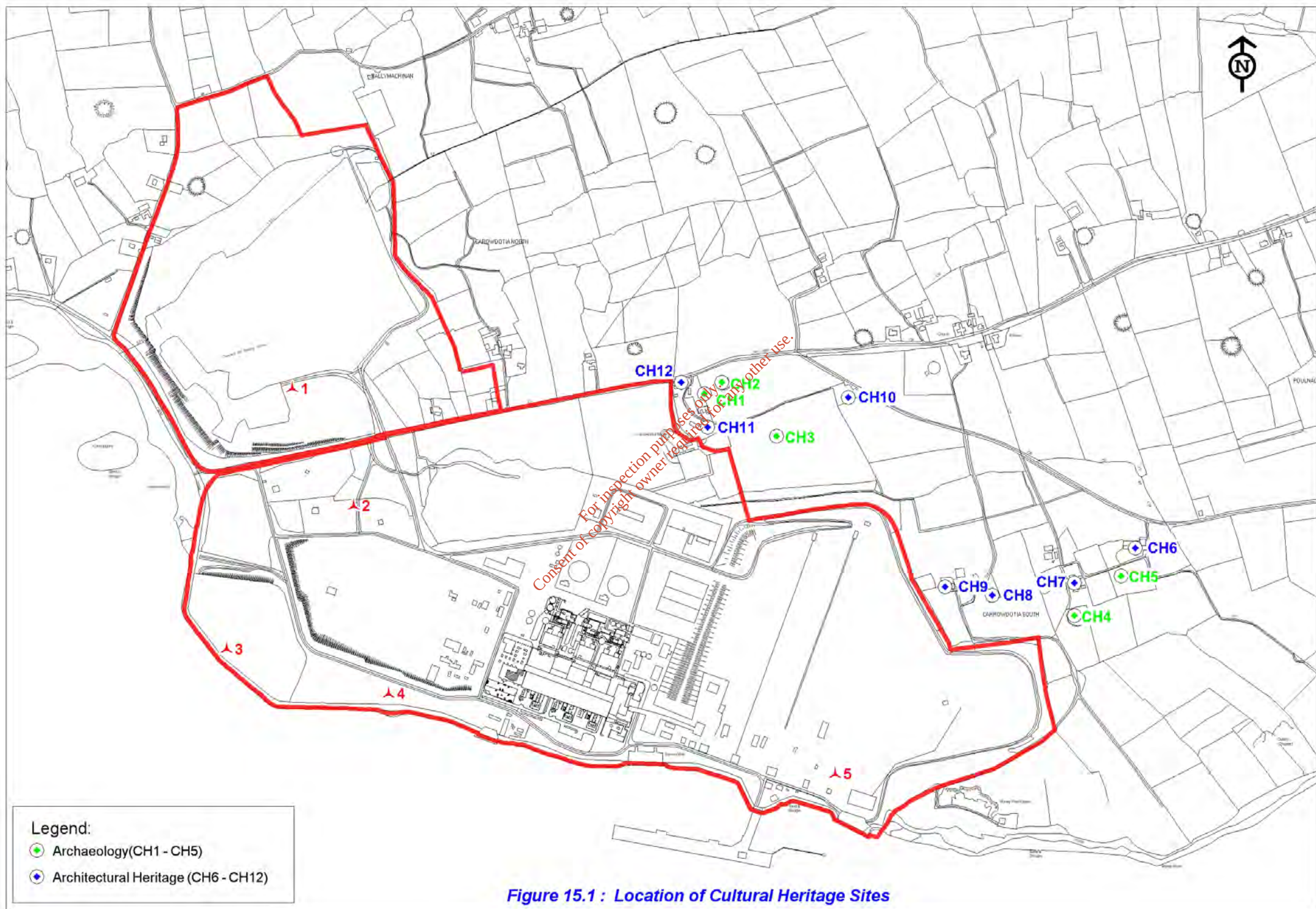
The wind farm has no potential to impact on Architectural heritage sites that are outside of the station lands.

15.3 MITIGATION

No mitigation of impacts is proposed.

15.4 CONCLUSIONS

The proposed development will not result in significant environmental impacts.



16. INTERACTION OF IMPACTS

16.1 INTRODUCTION

In addition to the requirement to describe the likely significant effects of the proposed development on the different elements of the environment, it is also required to consider the interaction of those effects. Interactions are considered by a means of the matrix presented in Table 16.1. Each aspect of the environment which is considered in detail in the appropriate sections of the EIS is cross tabulated against all other aspects that have also been considered.

Where an interaction is considered to be both likely and significant, it is given a reference number in the matrix and detail of the interaction is discussed herein.

Mitigation measures in relation to primary impacts are outlined in the relevant Section of the EIS. Mitigation measures are not repeated herein and only mitigation that is additional to the primary impacts is described.

16.2 INTERACTION

1: Human Beings / Noise

In terms of the construction noise, any impacts arising will be short-term in nature and a perceptible increase in noise sufficient to cause harm to residential amenity will not result given the distance from the site to the existing properties in the area.

With the closest occupied residence being located in excess 500 m from the nearest proposed turbine, noise predictions indicated that noise from Moneypoint Wind Farm in combination with noise associated with operation of the power station will not exceed fixed limit values suggested by the EPA.

No further mitigation measures are proposed.

2: Human Beings / Shadow Flicker

When the wind farm is operational there is potential for shadow flicker to arise, depending on the simultaneous occurrence of a number of unrelated conditions.

Potential occurrence was assessed for all properties surrounding the site at Moneypoint, Regardless of their actual susceptibility to actual occurrence. Results indicated shadow flicker was possible but calculations showed a predicted maximum occurrence of only about 50% of the recommended limit value of 30 hours.

No further mitigation measures are proposed.

3: Human Beings / Landscape

Impacts on the landscape are commonly recognised as being the most significant impacts of this type of development. Photomontages were generated for 15 viewshed reference points and a detailed analysis of each was presented. In addition to impacts on visual character and landscape character, impacts on human beings were considered in the context of built-up areas, recreational areas and roads (scenic routes, national primary roads, regional roads and country roads).

The main near-distance views of the wind farm occur mostly within a 7 km radius around the site. Its visual impact is considered to range from slight to moderate adverse with

higher potential visual impact on views from locations close to the development. The wind farm will not be visible from all locations within this area, as some screening is provided by existing vegetation and the undulating land profile.

No further mitigation measures are proposed.

4: Human Beings / Roads & Traffic

The development will generate traffic during the construction phase and but the number of heavy traffic movements on and off the site has been calculated as being the equivalent of 9 traffic movements daily over a 6-month period. Rather than occurring uniformly throughout the construction period, traffic movements will likely peak on the five non-consecutive days on which concrete for turbine foundations will be delivered. Each foundation will involve up to 35-40 deliveries or 80 vehicle movements.

For existing road users on the N67 National Secondary Route there will be an indiscernible impact. The network of local minor roads and its users will be unaffected by the development.

Traffic management measures that may be employed to mitigate the impacts of long loads, in the event that road haulage rather than the station's barge landing facility is used for the delivery of wind turbine components, have the potential to cause temporary inconvenience for other road users.

Any local road improvements that may be necessary for delivery of wind turbine components, albeit they would be of limited extent, would improve overall road safety in the long term.

No further mitigation measures are proposed.

5: Human Beings / Material Assets

No impacts were predicted in relation to electromagnetic interference. In the very unlikely event of interference with television reception, all necessary measures will be undertaken by the developer in accordance with standard mitigation measures to fully eliminate any negative impact.

No further mitigation measures are proposed.

5: Ecology (Flora & Mammals – Avifauna) / Landscape

The main ecologically designated area in the vicinity of the site is the Lower River Shannon Special Areas of Conservation (SAC). There will be a combination of long-distance, mid-distance and short-distance views of the wind farm from the SAC. However, this site and others that in the broader area are designated for their nature conservation value, which is not impacted upon by the visibility of the wind farm.

No further mitigation measures are proposed.

6: Landscape / Material Assets

The landscape assessment concluded that the overall image presented by the wind farm development is not a negative one. In that context it is not considered that the visual impact of the proposed development will negatively impact on existing or future tourism facilities in the area.

One of the main findings of the Irish public's attitude to wind energy was that those with direct experience of wind farms in their locality do not in general consider that they have

had any adverse impact on the scenic beauty of the area or on tourism. Independent research elsewhere has confirmed that the presence of wind farms makes no difference to tourists' enjoyment of their holiday.

No further mitigation measures are proposed.

7: Landscape / Cultural Heritage

While there are no recorded archaeological, historical or architectural features within the site of the proposed development, the nature of the development is such that indirect impacts associated with visual intrusion will result at cultural heritage sites in the broader landscape. The extent of visibility is determined by local topography, vegetative screening and the effects of distance. Although there are no mitigation measures available to reduce impact arising, it was considered that any impacts arising would not be significant.

No further mitigation measures are proposed.

8: Air & Climate / Roads & Traffic

The primary air quality issue relates to dust potentially arising from a number of activities that include construction transport within and off the site. Traffic associated with the development will also give rise to exhaust emissions during the construction phase. The potential impact is not considered significant in the context of the extent of traffic movements arising.

No further mitigation measures are proposed.

9: Soils & Waters / Cultural Heritage

There are no Recorded Monuments located within the site. Excavations of soils during construction doesn't have the possibility of uncovering previously unrecorded features and material of archaeological interest and potential.

No further mitigation measures are proposed.

16.3 EPA GUIDANCE

The Environmental Protection Agency (EPA) published its Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), which are designed to accompany the Guidelines on the information to be contained in Environmental Impact Statements, also published by the EPA.

The Advice Notes contain greater detail on many of the topics covered by the Guidelines and offer guidance on current practice for the structure and content of Environmental Impact Statements. They are divided into five sections, each providing detailed guidance on specific aspects to be considered in the preparation of an EIS.

Section 3 provides guidance on the topics which would usually be addressed when preparing an EIS for a particular class of development, highlighting typical issues which arise. The projects are grouped into 33 generic types, which have similar development or operational characteristics.

Project Type 33 addresses installations for the harnessing of wind power for energy production and the guidance on interaction of impacts for this project type notes as follows:

The interaction of noise, visual impacts, access to underdeveloped areas and effects on ecology can combine to affect perceptions of the integrity of natural areas.

At Moneypoint the magnitude of separate impacts on the listed environmental factors is not such as to combine to affect the perception of integrity of a natural area.

16.4 CONCLUSIONS

In summary, the consideration of Interaction of Impacts has concluded that no additional potentially unacceptable environmental impacts arising as a result of the construction and operation of the wind farm at Moneypoint, provided that the recommended mitigation measures are implemented.

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Table 16.1: Potential Interaction of Significant Environmental Impacts

Interactions	Human Beings	Noise	Shadow Flicker	Flora & Mammals	Avifauna	Landscape	Air & Climate	Soils & Waters	Roads & Traffic	Material Assets	Cultural Heritage
Human Beings		1	2			3			4	5	
Noise	1										
Shadow Flicker	2										
Flora & Mammals						5					
Avifauna						5					
Landscape	3			5	5					6	7
Air & Climate									8		
Soils & Waters											9
Roads & Traffic	4						8				
Material Assets	5					6					
Cultural Heritage						7		9			

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APPENDIX B: PREDICTED NOISE LEVELS

RESULTS OF WINDPRO ANALYSIS AT MONEYPPOINT

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Project:

Moneypoint Wind Farm_May 2011

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11/01/2012 16:18 / 1

Licensed user:

ESBI Engineering & Facility Management Ltd

Stephen Court 18/21 Stephen's Green

IE-DUBLIN 2

+353 1 703 8000

David Murphy / david.murphy@esbi.ie

Calculated:

11/01/2012 16:17/2.7.490

DECIBEL - Main Result**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012**Noise calculation model:**

ISO 9613-2 General

Wind speed:

3.0 m/s - 12.0 m/s, step 1.0 m/s

Ground attenuation:

General, Ground factor: 0.5

Meteorological coefficient, C0:

0.0 dB

Type of demand in calculation:

1: WTG noise is compared to demand (DK, DE, SE, NL etc.)

Noise values in calculation:

All noise values are 90% exceedance values (L90)

Pure tones:

Pure and impulse tone penalty are added to WTG source noise

Height above ground level, when no value in NSA object:

4.0 m Don't allow override of model height with height from NSA object

Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:

0.0 dB(A)



Scale 1:50,000

New WTG Noise sensitive area

WTGs

IG				WTG type			Noise data											
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	First wind speed [m/s]	LwaRef [dB(A)]	Last wind speed [m/s]	LwaRef [dB(A)]	Pure tones	Octave data
IG	[m]							[kW]	[m]	[m]								
1	102,890	152,233	15.6	VESTAS V112 3000 112.0 IOI hub...	Yes	VESTAS	V112-3,000	3,000	112.0	94.0	USER	User Input Values_Level 0 - Mode 0_May 2011	3.0	94.7	12.0	106.5	0 dB	Generic *)
2	103,035	151,939	10.2	VESTAS V112 3000 112.0 IOI hub...	Yes	VESTAS	V112-3,000	3,000	112.0	94.0	USER	User Input Values_Level 0 - Mode 0_May 2011	3.0	94.7	12.0	106.5	0 dB	Generic *)
3	102,735	151,617	5.3	VESTAS V112 3000 112.0 IOI hub...	Yes	VESTAS	V112-3,000	3,000	112.0	94.0	USER	User Input Values_Level 0 - Mode 0_May 2011	3.0	94.7	12.0	106.5	0 dB	Generic *)
4	103,118	151,511	5.2	VESTAS V112 3000 112.0 IOI hub...	Yes	VESTAS	V112-3,000	3,000	112.0	94.0	USER	User Input Values_Level 0 - Mode 0_May 2011	3.0	94.7	12.0	106.5	0 dB	Generic *)
5	104,176	151,320	12.7	VESTAS V112 3000 112.0 IOI hub...	Yes	VESTAS	V112-3,000	3,000	112.0	94.0	USER	User Input Values_Level 0 - Mode 0_May 2011	3.0	94.7	12.0	106.5	0 dB	Generic *)
*)Notice: One or more noise data for this WTG is generic or input by user																		

*)Notice: One or more noise data for this WTG is generic or input by user

Calculation Results**Sound Level****Noise sensitive area**

No.	Name	IG			Imission height	Demands		Sound Level		Demands fulfilled ?
		East	North	Z		Max Noise	Max From WTGs			
				[m]	[m]	[dB(A)]	[dB(A)]			Noise
A	Noise sensitive point: User defined (1)	102,285	152,580	16.1	4.0	45.0	38.6			Yes
B	Noise sensitive point: User defined (2)	102,477	152,614	15.8	4.0	45.0	40.2			Yes
C	Noise sensitive point: User defined (3)	102,534	152,764	20.0	4.0	45.0	39.0			Yes
D	Noise sensitive point: User defined (4)	102,556	152,864	20.0	4.0	45.0	38.0			Yes
E	Noise sensitive point: User defined (5)	103,042	153,015	22.4	4.0	45.0	37.2			Yes
F	Noise sensitive point: User defined (6)	103,397	152,329	23.6	4.0	45.0	42.7			Yes
G	Noise sensitive point: User defined (7)	103,375	152,362	20.3	4.0	45.0	42.7			Yes
H	Noise sensitive point: User defined (8)	103,563	152,332	30.0	4.0	45.0	40.8			Yes
I	Noise sensitive point: User defined (9)	103,813	152,191	34.5	4.0	45.0	39.3			Yes
J	Noise sensitive point: User defined (10)	104,174	152,262	40.0	4.0	45.0	36.8			Yes
K	Noise sensitive point: User defined (11)	104,405	151,895	27.2	4.0	45.0	38.5			Yes
L	Noise sensitive point: User defined (12)	104,513	151,790	30.0	4.0	45.0	38.7			Yes
M	Noise sensitive point: User defined (13)	104,646	151,878	30.0	4.0	45.0	36.8			Yes
N	Noise sensitive point: User defined (14)	105,002	151,975	30.0	4.0	45.0	33.4			Yes
O	Noise sensitive point: User defined (15)	105,435	151,701	30.0	4.0	45.0	31.0			Yes
P	Noise sensitive point: User defined (16)	105,534	151,892	23.0	4.0	45.0	30.1			Yes

Distances (m)

WTG					
NSA	1	2	3	4	5
A	698	987	1063	1355	2272
B	562	876	1030	1276	2136
C	639	965	1165	1383	2187
D	714	1042	1260	1465	2238
E	797	1076	1431	1506	2039
F	516	532	972	864	1275

To be continued on next page...

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DECIBEL - Main Result**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012

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WTG

NSA	1	2	3	4	5
G	502	543	982	889	1314
H	680	658	1094	934	1183
I	924	818	1221	972	944
J	1284	1184	1577	1296	942
K	1552	1371	1693	1343	619
L	1682	1485	1786	1423	578
M	1792	1612	1929	1571	730
N	2128	1967	2295	1940	1054
O	2600	2412	2701	2325	1315
P	2666	2499	2812	2446	1474

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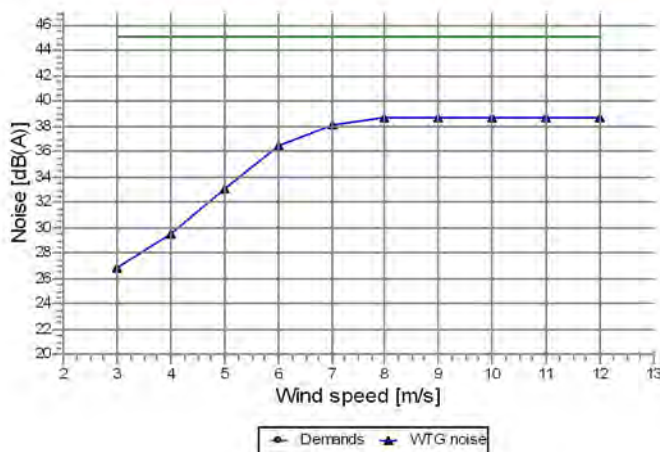
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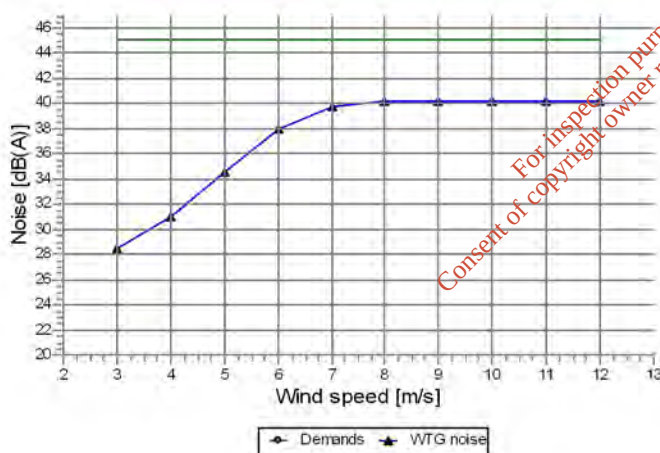
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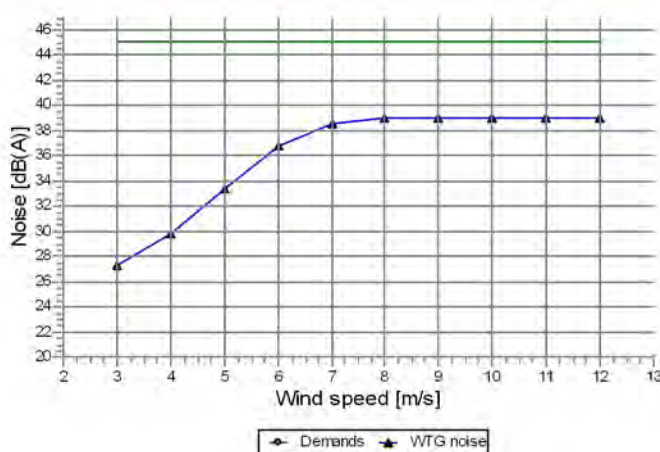
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (1) (A)**

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	26.8	Yes
4.0	45.0	29.4	Yes
5.0	45.0	33.0	Yes
6.0	45.0	36.4	Yes
7.0	45.0	38.1	Yes
8.0	45.0	38.6	Yes
9.0	45.0	38.6	Yes
10.0	45.0	38.6	Yes
11.0	45.0	38.6	Yes
12.0	45.0	38.6	Yes

Noise sensitive point: User defined (2) (B)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	28.4	Yes
4.0	45.0	31.0	Yes
5.0	45.0	34.6	Yes
6.0	45.0	38.0	Yes
7.0	45.0	39.7	Yes
8.0	45.0	40.2	Yes
9.0	45.0	40.2	Yes
10.0	45.0	40.2	Yes
11.0	45.0	40.2	Yes
12.0	45.0	40.2	Yes

Noise sensitive point: User defined (3) (C)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	27.2	Yes
4.0	45.0	29.8	Yes
5.0	45.0	33.4	Yes
6.0	45.0	36.8	Yes
7.0	45.0	38.5	Yes
8.0	45.0	39.0	Yes
9.0	45.0	39.0	Yes
10.0	45.0	39.0	Yes
11.0	45.0	39.0	Yes
12.0	45.0	39.0	Yes

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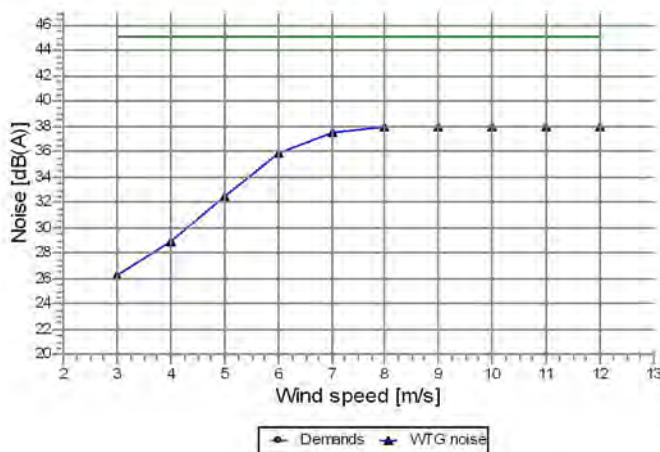
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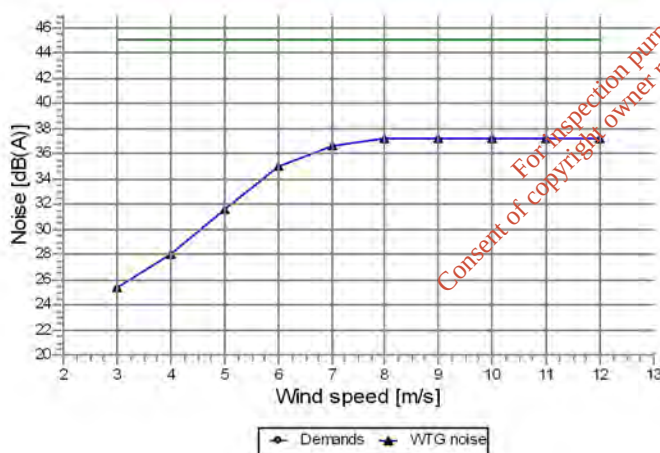
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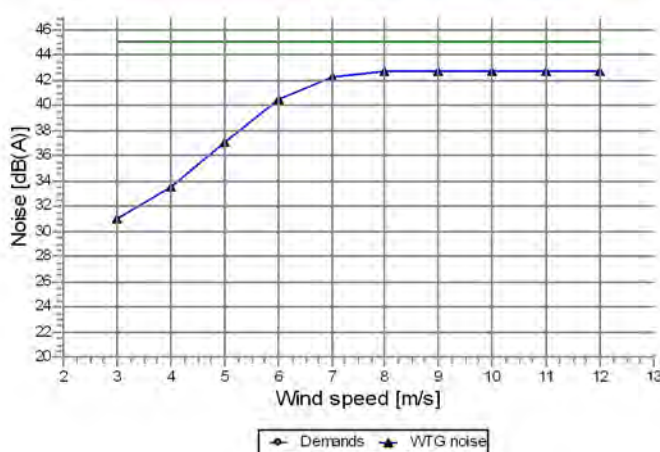
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (4) (D)****Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	26.2	Yes
4.0	45.0	28.8	Yes
5.0	45.0	32.4	Yes
6.0	45.0	35.8	Yes
7.0	45.0	37.5	Yes
8.0	45.0	38.0	Yes
9.0	45.0	38.0	Yes
10.0	45.0	38.0	Yes
11.0	45.0	38.0	Yes
12.0	45.0	38.0	Yes

Noise sensitive point: User defined (5) (E)**Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	25.4	Yes
4.0	45.0	28.0	Yes
5.0	45.0	31.6	Yes
6.0	45.0	35.0	Yes
7.0	45.0	36.7	Yes
8.0	45.0	37.2	Yes
9.0	45.0	37.2	Yes
10.0	45.0	37.2	Yes
11.0	45.0	37.2	Yes
12.0	45.0	37.2	Yes

Noise sensitive point: User defined (6) (F)**Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	30.9	Yes
4.0	45.0	33.5	Yes
5.0	45.0	37.1	Yes
6.0	45.0	40.5	Yes
7.0	45.0	42.2	Yes
8.0	45.0	42.7	Yes
9.0	45.0	42.7	Yes
10.0	45.0	42.7	Yes
11.0	45.0	42.7	Yes
12.0	45.0	42.7	Yes

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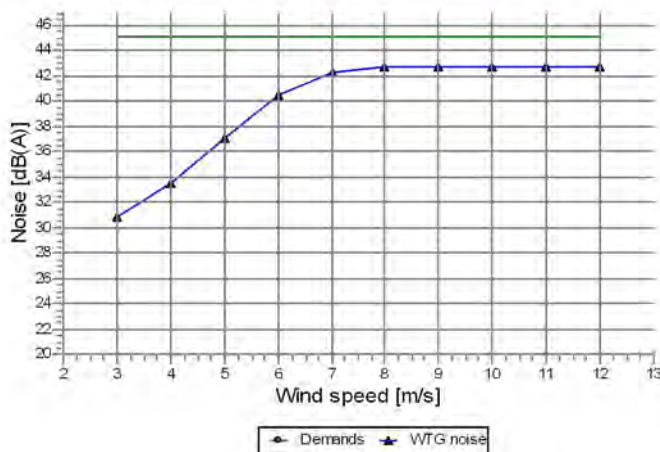
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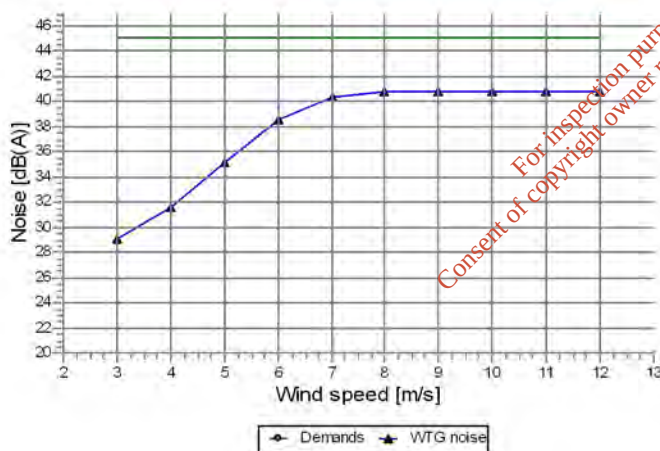
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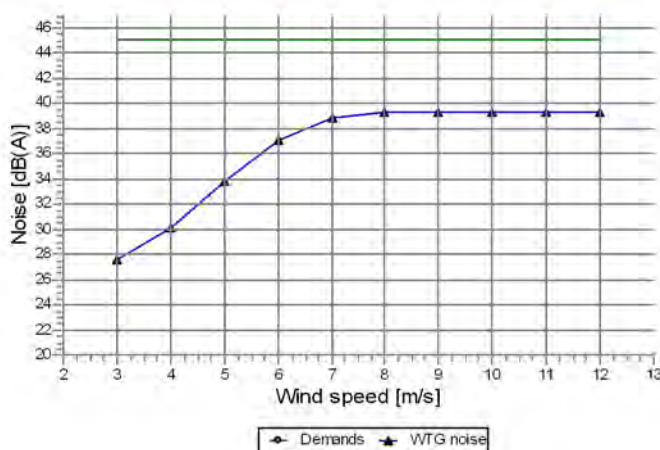
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (7) (G)****Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	30.9	Yes
4.0	45.0	33.5	Yes
5.0	45.0	37.1	Yes
6.0	45.0	40.5	Yes
7.0	45.0	42.2	Yes
8.0	45.0	42.7	Yes
9.0	45.0	42.7	Yes
10.0	45.0	42.7	Yes
11.0	45.0	42.7	Yes
12.0	45.0	42.7	Yes

Noise sensitive point: User defined (8) (H)**Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	29.0	Yes
4.0	45.0	31.6	Yes
5.0	45.0	35.2	Yes
6.0	45.0	38.6	Yes
7.0	45.0	40.3	Yes
8.0	45.0	40.8	Yes
9.0	45.0	40.8	Yes
10.0	45.0	40.8	Yes
11.0	45.0	40.8	Yes
12.0	45.0	40.8	Yes

Noise sensitive point: User defined (9) (I)**Sound Level**

Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	27.5	Yes
4.0	45.0	30.1	Yes
5.0	45.0	33.7	Yes
6.0	45.0	37.1	Yes
7.0	45.0	38.8	Yes
8.0	45.0	39.3	Yes
9.0	45.0	39.3	Yes
10.0	45.0	39.3	Yes
11.0	45.0	39.3	Yes
12.0	45.0	39.3	Yes

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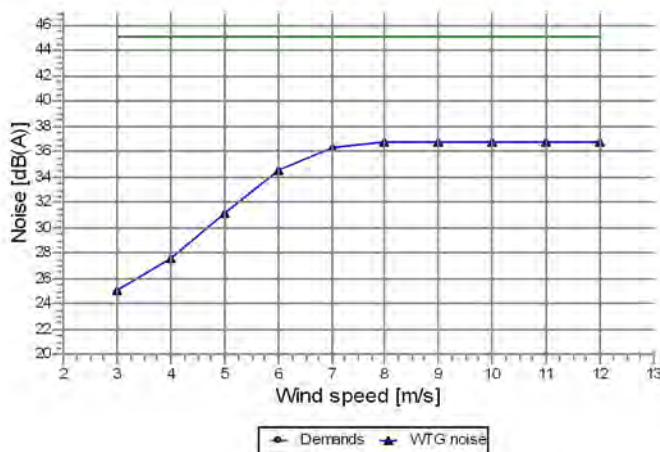
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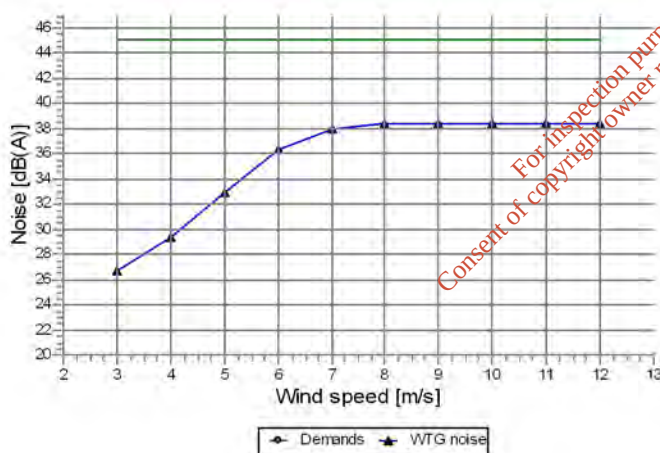
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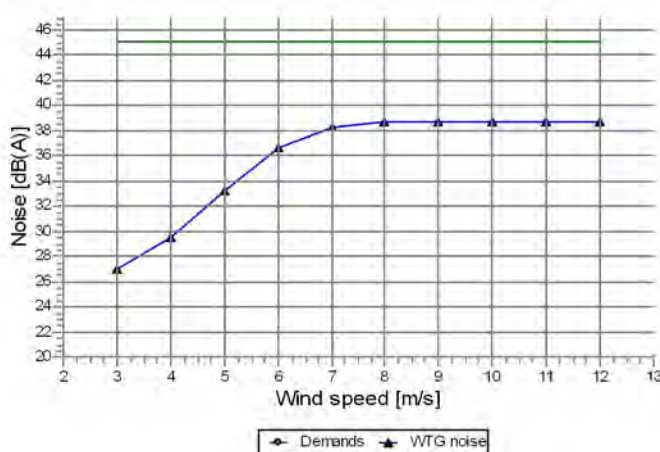
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (10) (J)**

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	25.0	Yes
4.0	45.0	27.6	Yes
5.0	45.0	31.2	Yes
6.0	45.0	34.6	Yes
7.0	45.0	36.3	Yes
8.0	45.0	36.8	Yes
9.0	45.0	36.8	Yes
10.0	45.0	36.8	Yes
11.0	45.0	36.8	Yes
12.0	45.0	36.8	Yes

Noise sensitive point: User defined (11) (K)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	26.7	Yes
4.0	45.0	29.3	Yes
5.0	45.0	32.9	Yes
6.0	45.0	36.3	Yes
7.0	45.0	38.0	Yes
8.0	45.0	38.5	Yes
9.0	45.0	38.5	Yes
10.0	45.0	38.5	Yes
11.0	45.0	38.5	Yes
12.0	45.0	38.5	Yes

Noise sensitive point: User defined (12) (L)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	27.0	Yes
4.0	45.0	29.6	Yes
5.0	45.0	33.2	Yes
6.0	45.0	36.5	Yes
7.0	45.0	38.2	Yes
8.0	45.0	38.7	Yes
9.0	45.0	38.7	Yes
10.0	45.0	38.7	Yes
11.0	45.0	38.7	Yes
12.0	45.0	38.7	Yes

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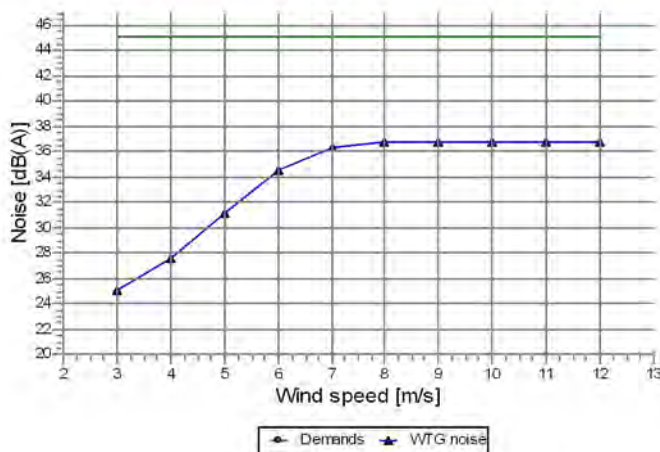
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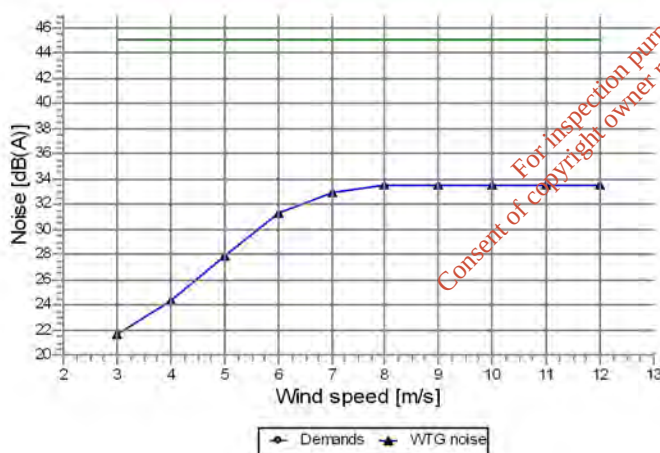
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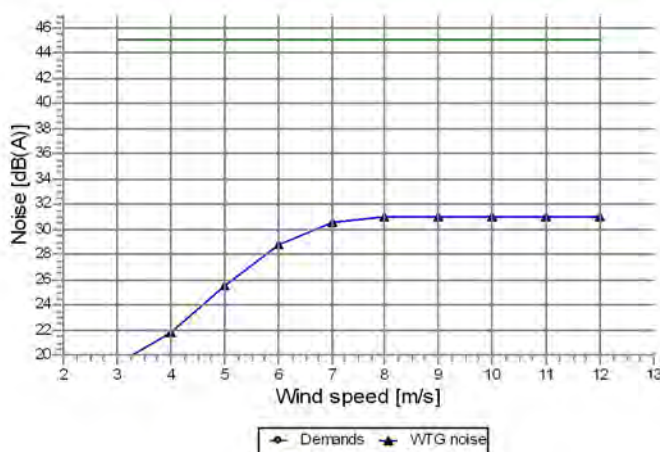
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (13) (M)**

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	25.0	Yes
4.0	45.0	27.6	Yes
5.0	45.0	31.2	Yes
6.0	45.0	34.6	Yes
7.0	45.0	36.3	Yes
8.0	45.0	36.8	Yes
9.0	45.0	36.8	Yes
10.0	45.0	36.8	Yes
11.0	45.0	36.8	Yes
12.0	45.0	36.8	Yes

Noise sensitive point: User defined (14) (N)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	21.6	Yes
4.0	45.0	24.2	Yes
5.0	45.0	27.8	Yes
6.0	45.0	31.2	Yes
7.0	45.0	32.9	Yes
8.0	45.0	33.4	Yes
9.0	45.0	33.4	Yes
10.0	45.0	33.4	Yes
11.0	45.0	33.4	Yes
12.0	45.0	33.4	Yes

Noise sensitive point: User defined (15) (O)

Sound Level			
Wind speed [m/s]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?
3.0	45.0	19.2	Yes
4.0	45.0	21.8	Yes
5.0	45.0	25.4	Yes
6.0	45.0	28.8	Yes
7.0	45.0	30.5	Yes
8.0	45.0	31.0	Yes
9.0	45.0	31.0	Yes
10.0	45.0	31.0	Yes
11.0	45.0	31.0	Yes
12.0	45.0	31.0	Yes

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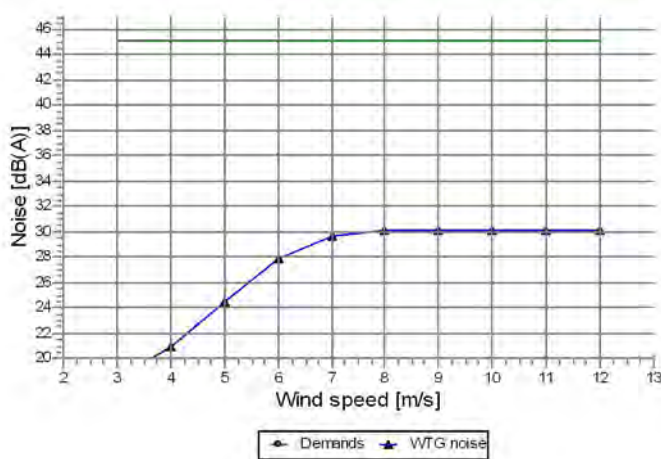
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DECIBEL - Detailed results**Calculation:** Moneypoint Noise Calc 5 x Vestas V112 11th Jan 2012 **Noise calculation model:** ISO 9613-2 General**Noise sensitive point: User defined (16) (P)**

Sound Level			
Wind speed	Demands	WTG noise	Demands fulfilled ?
[m/s]	[dB(A)]	[dB(A)]	
3.0	45.0	18.3	Yes
4.0	45.0	20.9	Yes
5.0	45.0	24.5	Yes
6.0	45.0	27.9	Yes
7.0	45.0	29.6	Yes
8.0	45.0	30.1	Yes
9.0	45.0	30.1	Yes
10.0	45.0	30.1	Yes
11.0	45.0	30.1	Yes
12.0	45.0	30.1	Yes

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APPENDIX C: FLORA & MAMMALS

LEGISLATION AND STATUTORY CONTEXT

TABLE C.1: SITES DESIGNATED FOR ECOLOGICAL REASONS

TABLE C.2: CRITERIA FOR ASSESSING TERRESTRIAL SITES (NRA, 2004)

TABLE C.3: CRITERIA FOR ASSESSING THE IMPORTANCE OF ECOLOGICAL FEATURES (NRA, 2004)

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Legislative and Statutory Context

Birds Directive: Article 4 of the Birds Directive requires that, in SPAs, it is incumbent on the developer to provide empirical evidence that the qualifying interest of that SPA will not be adversely impacted upon by the proposed development and outside SPAs the State must strive to 'avoid pollution or deterioration of habitats' of all wild birds, including species listed in Annex I of the Directive. Annex I refers to a list of species that require strict protection due to their populations declining seriously throughout their respective ranges.

Habitats Directive: The Habitats Directive 92/43/EEC was transposed into national law through the European Communities (Natural Habitats) Regulations, 1997. These regulations require local governments to ensure that an appropriate assessment of the implications of the proposals on sites, in view of the sites conservation objectives, is undertaken. This applies to all development proposals, irrespective of their location, or likely impact on these sites.

Wildlife Act, 1976: The Wildlife Act, 1976 is the principal national legislation providing for the protection of wildlife and the control of some activities which may adversely affect wildlife. Its aims are to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation, and to provide the services necessary to accomplish such aims. As a consequence of the Act all wild birds are protected throughout the state and careful assessment of their habitats must take place before any development is allowed. The Third Schedule to the Act was amended by the European Communities (Wildlife Act, 1976) (Amendment) Regulations, 1985, which removed the remaining 12 unprotected species from that schedule.

Wildlife (Amendment) Act, 2000: This Act broadened the scope of the wildlife protection to include most species, including the majority of fish and aquatic invertebrate species. It strengthened the provisions relating to the cutting of hedgerows during the critical bird-nesting period and the protective regime for SACs by removing any doubt that protection will in all cases apply from the time of notification of proposed sites. The Act also addresses promoting the conservation of biological diversity, in light of Ireland's commitment to the UN Convention on Biological Diversity.

Table C.1: Sites Designated for Ecological Reasons

Name Site code	Designation	Notes	Distance and Direction
Lower River Shannon 002165	SAC	This very large site stretches along the Shannon valley from Killaloe to Loop Head/Kerry Head, a distance of 120 km. The site is a candidate SAC selected for lagoons, alluvial wet woodlands, floating river vegetation, Molina meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, sea cliffs, reefs and large inlets and bays, amongst others, all Annex I habitats of the EU Habitats Directives. The site is also selected for species listed on Annex II of the same directive such as bottlenose dolphin, sea lamprey, river lamprey, brook lamprey, freshwater pearl mussel, Atlantic salmon and otter.	Adjacent southern and western site boundaries.
Scattery Island 001911	pNHA	Scattery Island lies c. 2km offshore from Kilrush, 7km west of Moneypoint. It is composed of glacial till, with soft cliffs on the western side. There is a tidal lagoon, and some areas of salt marsh. Most of the island is grassland in light agricultural use.	~3 km south-west
Derrygeeha Lough 000050	pNHA	Derrygeeha Lough is a small freshwater lake c. 2km inland from Clonderalaw Bay, with lake, wet woodland and cutover bog habitats. Its main interest is as one of only two known stations for the caddis fly <i>Cyrnus insolutus</i> in Ireland.	~3 km west-south-west
St. Senan's Lough 0001025	pNHA	St. Senan's Lough is located 3 km north of Moneypoint. It is an acidic lake with adjoining marsh habitats, with moss rich marsh including areas of peat forming Sphagnum mosses, and areas of cut over bog. The area of interest is 11ha in extent. Acidic wetlands of this type support small numbers of waterfowl in comparison with calcareous systems.	~3 km north
Ballylongford Bay 001332	pNHA	No site synopsis available.	~3 km south-west
Clonderalaw Bay 0013860	pNHA	No site synopsis available.	~3 km east
Tarbert Bay 00027	pNHA	No site synopsis available.	~3 km south

Table C.2: Criteria for Assessing Terrestrial Sites (NRA, 2004)

Impact Level	A Sites: Internationally Important	B Sites: Nationally Important	C Sites: High Value, Locally Important	D Sites: Moderate Value Locally Important	E Sites: Low Value, Locally Important
Severe Negative	Any permanent impacts	Permanent impacts on a large part of a site			
Major Negative	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site		
Moderate Negative	Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site	
Minor Negative		Temporary impacts on a small part of a site	Temporary impacts on a large part of a site	Permanent impacts on a small part of a site	Permanent impacts on a large part of a site
Neutral	No impacts	No impacts	No impacts	No impacts	Permanent impacts on a small part of a site
Minor Positive				Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site
Moderate Positive			Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site	
Major Positive		Permanent beneficial impacts on a small part of a site	Permanent beneficial impacts on a large part of a site		

Table C.3: Criteria for Assessing the Importance of Ecological Features (NRA, 2004)

Importance	Criteria
International	An internationally designated site or candidate site (SPA, pSPA, SAC, pSAC, Ramsar Site, Biogenetic Reserve). Also Sites which qualify for designation as SACs or SPAs – this includes sites on the NGO shadow list of SACs.
National ¹	A nationally designated site or candidate site (NHA, pNHA') (unfortunately there is no published criteria used in selecting these areas). Sites holding Red Data Book (Curtis and McGough, 1988) plant species.
County	Sites holding nationally scarce plant species (recorded from less than 65 10 km squares ²), unless they are locally abundant. Sites holding semi-natural habitats likely to be of rare occurrence within the county. Sites holding the best examples of a semi-natural habitat type within the county.
High Local Importance	Sites holding semi-natural habitats and/or species likely to be of rare occurrence within the local area. Sites holding the best examples of a high quality semi-natural habitat type within the local area.
Local Importance	Sites holding high quality semi-natural habitats
Local Value	Any semi-natural habitat

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APPENDIX D: AVIFAUNA

TABLE D.1: VANTAGE POINT SURVEY WATCH DATA - SPRING 2010

TABLE D.2: MONEYPPOINT MONITORING - AUTUMN 2010 WATCH INFORMATION

TABLE D.3: MONEYPPOINT WINTER 2010 / 2011 VANTAGE POINT WATCH INFORMATION

TABLE D.4: MONEYPPOINT FLIGHT ACTIVITY AUTUMN 2010

TABLE D.5: MONEYPPOINT FLIGHT ACTIVITY WINTER 2010 / 2011

TABLE D.6: MONEYPPOINT I-WEBS SURVEYS AUTUMN 2010 & NOVEMBER 2010 - FEBRUARY 2011

TABLE D.7: TOTAL SPECIES RECORDED AT MONEYPPOINT IN AUTUMN 2010

TABLE D.8: MONEYPPOINT TOTAL SPECIES LIST FOR WINTER 2010/2011 SURVEY

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Table D.1: Waterfowl Numbers at Moneypoint – November / December 2001

Species	1% National level	< 500m Peak count	Height (m) over water	On Site	Height (m) over ground
Bar-tailed Godwit	175	1	40	0	-
Blackheaded Gull	N/A	26	0-150	26	30-150
Cormorant	105	8-10	1-100	15	3-150
Common Gull	NA	20	1-30	6-10	-
Curlew	1,000	150	1-50	40	<3
Dunlin	1,200	5	N/A	0	-
Great Black-backed Gull	N/A	3	1-200	3	-
Great Crested Grebe	35	3	N/A	0	-
Greenshank	20	1	N/A	0	-
Grey Heron	105	2	1	2	0-3
Herring Gull	N/A	1	3m	0	-
Grey Plover	50	2	150	0	-
Lapwing	2,000	200	N/A	0	3 above road
Lesser Black-backed Gull	N/A	1	N/A	1	2
Mallard	500	2	N/A	0	-
Moorhen	N/A	0	-	3	N/A
Oystercatcher	700	32	<1	2	-
Pochard	350	0	-	1	N/A
Red-breasted Merganser	25	1	Low	0	-
Red Throated Diver	N/A	5	1	0	-
Ringed Plover	100	6	N/A	0	-
Ring-billed Gull	N/A	1	N/A	0	-
Shag	N/A	1	3	1	14
Shelduck	125	5	3	0	-
Snipe	N/A	N/A	N/A	40	< 20
Redshank	250	5	<1	1	-
Teal	500	2	N/A	0	-
Turnstone	100	11	N/A	0	-
Wigeon	1,000	4	Low	0	-

N/A: These species not observed in flight.

Table D.2: Results from the Spring 2010 breeding bird survey at Moneypoint. Birds recorded within 100 m of the observer are shown along with maximum counts, % frequency occurrence and conservation status.

Common Name	Scientific Name	Transec t 1	Transec t 2	Transec t 3	Transec t 4	Max. Count	% Frequency Occurrence	Conservation Status*
Blackbird	<i>Turdus merula</i>	11	11	0	8	11	75	Green
Blackcap	<i>Sylvia atricapilla</i>	2	1	0	2	2	75	Green
Blue Tit	<i>Parus caeruleus</i>	2	0	0	1	2	50	Green
Bullfinch	<i>Pyrrhula pyrrhula</i>	0	2	0	2	2	50	Green
Chaffinch	<i>Fringilla coelebs</i>	4	3	0	1	4	75	Green
Chiffchaff	<i>Phylloscopus collybita</i>	6	0	0	2	6	50	Green
Coal Tit	<i>Parus ater</i>	0	0	0	2	2	25	Green
Dunnock	<i>Prunella modularis</i>	0	2	0	2	2	50	Green
Hooded Crow	<i>Corvus cornix</i>	0	4	2	0	4	50	Green
House Sparrow	<i>Passer domesticus</i>	0	0	0	1	1	25	Amber
Jackdaw	<i>Corvus monedula</i>	3	8	0	12	12	75	Green
Lesser Black-backed Gull	<i>Larus fuscus</i>	0	0	1	0	1	25	Amber
Linnet	<i>Carduelis cannabina</i>	0	1	3	0	3	50	Amber
Magpie	<i>Pica pica</i>	1	1	0	5	5	75	Green
Meadow Pipit	<i>Anthus pratensis</i>	0	1	2	0	2	50	Green
Pheasant	<i>Phasianus colchicus</i>	0	1	0	0	1	25	N/A**
Raven	<i>Corvus corax</i>	0	3	0	0	3	25	Green

Common Name	Scientific Name	Transec t 1	Transec t 2	Transec t 3	Transec t 4	Max. Count	% Frequency Occurrence	Conservation Status*
Robin	<i>Erithacus rubecula</i>	3	5	3	8	8	100	Green
Rook	<i>Corvus frugilegus</i>	1	37	0	0	37	50	Green
Skylark	<i>Alauda arvensis</i>	0	0	1	1	1	50	Amber
Song Thrush	<i>Turdus philomelos</i>	6	1	0	2	6	75	Green
Starling	<i>Sturnus vulgaris</i>	14	11	1	9	14	100	Amber
Swallow	<i>Hirundo rustica</i>	1	13	0	2	13	75	Amber
Whimbrel	<i>Numenius phaeopus</i>	0	0	40	1	40	50	Green
Whitethroat	<i>Sylvia communis</i>	0	3	0	0	3	25	Green
Willow Warbler	<i>Phylloscopus trochilus</i>	2	2	1	1	2	100	Green
Woodpigeon	<i>Columba palumbus</i>	1	0	0	3	3	50	Green
Wren	<i>Troglodytes troglodytes</i>	5	8	0	7	8	75	Green
No. of Species	28	15	20	9	20			

* BoCCI, Birds of Concern in Ireland: Species highlighted in amber are of Medium Conservation Concern (*Amber-listed*) and birds highlighted in red are of High Conservation Concern (*Red-listed*) according to the Birds of Conservation Concern in Ireland list (BOCCI, Lynas *et al.*, 2007). All other species are not currently of special conservation concern in Ireland (*Green-listed*).

** N/A, non applicable as Pheasant is a stocked species

Table D.3: Vantage Point Survey Watch Data - Spring 2010

Date	VP	Start - Finish	Sighting	Flight	Species	No.	Time	On/Off	Height (m)	Weather
12/05/2010	1	10.15-13.15	1	1	Jackdaw	2	10.26	on	20	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	2	2	Hooded Crow	1	10.34	on	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	3	3	Raven	1	10.36	off	20	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	4	4	Sparrowhawk	1	11.09	on	5	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	5	5	Rook	1	11.17	on	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	6	6	Kestrel	1	11.36	on	60	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	7	7	Cormorant	1	11.56	off	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	8	8	Cormorant	1	11.56	off	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	9	9	Kestrel	1	12.26	on	40	Bright/Dry/Wind0/Vis ex.
12/05/2010	1	10.15-13.15	10	10	Raven	1	12.45	on	20	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	1	11	Woodpigeon	1	14.57	on	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	2	12	Raven	1	15.01	on	30	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	3	13	Raven	1	15.12	on	10	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	4	14	Sparrowhawk	1	15.29	on	120	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	5	15	Lesser Black Backed Gull	1	15.41	on	40	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	6	16	Whimbrel	16	16.15	on	15	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	7	17	Raven	1	16.2	on	40	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	8	18	Whimbrel	1	16.39	on	20	Bright/Dry/Wind0/Vis ex.
12/05/2010	2	14.30-17.30	9	19	Whimbrel	5	17.05	on	20	Bright/Dry/Wind0/Vis ex.

Date	VP	Start - Finish	Sighting	Flight	Species	No.	Time	On/Off	Height (m)	Weather
13/05/2010	3	09.30-12.30	1	20	Lesser Black Backed Gull	3	9.55	on	30	Bright/Showers/Wind0/Vis.good
13/05/2010	3	09.30-12.30	2	21	Raven	1	10.27	on	30	Bright/Showers/Wind0/Vis.good
13/05/2010	3	09.30-12.30	3	22	Whimbrel	20	10.44	on	10	Bright/Showers/Wind0/Vis.good
13/05/2010	3	09.30-12.30	4	23	Whimbrel	11	11.45	on	15	Bright/Showers/Wind0/Vis.good
13/05/2010	1	13.00-16.00	1	24	Lesser Black Backed Gull	1	13.40	on	30	Bright/Showers/Wind0/Vis.good
13/05/2010	1	13.00-16.00	2	25	Grey Heron	1	14.12	on	5	Bright/Showers/Wind0/Vis.good
14/05/2010	2	09.00-12.00	1	26	Kestrel	1	9.36	ON	10	Bright/Dry/Cloud 60%/Vis. Ex.
14/05/2010	2	09.00-12.00	2	27	Whimbrel	4	10.29	ON	5	Bright/Dry/Cloud 60%/Vis. Ex.
14/05/2010	3	12.30-15.30	1	28	Lesser Black Backed Gull	1	12.39	on	10	Bright/Dry/Cloud 60%/Vis. Ex.
14/05/2010	3	12.30-15.30	2	29	Whimbrel	2	12.41	on	20	Bright/Dry/Cloud 60%/Vis. Ex.

All habitats are Improved Agricultural Grassland (IAG)

Table D.4: Moneypoint Monitoring - Autumn 2010 Watch Information

VP	Grid Reference	Date	Start-Finish	Visibility	Cloud Cover	Wind Speed/Direction	Precipitation	Temperature
3	01280 52802	31/08/2010	11.50 - 14.50	Excellent	50%	E F1	None	Warm
1	04542 52317	31/08/2010	15.10 - 18.10	Excellent	50%	E F1	None	Warm
3	01280 52802	01/09/2010	06.45 - 09.45	Good	70%	E F1	None	Warm
2	02507 53477	01/09/2010	10.10 - 13.10	Good	70%	E F1	None	Warm
1	04542 52317	01/09/2010	14.20 - 17.20	Good	70%	E F1	None	Warm
2	02507 53477	02/09/2010	07.30 - 10.30	Excellent	10%	SE F1	None	Warm

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Table D.5: Moneypoint Winter 2010 / 2011 Vantage Point Watch Information

Date	Start-Finish	Visibility	Cloud Cover	Wind Direction / Speed	Precipitation	Temperature
11/11/2010	07.30 – 09.30	Good	75%	SW F3 + Gusts	Showers	Mild
11/11/2010	09.30 – 11.30	Good	75%	SW F3 + Gusts	Showers	Mild
11/11/2010	11.45 – 13.45	Good	75%	SW F3 + Gusts	Showers	Mild
15/12/2010	08.15 – 10.15	Good	80%	Wind 0	Dry	Cool
15/12/2010	10.20 – 12.20	Good	80%	Wind 0	Dry	Cool
15/12/2010	12.20 – 14.20	Good	80%	Wind 0	Dry	Cool
27/01/2011	08.30 – 10.30	Excellent	10%	Wind 0	Dry	Cool
27/01/2011	11.15 – 13.15	Excellent	10%	Wind 0	Dry	Cool
27/01/2011	13.20 – 15.20	Excellent	10%	Wind 0	Dry	Cool
22/02/2011	09.45 – 11.45	Excellent	80%	S F1	Showers	Mild
22/02/2011	11.51 – 13.51	Excellent	80%	S F1	Showers	Mild
22/02/2011	14.00 – 16.00	Excellent	80%	S F1	Showers	Mild

Table D.6: Moneypoint Flight Activity Autumn 2010

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
AUGUST											
1	31/08/2010	3	1	11.50-14.50	Curlew	11.50	30s		30		
2	31/08/2010	3	2	11.50-14.50	Curlew	12.03	30s		30		
3	31/08/2010	3	3	11.50-14.50	Black Headed Gull	12.12	10s	10			
4	31/08/2010	3	4	11.50-14.50	Grey Heron	12.13	25s		25		
5	31/08/2010	3	5	11.50-14.50	Herring Gull	12.19	30s		30		
6	31/08/2010	3	6	11.50-14.50	Herring Gull	12.21	36s		36		
7	31/08/2010	3	7	11.50-14.50	Common Gull	12.24	43s		43		
8	31/08/2010	3	8	11.50-14.50	Common Gull	12.29	40s	40			
9	31/08/2010	3	9	11.50-14.50	Common Gull	12.31	34s	34			
10	31/08/2010	3	10	11.50-14.50	Curlew	12.36	25s		25		
11	31/08/2010	3	11	11.50-14.50	Common Gull	12.51	32s		32		70 birds
12	31/08/2010	3	12	11.50-14.50	Curlew	12.51	10s	10			
13	31/08/2010	3	13	11.50-14.50	Common Gull	13.01	17s		17		
14	31/08/2010	3	14	11.50-14.50	Raven	13.02	81s	81			
15	31/08/2010	3	15	11.50-14.50	Sparrowhawk	14.28	137s		137s		
16	31/08/2010	3	16	11.50-14.50	Curlew	14.33	16s	16			
17	31/08/2010	3	17	11.50-14.50	Curlew	14.33	18s		18		
18	31/08/2010	1	18	15.10-18.10	Starling	15.41	107s		107		120 birds

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
19	31/08/2010	1	19	15.10-18.10	Kestrel	16.02	40s		40		
20	31/08/2010	1	20	15.10-18.10	Common Gull	16.5	114s		114		
21	31/08/2010	1	21	15.10-18.10	Common Gull	17.51	33s		33		
22	31/08/2010	1	22	15.10-18.10	Cormorant	17.58	120s		120		14 birds
SEPTEMBER											
23	01/09/2010	3	23	06.45-09.45	Common Gull	6.56	162s		162		50 birds
24	01/09/2010	3	24	06.45-09.45	Common Gull	7.02	30s		30		
25	01/09/2010	3	25	06.45-09.45	Black Headed Gull	7.06	64s		64		
26	01/09/2010	3	26	06.45-09.45	Rook	7.06	30s	30			
27	01/09/2010	3	27	06.45-09.45	Curlew	7.22	40s		40		
28	01/09/2010	3	28	06.45-09.45	Curlew	7.25	25s	25			
29	01/09/2010	3	29	06.45-09.45	Curlew	7.37	20s		20		
30	01/09/2010	3	30	06.45-09.45	Black Headed Gull	7.39	49s		49		10 birds
31	01/09/2010	3	31	06.45-09.45	Black Headed Gull	7.41	92s		92		30 birds
32	01/09/2010	3	32	06.45-09.45	Cormorant	7.46	34s	34			
33	01/09/2010	3	33	06.45-09.45	Common Gull	8.43	80s		80		
34	01/09/2010	3	34	06.45-09.45	Common Gull	9.14	40s		40		
35	01/09/2010	2	35	10.10-13.10	Sparrowhawk	10.19	40s	40			
36	01/09/2010	2	36	10.10-13.10	Common Gull	10.44	142s		142		
37	01/09/2010	2	37	10.10-13.10	Rook	10.55	20s	20			

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
38	01/09/2010	1	38	10.10-13.10	Black Headed Gull	11.01	120s		120		
39	01/09/2010	1	39	10.10-13.10	Common Gull	11.59	108s		108		
40	01/09/2010	1	40	14.20-17.20	Starling	14.2	120s		120		100 birds
41	01/09/2010	1	41	14.20-17.20	Black Headed Gull	14.37	20s		20		
42	01/09/2010	1	42	14.20-17.20	Kestrel	14.51	42s		42		
43	01/09/2010	1	43	14.20-17.20	Lesser Black Backed Gull	14.53	10s	10			
44	01/09/2010	1	44	14.20-17.20	Glaucous Gull	15.03	97s		97		
45	01/09/2010	1	45	14.20-17.20	Starling	15.16	45s		45		
46	01/09/2010	1	46	14.20-17.20	Starling	15.29	25s		25		120 birds
47	01/09/2010	1	47	14.20-17.20	Kestrel	15.29	179s		179		
48	01/09/2010	1	48	14.20-17.20	Grey Heron	15.35	42s		42		
49	01/09/2010	1	49	14.20-17.20	Kestrel	15.4	12s	12			
50	01/09/2010	1	50	14.20-17.20	Kestrel	15.5	98s		98		
51	01/09/2010	1	51	14.20-17.20	Black Headed Gull	16.04	26s		26		
52	02/09/2010	2	52	07.30-10.30	Curlew	7.41	31s	31			
53	02/09/2010	2	53	07.30-10.30	Black Headed Gull	7.47	246s		246		17 Birds
54	02/09/2010	2	54	07.30-10.30	Common Gull	8.15	32s	32			
55	02/09/2010	2	55	07.30-10.30	Raven	8.42	50s		50		
56	02/09/2010	2	56	07.30-10.30	Curlew	8.49	50s	10	40		
57	02/09/2010	2	57	07.30-10.30	Common Gull	9.16	29s		29		10 Birds

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
58	02/09/2010	2	58	07.30-10.30	Lesser Black Backed Gull	9.31	17s		17		
59	02/09/2010	2	59	07.30-10.30	Common Gull	9.36	120s		120		
60	02/09/2010	2	60	07.30-10.30	Lesser Black Backed Gull	9.54	32s		32		
61	02/09/2010	2	61	07.30-10.30	Lesser Black Backed Gull	10.25	16s		16		

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Table D.7: Moneypoint Flight Activity Winter 2010 / 2011

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
NOVEMBER											
1	11/11/2010	1	1	07.30-09.30	Jackdaw	07.43	20s		20		
2	11/11/2010	1	2	07.30-09.30	Hooded Crow	07.44	20s	20			
3	11/11/2010	1	3	07.30-09.30	Hooded Crow	07.46	20s		20		
4	11/11/2010	1	4	07.30-09.30	Rook	07.49	20s	20			
5	11/11/2010	1	5	07.30-09.30	Rook	07.54	60s		20		10 birds
6	11/11/2010	1	6	07.30-09.30	Common Gull	08.23	30s	30			
7	11/11/2010	1	7	07.30-09.30	Starling	08.24	10s		10		
8	11/11/2010	1	8	07.30-09.30	Common Gull	08.26	60s		60		
9	11/11/2010	1	9	07.30-09.30	Cormorant	08.38	20s		20		
10	11/11/2010	1	10	07.30-09.30	Black Headed Gull	08.41	37s		37		
11	11/11/2010	1	11	07.30-09.30	Cormorant	08.53	5s		10		
12	11/11/2010	1	12	07.30-09.30	Rook	09.02	10s		10		
13	11/11/2010	1	13	09.30-11.30	Cormorant	09.12	30s		30		
14	11/11/2010	2	14	09.30-11.30	Lesser Black Backed Gull	09.44	40s		40		
15	11/11/2010	2	15	09.30-11.30	Hooded Crow	09.48	15s	15			
16	11/11/2010	2	16	09.30-11.30	Starling	09.59	10s	10			100
17	11/11/2010	2	17	09.30-11.30	Common Gull	10.06	60s		60		10
18	11/11/2010	2	18	09.30-11.30	Starling	10.12	10s	10			100

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
19	11/11/2010	2	19	09.30-11.30	Common Gull	10.17	10s	10			
20	11/11/2010	2	20	09.30-11.30	Lapwing	10.41	15s		15		40
21	11/11/2010	2	21	09.30-11.30	Lapwing	10.48	10s		10		
22	11/11/2010	2	22	09.30-11.30	Starling	10.55	10s	10			
23	11/11/2010	2	23	09.30-11.30	Black Headed Gull	10.57	30s	30			
24	11/11/2010	3	24	11.45-13.45	Starling	11.47	30s		30		
25	11/11/2010	3	25	11.45-13.45	Lapwing	11.49	15s		15		
26	11/11/2010	3	26	11.45-13.45	Lapwing	12.15	15s		15		20
27	11/11/2010	3	27	11.45-13.45	Common Gull	12.28	20s		20		85
DECEMBER											
28	15/12/2010	1	1	08.15-10.15	Cormorant	08.33	10s	10			6 birds
29	15/12/2010	1	2	08.15-10.15	Jackdaw	08.36	10s	10			Flock of 30
30	15/12/2010	1	3	08.15-10.15	Hooded Crow	08.44	15s		15		
31	15/12/2010	1	4	08.15-10.15	Lesser Black Backed Gull	08.46	5s		5		
32	15/12/2010	1	5	08.15-10.15	Rook	08.48	101s		101		2 birds
33	15/12/2010	1	6	08.15-10.15	Black Headed Gull	08.51	54s	54			
34	15/12/2010	1	7	08.15-10.15	Jackdaw	08.58	47s	47			
35	15/12/2010	1	8	08.15-10.15	Common Gull	09.08	10		10		
36	15/12/2010	1	9	08.15-10.15	Lesser Black Backed Gull	09.10	11s		11		
37	15/12/2010	1	10	08.15-10.15	Common Gull	09.17	86s		86		

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
38	15/12/2010	1	11	08.15-10.15	Lesser Black Backed Gull	09.43	80s		80		
39	15/12/2010	1	12	08.15-10.15	Starling	09.47	10s	10			
40	15/12/2010	1	13	08.15-10.15	Grey Heron	09.48	41s	41			
41	15/12/2010	1	14	08.15-10.15	Black Headed Gull	09.49	45s		45		
42	15/12/2010	2	15	10.20-12.20	Jackdaw	10.29	20s		20		14 birds
43	15/12/2010	2	16	10.20-12.20	Jackdaw	10.33	10s	10			
44	15/12/2010	2	17	10.20-12.20	Lapwing	10.35	20s	20			10 birds
45	15/12/2010	2	18	10.20-12.20	Black Headed Gull	10.45	35s		35		
46	15/12/2010	2	19	10.20-12.20	Hooded Crow	10.53	28s	28			
47	15/12/2010	2	20	10.20-12.20	Raven	10.57	5s		5		2 birds
48	15/12/2010	2	21	10.20-12.20	Curlew	11.06	16s	16			
49	15/12/2010	2	22	10.20-12.20	Curlew	11.09	31s		31		22 birds
50	15/12/2010	2	23	10.20-12.20	Lapwing	11.21	10s	10			15 birds
51	15/12/2010	2	24	10.20-12.20	Lapwing	11.25	20s	20			25 birds
52	15/12/2010	2	25	10.20-12.20	Lapwing	12.05	38s		38		7 birds
53	15/12/2010	3	26	12.20-14.20	Lapwing	12.33	14s		14		
54	15/12/2010	3	27	12.20-14.20	Black Headed Gull	12.36	10s	10			
55	15/12/2010	3	28	12.20-14.20	Curlew	12.41	31s	31			5 birds
56	15/12/2010	3	29	12.20-14.20	Curlew	13.14	27s	27			
57	15/12/2010	3	30	12.20-14.20	Lapwing	13.22	27s		27		30 birds

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
58	15/12/2010	3	31	12.20-14.20	Curlew	13.29	55s		55		30 birds
59	15/12/2010	3	32	12.20-14.20	Lapwing	13.29	55s		55		40 birds
60	15/12/2010	3	33	12.20-14.20	Black Headed Gull	14.04	78s		78		
JANUARY											
61	27/01/2011	1	1	08.30-10.30	Lesser Black Backed Gull	08.39	47s		47		
62	27/01/2011	1	2	08.30-10.30	Hooded Crow	08.41	31s	31			
63	27/01/2011	1	3	08.30-10.30	Raven	09.07	77s		77		
64	27/01/2011	2	4	11.15-13.15	Lapwing	11.26	75s		75		
65	27/01/2011	2	5	11.15-13.15	Curlew	11.31	20s	20			51 birds
66	27/01/2011	2	6	11.15-13.15	Merlin	11.43	30s	30			
67	27/01/2011	2	7	11.15-13.15	Lapwing	11.48	30s		30		150 flock
68	27/01/2011	2	8	11.15-13.15	Sparrowhawk	12.30	30s	30			
69	27/01/2011	2	9	11.15-13.15	Curlew	12.59	43s		43		80 birds
70	27/01/2011	2	10	11.15-13.15	Grey Heron	13.06	26s		26		
71	27/01/2011	3	11	13.20-15.20	Curlew	13.24	34s		34		30 birds
72	27/01/2011	3	12	13.20-15.20	Cormorant	13.43	11s		11		
73	27/01/2011	3	13	13.20-15.20	Sparrowhawk	14.03	15s	15			
74	27/01/2011	3	14	13.20-15.20	Sparrowhawk	14.20	20s		20		Female
FEBRUARY											
75	22/02/2011	1	1	09.45-11.45	Hooded Crow	10.15	33s		33		

Bout	Date	VP	Flightline	Period	Species	Start	Time	<10	10-100	>100	Notes
76	22/02/2011	1	2	09.45-11.45	Black Headed Gull	10.27	72s		72		
77	22/02/2011	1	3	09.45-11.45	Peregrine	10.31	10s		10		
78	22/02/2011	1	4	09.45-11.45	Great Black Backed Gull	10.54	77s		77		
79	22/02/2011	1	5	09.45-11.45	Raven	10.55	20s		20		
80	22/02/2011	1	6	09.45-11.45	Herring Gull	11.20	20s		20		
81	22/02/2011	1	7	09.45-11.45	Sparrowhawk	11.24	20s	20			
82	22/02/2011	1	8	09.45-11.45	Raven	11.36	10s		10		
83	22/02/2011	2	9	11.51-13.51	Hooded Crow	11.51	30s		30		
84	22/02/2011	2	10	11.51-13.51	Redwing	12.12	24s		24		23 birds
85	22/02/2011	2	11	11.51-13.51	Snipe	12.23	30s		30		2 birds
86	22/02/2011	2	12	11.51-13.51	Sparrowhawk	12.55	10s	10			
87	22/02/2011	3	13	14.00-16.00	Starling	14.25	20s	20			100 birds
88	22/02/2011	3	14	14.00-16.00	Rook	14.34	25s		25		
89	22/02/2011	3	15	14.00-16.00	Curlew	14.40	20s		20		
90	22/02/2011	3	16	14.00-16.00	Rook	15.10	10s		10		60-70 birds
91	22/02/2011	3	17	14.00-16.00	Great Black Backed Gull	15.20	24s	24			
92	22/02/2011	3	18	14.00-16.00	Black Headed Gull	15.22	31s		31		3 birds

Table D.8: Moneypoint I-WeBS Surveys Autumn 2010 & November 2010 - February 2011

Species	Scientific Name	Autumn 2010				Winter 2010 / 2011			
		Section A	Section B	Section C	Totals	November	December	January	February
Black Guillemot	<i>Cephus grylle</i>	-	-	-	-	0	0	0	1
Black Headed Gull	<i>Larus ridibundus</i>	48	0	1	49	49	0	20	8
Common Gull	<i>Larus canus</i>	3	0	15	18	18	2	2	2
Common Sandpiper	<i>Actitis hypoleucos</i>	0	0	1	1	1	0	0	0
Cormorant	<i>Phalacrocorax carbo</i>	2	14	0	16	16	0	2	2
Curlew	<i>Numenius arquata</i>	7	1	3	11	11	4	85	11
Dunlin	<i>Calidris alpina</i>	0	0	10	10	10	0	2	0
Glaucous Gull	<i>Larus hyperboreus</i>	0	0	1	1	1	0	0	0
Great Crested Grebe	<i>Podiceps cristatus</i>	-	-	-	-	0	4	6	3
Great Northern Diver	<i>Gavia immer</i>	-	-	-	-	0	0	1	1
Greenshank	<i>Tringa nebularia</i>	2	0	0	2	2	0	2	0
Grey Heron	<i>Ardea cinerea</i>	1	0	2	3	3	1	0	0
Lesser Black Backed Gull	<i>Larus fuscus</i>	2	0	1	3	3	0	0	0
Lapwing	<i>Vanellus vanellus</i>	0	0	2	2	2	48	31	0
Little Egret	<i>Egretta garzetta</i>	3	1	0	4	4	0	0	0
Mallard	<i>Anas platyrhynchos</i>	-	-	-	-	0	0	1	2
Mediterranean Gull	<i>Larus melanocephalus</i>	2	0	0	2	2	0	0	0

Species	Scientific Name	Autumn 2010				Winter 2010 / 2011			
		Section A	Section B	Section C	Totals	November	December	January	February
Mute Swan	<i>Cygnus olor</i>	2	0	0	2	2	0	0	0
Oystercatcher	<i>Haematopus ostralegus</i>	1	3	2	6	6	13	26	15
Razorbill	<i>Alca torda</i>	-	-	-	-	0	0	0	1
Red Breasted Merganser	<i>Mergus serrator</i>	-	-	-	-	0	1	0	0
Redshank	<i>Tringa totanus</i>	9	0	0	9	9	2	2	9
Ringed Plover	<i>Charadrius hiaticula</i>	0	0	31	31	31	0	14	0
Shelduck	<i>Tadorna tadorna</i>	-	-	-	-	0	0	1	0
Teal	<i>Anas crecca</i>	5	0	0	5	5	0	35	0
Turnstone	<i>Arenaria interpres</i>	0	0	20	20	20	3	11	21
Wigeon	<i>Anas penelope</i>	-	-	-	-	0	0	24	0

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Table D.9: Total Species Recorded at Moneypoint in Autumn 2010

Common Name (Scientific Name)	Common Name (Scientific Name)
Black Headed Gull (<i>Larus ridibundus</i>)	Lesser Black Backed Gull (<i>Larus fuscus</i>)
Blackbird (<i>Turdus merula</i>)	Linnet (<i>Carduelis cannabina</i>)
Blue Tit (<i>Parus caeruleus</i>)	Little Egret (<i>Egretta garzetta</i>)
Chiffchaff (<i>Fringilla coelebs</i>)	Magpie (<i>Pica pica</i>)
Collared Dove (<i>Streptopelia decaocto</i>)	Mediterranean Gull (<i>Larus melanocephalus</i>)
Common Gull (<i>Larus canus</i>)	Mute Swan (<i>Cygnus olor</i>)
Common Sandpiper (<i>Actitis hypoleucos</i>)	Oystercatcher (<i>Haematopus ostralegus</i>)
Cormorant (<i>Phalacrocorax carbo</i>)	Pied Wagtail (<i>Motacilla alba</i>)
Curlew (<i>Numenius arquata</i>)	Raven (<i>Corvus corax</i>)
Dunlin (<i>Calidris alpina</i>)	Ringed Plover (<i>Charadrius hiaticula</i>)
Glaucous Gull (<i>Larus hyperboreus</i>)	Robin (<i>Erithacus rubecula</i>)
Goldfinch (<i>Carduelis carduelis</i>)	Rook (<i>Corvus frugilegus</i>)
Greenshank (<i>Tringa nebularia</i>)	Sparrowhawk (<i>Accipiter nisus</i>)
Grey Heron (<i>Ardea cinerea</i>)	Starling (<i>Sturnus vulgaris</i>)
Grey Wagtail (<i>Motacilla cinerea</i>)	Swallow (<i>Hirundo rustica</i>)
Hooded Crow (<i>Corvus cornix</i>)	Teal (<i>Anas crecca</i>)
House Martin (<i>Delichon urbica</i>)	Turnstone (<i>Arenaria interpres</i>)
House Sparrow (<i>Passer domesticus</i>)	Willow Warbler (<i>Phylloscopus trochilus</i>)
Jackdaw (<i>Corvus monedula</i>)	Woodpigeon (<i>Columba palumbus</i>)
Kestrel (<i>Falco tinnunculus</i>)	Wren (<i>Troglodytes troglodytes</i>)
Lapwing (<i>Vanellus vanellus</i>)	

Table D.10: Moneypoint Total Species List for Winter 2010/2011 Survey

Common Name (Latin Name)	Common Name (Latin Name)
Bullfinch (<i>Pyrrhula pyrrhula</i>)	Magpie (<i>Pica pica</i>)
Blackbird (<i>Turdus merula</i>)	Mallard (<i>Anas platyrhynchos</i>)
Black Guillemot (<i>Cepphus grylle</i>)	Meadow Pipit (<i>Anthus pratensis</i>)
Black Headed Gull (<i>Larus ridibundus</i>)	Mediterranean Gull (<i>Larus melanocephalus</i>)
Collared Dove (<i>Streptopelia decaocto</i>)	Merlin (<i>Falco columbarius</i>)
Common Gull (<i>Larus canus</i>)	Mute Swan (<i>Cygnus olor</i>)
Common Sandpiper (<i>Actitis hypoleucos</i>)	Oystercatcher (<i>Haematopus ostralegus</i>)
Cormorant (<i>Phalacrocorax carbo</i>)	Peregrine (<i>Falco peregrinus</i>)
Chaffinch (<i>Fringilla coelebs</i>)	Pied Wagtail (<i>Motacilla alba</i>)
Glaucous Gull (<i>Larus hyperboreus</i>)	Raven (<i>Corvus corax</i>)
Curlew (<i>Numenius arquata</i>)	Razorbill (<i>Alca torda</i>)
Dunlin (<i>Calidris alpina</i>)	Ringed Plover (<i>Charadrius hiaticula</i>)
Dunnock (<i>Prunella modularis</i>)	Reed Bunting (<i>Emberiza schoeniclus</i>)
Fieldfare (<i>Turdus pilaris</i>)	Redshank (<i>Tringa totanus</i>)
Goldcrest (<i>Regulus regulus</i>)	Red Breasted Merganser (<i>Mergus serrator</i>)
Goldfinch (<i>Carduelis carduelis</i>)	Redwing (<i>Turdus iliacus</i>)
Great Northern Diver (<i>Gavia immer</i>)	Robin (<i>Erithacus rubecula</i>)
Great Crested Grebe (<i>Podiceps cristatus</i>)	Rook (<i>Corvus frugilegus</i>)
Great Tit (<i>Parus Major</i>)	Shelduck (<i>Tadorna tadorna</i>)
Greenshank (<i>Tringa nebularia</i>)	Snipe (<i>Gallinago gallinago</i>)
Grey Heron (<i>Ardea cinerea</i>)	Starling (<i>Sturnus vulgaris</i>)
House Sparrow (<i>Passer domesticus</i>)	Stonechat (<i>Saxicola torquata</i>)
Hooded Crow (<i>Corvus cornix</i>)	Sparrowhawk (<i>Accipiter nisus</i>)
Jackdaw (<i>Corvus monedula</i>)	Teal (<i>Anas crecca</i>)
Lapwing (<i>Vanellus vanellus</i>)	Turnstone (<i>Arenaria interpres</i>)
Lesser Black Backed Gull (<i>Larus fuscus</i>)	Wigeon (<i>Anas penelope</i>)
Little Egret (<i>Egretta garzetta</i>)	Woodpigeon (<i>Columba palumbus</i>)
Long Tailed Tit (<i>Aegithalos caudatus</i>)	