



## MAYO WIND ENERGY STRATEGY.



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## ***PREFACE***

Environmental Resources Management Ireland Limited (“ERM”) in association with ERA-Maptec Ltd was commissioned by Mayo County Council to prepare an *Integrated Wind Energy Strategy* for the County. The objective of the study was to review and identify geographic areas of the county that would be deemed suitable for the siting of wind energy developments in a manner that safeguards both environmental issues and landscape and visual amenity.

### ***TERMS OF REFERENCE.***

The specific terms of reference or scope of works to be carried out by ERM was as follows:

- Comment on the national and local environmental and policy designations that apply to the County;
- Comment on relevant studies undertaken specifically for Mayo County together with current relevant policies and strategies namely the following;
  - *Wind capability study for County Mayo undertaken by ESB International in the year 2000.*
  - *The Mayo County Development Plan 2003-2009 - Landscape Appraisal of County Mayo.*
  - *Wind Energy Atlas prepared by Sustainable Energy Ireland in 2004*
  - *Wind Energy Planning Guidelines June 2006 published by the DoEHLG.*
- Review of the principal environmental constraints and analysis of same as a basis for identifying ‘strategic search areas’ under the following headings;
  - *Designated Sites, specifically those designated as SACs, NHAs, and SPAs which form a major factor in any assessment of suitable areas for windfarm development.*
  - *Archaeology and cultural heritage.*
  - *Landscape and visual amenity.*

### ***REPORT STRUCTURE.***

The report is subdivided into five sections:

- Section 1: Introduction
- Section 2: Policy Background
- Section 3: Studies conducted to date in Mayo County
- Section 4: Capacity Study
- Section 5: Proposed Strategy

Methodologies and particular study findings are supported by illustrative figures:

Figure 1, 1b, 1c:	Wind Resource for Mayo County
Figure 2:	Natural Heritage Designations
Figure 3:	CORINE Land Cover
Figure 4:	Built Heritage
Figure 5:	Landscape Protection Policy Areas
Figure 6, 6b:	Landscape Character Units
Figure 7:	Scenic Routes and Protected Views
Figure 8:	Environmental Constraints to Wind Energy Development
Figure 9:	Capacity Study

*Mayo County Council has updated the work carried out by ERM and has inserted some new Sections into the original text as required only to elaborate on the Strategy as proposed by ERM.*

# **1 INTRODUCTION.**

## **1.1 Growth of Wind Power.**

The contribution of wind power to electricity generation is a rapidly expanding one. From 2,500 MW in 1992 to over 40,000 MW by the end of 2003, the global industry has grown at a rate of over 30% per year. Almost 75% of this capacity (30,000 MW) has been installed in Europe, this figure is expected to exceed 1.2 million MW by the year 2020

Penetration levels in the electricity sector have reached over 20% in Denmark. The Northern German State of Schleswig-Holstein meets 30% of the regions total electricity needs using 1,800 MW of installed wind power. The Navarre region of Northern Spain produces 50% of it's electricity (over 700 MW generating capacity installed) from wind power.

Wind energy is already competing with conventional generation and will continue to do so with fairer market conditions, access to grids and fairer competition rules. Over the past ten years wind power capacity has been expanding at an annual rate averaging more than 30%. In contrast, the nuclear industry is growing at a rate of less than 1% whilst coal has not grown at all since the late 1980's and in Ireland is falling.

In 2006 Ireland had 741 MW of wind power plant (installed and committed) in an electricity system whose total capacity exceeds 6524 MW. Clearly there is room for growth. (some indication of the scale of development is given in Section 2.1.2 below. Government reports estimate that up to 50% of our electricity consumption being provided for by wind energy is a realistic target.

The number and size of turbines required to reach the national targets will increase almost exponentially in view of the fact that turbine do not and cannot operate at their theoretical Maximum Output. Recent UK research has established that most sites were built on expected capacity factors of around 30% (*the Capacity Factor is the Actual Output / Theoretical Maximum Output and is a reflection of wind resource*). The best performing wind sites are in the north of Scotland, and on Shetland (with a wind regime similar to Mayo) are only producing capacity factors of over 50%. Thus it will take a greater number of turbines to produce the national target than simply judging it by installed capacity.

## **1.2 Potential for growth in Mayo.**

At present there is an installed capacity of 28.55MW in County Mayo. Since 1992 with the opening of the country's first windfarm at Bellacorrick there has been considerable interest in wind farm development in Mayo.

<b>Application Status</b>	<b>Number of Applications</b>
Grant with Conditions	9
Grant with no Conditions	1
Refuse	16
Further Information	2
Undecided	2
Withdrawn	3
Incomplete	8
<b>Total</b>	<b>41</b>

In all there has been 41 applications for windfarms as can be seen the above table 10, have been granted permission and 16 have been refused. The spatial distribution reflects the fact that most of the applications in the Upland, Moors Heath or Bogs and in the Montaine Coastal Area have been unsuccessful.

The main reasons cited by both the Council and An Bord Pleanala in the applications refused in the Uplands are:

- Ecological.....*proximity to SAC and designated areas*  
*adverse impacts on ecology*  
*adverse impacts on avian species*
- Adverse impact on the landscape due to elevated location
- Material Contravention of Mayo County Development Plan with regard to policies on protection of landscape and natural heritage
- Interference with aircraft safety
- Premature pending the preparation of a Wind Energy Strategy.

Conversely the level of permissions granted is higher in the Drumlins and Inland Lowlands in the eastern part of the county where such issues do not arise or there are better opportunities to mitigate any such impacts.

## **2 POLICY BACKGROUND.**

### **2.1.1 International Policy Context.**

The development of renewable energy, including wind energy, is one of the main ways of mitigating global climate change, in particular in the control and reduction of Greenhouse Gases (GHGs). Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total emissions in the period 2008–12. The EU has an overall reduction target of 8% below 1990 levels and agreed a burden sharing agreement that recognises the different economic circumstances of each member state. Ireland's target is to limit the increase in the basket of greenhouse gases under the Kyoto Protocol to +13% over 1990 levels by the period 2008-2012. EU Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market which required Ireland to generate 13.2% of its electricity from renewable sources by 2010. This target was increased by Government to 15%.

### **2.1.2 National Policy Context.**

Wind energy developments have been steadily increasing, the “Green Paper on Sustainable Energy” published in 1999 set an interim target for 2000-2005 of 500MW installed capacity (almost entirely wind power) in January 2007 there was a total installed capacity of 740MW of which 25MW are Offshore.

The “Green Paper *“Towards A Sustainable Energy Future for Ireland”* of October 2006 envisages that the target of 15% of energy coming from renewable sources by 2010 is a stepping stone to a target of 30% by 2020

Wind power generation is expected to be the major contributor to meeting the renewable energy targets. The 15% target can be achieved with approximately 1,300 MW of wind power generation installed by 2010. The EirGrid *“Transmission Forecast Statement 2006-2012”* estimates that the total for wind farms connected, those with signed connection agreements and those with live connection offers is 1,281 MW suggesting that the 13.2% target is likely to be surpassed before 2010. There are a further 202 applications for wind farm connections totalling 3,076 MW under consideration.

The latest data available indicates that the country's greenhouse gas emissions in 2004 were 23.1% higher than in 1990. From the wind energy perspective it should be noted that greenhouse gas emissions from energy industries in 2004 were almost 35% above 1990 levels, but a downward trend is evident since 2001. Sustained economic growth has resulted in the primary energy consumption increasing by 58% since 1980, and is projected to increase in line with economic growth by a further 37% by 2010. Viewed in the light of the fact that the national Transmission Forecast Statement 2006-2012 anticipates a 3.7% growth in peak demand per annum over that period renewable energy is a priority.

It is widely acknowledged that Ireland is among the richest in Europe in terms of its wind resource. However, the harnessing of same in recognition of the need to produce clean energy poses potential conflicts with both environmental considerations and matters relating to landscape quality.

### **2.1.3 Sustainable Energy Ireland.**

SEI, the national energy authority promotes and assists the supply of energy in an environmentally and economically sustainable manner. The promotion and technology research associated with wind energy is a part of the overall brief carried by SEI. In 2003, a wind atlas for the whole of Ireland was released and records, for each county, the available wind resource. The wind atlas was used to inform this study.

### **2.1.4 Wind Energy Planning Guidelines.**

The Department of the Environment Heritage and Local Government published Wind Energy Development Guidelines in 2006 for the purpose of guiding Local Authorities in the preparation of a strategy or plan led approach towards the sensitive siting of these developments. This *Integrated Wind Energy Strategy* has been prepared in accordance with the principles set out in Chapter 3 of the guidelines.

## **2.2 COUNTY POLICY CONTEXT.**

### **2.2.1 General**

The County policy is committed to the preparation of a wind energy strategy as outlined in policy item **T1-RE3** in fulfilment of its overall objective to support the National Climate Change Strategy. Specifically this policy states the following:

*'It is an objective of the Council to commence, as a matter of immediate priority, the preparation of a Wind Energy Strategy for the County.'*

### **2.2.2 Recreation and Amenity**

The aspirations for renewable energy must be balanced with the requirements to preserve natural resources throughout the County as amenity assets as outlined in the County Plan Policy as follows.

**HC-RA10** which states *'It is an objective of the Council to preserve the major natural amenities of the County and to provide parks and open spaces in association with them and to enhance their recreational, amenity and conservation value.'*

**HC-RA11** which states *'It is an objective of the Council to protect and preserve the public rights of way and access to traditional outdoor amenities and heritage including rivers, the shore-line and marine resources'*

Specific reference is made to the islands and the preservation of their form and character as outlined in policy **HC-IS3** which states the following;

*'It is an objective of the Council to ensure that new development is sympathetic to the form and character of the landscapes and traditional building patterns of individual islands and has regard to the need to protect designated conservation areas.'*



### 2.2.3 Policy on Landscape

The County Development Plan policy in regard to the protection and enhancement of Mayo Landscapes is referenced in Policy Objectives quoted below;

Policy **EH-LC1** which states *'It is an objective of the Council, through the Landscape Appraisal of County Mayo contained in appendix 6, to recognise and facilitate appropriate development in a manner that has regard to the character and sensitivity of the landscape, to ensure that development that will not have a disproportionate effect on the existing or future character of a landscape in terms of location, design and visual prominence, that development will have regard to the effects of developments on views from the public realm towards sensitive or vulnerable features or areas.'*

Policy **EH-LC2** which states *'It is an objective of the Council that all development in the County shall be considered in the context of the policies set out for the four Principal Policy Areas defined in Landscape Appraisal of County Mayo, provided such policies do not conflict with the specific objectives of this County Development Plan. These areas are described as Montaine Coastal, Lowland Coastal, Uplands, Moors, heath or bogs, drumlins, Lowlands and Lakeland sub areas'*

*Appendix X Landscape Appraisal of County Mayo prepared as part of the, County Development Plan 2003 – 2009, analyses the landscape of the county under four headings as follows:*

- **Identification of landscape character units.** The County is subdivided into 16 parcels of landscape, defined by the physical characteristics that contribute or define their character.
- **Determination of Landscape Sensitivities.** The sensitivity of the different landscape types in terms of accommodating development, including windfarms is identified. In this regard, areas are designated as vulnerable, sensitive, normal, robust or degraded. In addition, scenic routes and scenic vistas are identified.
- **Definition of Principal Policy Areas.** This relates to the grouping of landscape character units that have similarity of landscape types. Four such categories were identified for Mayo County as follows;
  - *Montaine Coastal*
  - *Lowland Coastal*
  - *Uplands, moors, heath or bog*
  - *Drumlins and lowlands*
- **Policy Responses.** Each Principal Policy area is evaluated for its robustness or sensitivity to development, including wind farms. A landscape policy is presented together with a sensitivity rating in respect of the impact of development on Landscape. The landscape sensitivity measure is based on the eight most common development types (including windfarms) that currently affect Mayo Landscapes.

#### **2.2.4 Policy on Natural Heritage**

Specific policy for the protection of Natural Heritage is outlined in the County Development Plan. Policy objective **EH-NH 1** states: *'It is an objective of the Council to protect, enhance and conserve areas designated as candidate Special Areas of Conservation, Special Protection Areas and proposed National Heritage Areas listed in Appendix 5 or any additional such areas that may be so designated during the lifetime of the plan.'*

The County Development Plan also sets out specific policy in regard to the protection of the National Park at Ballycroy. Policy Objective, **EH-NH 6** states *' It is an objective of the Council to use the powers available to the Planning Authority to ensure that the unique ecological, scenic, recreational and environmental character of the National Park is protected and enhanced to prohibit any development which would impair its character as a National Park.'*

The Development Plan also undertakes to “protect, enhance and conserve certain areas of bog and fen” not designated statutory protection (see Appendix V, Table 5.4) as well as natural habitats listed under the Habitats Directive, Birds Directive, Wildlife Act and the Flora Protection Order that also include peatlands.

### 3 **PREVIOUS STUDIES.**

#### 3.1 **WIND RESOURCE ESBI (2000).**

ESB International was commissioned by Mayo County Council in 2000 to evaluate the wind resource for the county. The report outlining the study findings can be summarised as follows;

Wind data was gathered on the basis of a grid measuring 1 kilometre to the square at an assumed turbine hub height of 45 metres above ground level. Wind speed was measured in terms of the 'theoretical energy resource' and the wind speed data used were derived from meteorological records held for the whole of Ireland and took into account topography and surface roughness as determined by the type of landcover (forestry, grassland, heath etc) found throughout the county. The results of the exercise amounted to a mean windspeed of 6.5 to 7metres per second or greater for the whole county with windspeeds in the range of 8 – 10 m per second in the upland and coastal areas.

Areas that were deemed physically unsuitable for wind energy development were omitted from the '*theoretical energy resource*' to give rise to the '*feasible energy resource*' based on the following criteria:

- 100m wide buffer zone along linear features such as principal roads, railways, rivers, electricity transmission and distribution lines.
- 400m buffer zone around cities, towns and settlements
- 6km buffer zone around airports.

The '*feasible energy resource*' was further examined in order to identify and eliminate areas for wind farm development based on factors relating to safety and environmental impact. The resulting '*accessible energy resource*' was thus defined and excluded the following:

- National Parks
- Natural Heritage Areas, Special Areas of Conservation and Special Protection Areas
- 300m zone from edge of road route in respect of securing driver safety
- 500m zone inland of coastline in respect of conserving scenic quality
- 500m zone around lakes in respect of conserving scenic quality

Finally, the '*practicable energy resource*' was derived from the feasible energy resource and relates to geographic areas in which it is economically feasible to develop wind energy and within which the electricity system is deemed suitable for the development or indeed poses no constraints to development. The measurement of the 'practicable energy resource' was based on a minimum required wind speed of 8m/s. In summary, much of the County is recorded as having an 'economic windspeed of 8m/s (Vestas 660KW)'

### **3.2     *WIND RESOURCE – SUSTAINABLE ENERGY IRELAND (2003).***

The assessment of the wind resource, at national level, undertaken by SEI in 2003 presents geographically, the economically viable wind resource for each county in the form of a wind atlas.

This study represents meaningful progress forward from previous ESBI studies as it provides information in a user friendly graphic format to assist the developer in choosing a suitable location for a wind farm. Specifically, the critical information presented in the wind atlas related to locations and access to the electricity grid together with measurement of windspeed at varying heights above ground level.

## **4 CAPACITY STUDY.**

### **4.1 METHODOLOGY.**

The methodology adopted for this study is largely derived from the Wind Energy Planning Guidelines issued by the Department of the Environment, Heritage and Local Government referred to above. Reference is made to both environmental policy as enshrined in the Mayo County Development Plan together with specific policy for landscape as set out in the Landscape Appraisal Annex of the County Plan.

### **4.2 WIND RESOURCE.**

An evaluation of the wind resource for Mayo County is presented in mapped figures as part of this report. The data, abstracted from the Wind Atlas 2003 prepared by Sustainable Energy Ireland (SEI) illustrates the '*constrained wind resource*' for the county at 100m, 75m and 50m above ground level. The '*constrained wind speed*' is presented on a county map and highlights the geographic areas in Mayo County in which the windspeeds are sufficient for the harnessing of wind energy. These geographic areas which are deemed economically viable have a minimum windspeed of 8 metres per second at 50m, 75m and 100m height above ground level. In addition these areas are judged to have adequate infrastructure (in terms of electricity) for the harnessing of wind energy.

### **4.3 HERITAGE RESOURCE.**

An overview of the heritage resource for the County is presented in the context of the potential constraints arising that may restrict or prohibit wind energy developments. This focused heritage appraisal is conducted as a desk study and covers specific disciplines as follows;

- Terrestrial ecology (land based habitats)
- Water resources
- Built heritage and Archaeology
- Landscape

Constraints presented under the aforementioned headings seek to identify, in the first instance, areas of the County that would be deemed unsuitable for wind energy development. In respect of areas identified as potentially suitable for wind energy development, qualitative field surveys were conducted for the purpose of ascertaining the physical quality of the landscape and the heritage resource.

The findings of the field surveys combined with the desk study provide clear guidance as to the geographically specific areas of the county that are be more capable of accommodating wind energy developments than others.

### **4.4 TERRESTRIAL ECOLOGY.**

Wind farm developments have the potential to significantly impact upon ecological resources and natural heritage. The main natural heritage sensitivities identified in County Mayo relate to impacts on certain designated sites i.e. SAC's, NHA's and National Parks. County Mayo is home to 52 SACs, 16 SPAs and 101 NHAs. There is one National Park and two Nature Reserves. Something in the region of 35% of County Mayo is designated for conservation of

which approximately 75% is onshore. The majority of statutory designated sites in Mayo are located in the western half of the county and are predominantly associated with the land cover given over to Atlantic Blanket Bog.

Atlantic Blanket Bog is a **priority habitat** as set out in Annex 1 of *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora* (the Habitats Directive).

Almost 80% of designated areas lie within the western half of the county as indicated in Figure 2: Natural Heritage Designations. Peatbog accounts for approximately 48% of the designated conservation areas in Mayo.

The County Development Plan, as described above in section 2.2.4, has set out clear objectives with respect to the protection and conservation of designated sites. To further underpin these objectives these policies were respected in the ESBI report (2000) on Wind farms in County Mayo recommended the exclusion of wind farm developments from areas protected by statutory designation. The Wind Energy Planning Guidelines do not preclude wind farm development in areas that are subject to environmental designation. In this regard, the guidelines recommend that policy guidance and objectives set out in the County Development Plan ought to be observed in the planning of a wind farm.

Furthermore, the potential adverse impacts of wind farm developments are not specific to certain sites that have been designated a protective status within an arbitrary boundary. The ecological composition of a sensitive site must be evaluated in the wider context to reflect broader areas that may be subject to cumulative impacts.

The Landscape Appraisal for County Mayo identifies areas as being vulnerable to development, including wind farm development. Typically these areas, designated vulnerable due to their intact character, are also areas of high ecological value. The Atlantic Blanket Bogs that dominate the land cover of much of the west of County Mayo are an example, of an area chosen as vulnerable in the Landscape Appraisal and also very sensitive to wind farm development on an ecological level. The combined ecological and landscape sensitivity of these sites provide a robust argument, for precluding such areas from any wind farm developments. These areas of the County, in particular, exhibit a high scenic quality in landscape terms and contain extensive areas of blanket bog.

A similar methodology to that used for the landscape character assessment can be adopted to identify ecologically sensitive areas. Thus, in designating sites in the broader context, an assessment of different habitat types can be undertaken to evaluate the sensitivity of a habitat to wind farm development. Within this context the predominant “sensitive” habitat in Mayo is represented by the Atlantic Blanket Bog.

Mayo County Council has already identified the importance of this habitat by also undertaking to “protect, enhance and conserve certain areas of bog and fen” not designated statutory protection (see Appendix V, Table 5.4) as well as natural habitats listed under the Habitats Directive, Birds Directive, Wildlife Act and the Flora Protection Order that also include peatlands (Mayo CDP, Objective EH – NH 2).

#### ***4.4.1 Ecological Sensitivity of Peatlands.***

A significant constraint for development on peatlands is the depth of the peat layer. Boglands with deeper peat deposits are generally more sensitive to disturbance. While the depth of the peat in Blanket Bogs is generally considered to be shallower than that of raised bogs, the blanket bogs of Mayo represent some of the deepest blanket bogs in the country and are typically over two metres in depth. The extent of bog, mapped to date for the County is presented in Figure 3: CORINE Land Cover. These peat bogs are more vulnerable to irreparable eco-hydrological damage if the integrity of the bog is interfered with. The development of wind farms on areas of deep peat deposits in the western upland areas of Mayo has the potential to impact upon the hydrological regime of the bog, causing the growth of the bog to stagnate and ultimately affecting the robustness of the habitat. The infrastructure (i.e. service roads and power lines) associated with wind farm developments can cause the peat to dry out and compact and may eventually destroy the habitat. The laying of turbine foundations may further exacerbate negative impacts to the habitat. The Wind Energy Guidelines specifically recognise that windfarms will generally lead to impacts on natural heritage sites and provide specific guidance on development in peatlands where wind energy development is permitted on peatlands.

In terms of indirect impacts, the fragmentation and eventual drainage of blanket bogs will cause CO<sub>2</sub> to be released into the atmosphere. An intact peat bog sequesters CO<sub>2</sub> and acts as a carbon sink, while emitting methane (CH<sub>4</sub>), a by-product of anaerobic decomposition processes within the bog. The accumulation of carbon and the efflux of methane to the atmosphere roughly cancel each other out in an intact peat bog in terms of contribution to greenhouse gas emissions. However drainage of a peat bog upsets the accumulation of carbon and causes an efflux of CO<sub>2</sub> to the atmosphere as a bi-product of aerobic decomposition. In Ireland over 40% of the peat-land has been modified and drained and is actively decomposing, thus contributing significantly to global warming.

Conservation policy in blanket bog areas is focused on avoiding severance and fragmentation.

The potential for impact from wind farm development was recently demonstrated by the bog slide which occurred near the village of Derrybrien, County Galway in 2003. The bog slide began within the site of a 72 turbine wind farm development on one of the main peaks of the Slieve Aughty Mountains. The site is dominated by blanket peat with average peat thicknesses of around 2 meters, but in some areas depth was recorded at 5.5 metres. Peat slid down-slope for approximately 2.5km and under adverse weather conditions the peat travelled further down along the Derrywee River before entering the nearby Lake. The slide had significant impacts with respect to fish kills and siltation on the river and lake substrate. A report (Lindsay & Bragg, 2004) was commissioned by the local community to investigate the possible causes of the disaster and the following issues were highlighted;

- peat needs to be considered as significantly different in properties and behaviour from most mineral soils,
- forest plantation on peat causes excessive cracking of peat,
- floating roads laid on peat are not a practical option for long-term access,
- need for sympathetic and sensitive water management,
- drainage operations do not necessarily stabilise peat.

The sensitivity of peat to changes in environmental conditions with disastrous consequences has already been experienced in Mayo with the Pollathomais bog slide in 2005 and the considerable public expenditure involved in remediating the situation.

#### **4.5 WATER RESOURCES.**

Wind energy developments and their associated road and drainage networks have the potential for significant effects on hydrology, hydrogeology, water quality, wetland habitat and fisheries. These effects are particularly relevant at construction stage and in upland locations.

As described above Mayo County is home to a significant number of designated sites. Many of these are water resource related. Significant sections of the county are covered by designation including the coastline, lakes and rivers. Groundwater is also of significant importance and has significant association with much of the designated sites in relation to groundwater dependent terrestrial ecosystems.

The range of site characteristics is very broad with whole river systems (River Moy; 002298, 805 km<sup>2</sup>) and shorter sections of rivers such as the Newport River (7km; 002144) under designation. There are also water bodies ranging from the larger lake systems of Conn, Cullin, Corrib and Mask/Carra (000519, 000297 & 001774 respectively) to more smaller systems such as the turloughs in Ardkill and Balla (000461 & 000463 respectively).

The designations were last updated on 31/5/05, however, there are likely to be new or extended sites for protection of the EU Habitats Directive Annex II species, Salmon (in freshwater only) in the near future. It is also important to take into account and make provision for the recognition of new, extended or modified nature conservation sites in the future. The majority of designated sites (including the more likely potential for new designation/extension) reside in the western half of the county as highlighted above in section 4.4.1 and as illustrated in Figure 2. The eastern half of the county has significantly fewer designated sites. Of these, the Moy Catchment is perhaps the most extensive geographically.

As outlined in previous studies (ESBI, 2000) other types of constraints which should be excluded from the “*accessible resource*” for wind farm development have been identified.

A 500m exclusion zone buffering coastlines and lakes for scenic reasons should also take into consideration the potential to impact on the water bodies themselves and in particular with respect to lakes. Exclusion of wind farm development is also recommended for 100m wide buffer zone along linear features such as rivers. The buffer zone of 100m on either side of the river bank represents a corridor for the protection of water quality, habitat etc.). From an overall perspective it is essential in such instances that a combination of criteria are assessed so that a source-pathway-receptor analysis can be carried out. Such criteria would include;

- soil type
- geology
- slope
- risk of slippage
- proximity to receptor.



#### **4.5.1 Water Framework Directive.**

The Water Framework Directive (2000/60 EEC) further defines the strategy framework by providing a regulatory mechanism for river basin management through the European Communities (Water Policy) Regulations 2003 (SI 722 of 2003). The main aim of the directive, in terms of environmental objectives, is to ensure that there is no further deterioration in the status of any waters and that, by 2015, all waters achieve at least *good status* (including good ecological status) or such higher status as is appropriate in the case of protected areas. The status of waters will be determined by water pollution indicators plus a wide range of new criteria based on pressures and impacts arising from aspects such as abstractions, hydromorphological alterations (e.g. navigations, hydropower, flood control), commercial marine fishing activities and invasive aquatic alien species).

The regulations have allowed for the definition of river basin districts which will be responsible for the delivery of respective river basin management plans (RBMP's). County Mayo falls within the scope of the Western River Basin District (WRBD) and the preparations being made with respect to their RBMP. The first stage for the preparation of the RBMP has been to provide an analysis of the characteristics of the various river basin districts including a review of the impact of human activity and the status of waters.

This initial assessment does not address future changes in pressure management. For example, at this early stage it has not been possible to take account of forthcoming changes due to implementation of the National Spatial Strategy, investment in wastewater treatment facilities or agricultural sector reform. As the availability and detail of information improves during the River Basin Management Planning (RBMP) process the implications of future changes in pressures and management measures will be taken into account.

The characterisation studies carried out to date within the WRBD should provide a valuable baseline resource for informing the implementation of the strategy with respect to wind farm development.

#### **4.5.2 Conclusion and Recommendations.**

The Wind Energy Planning Guidelines indicate that the designation of a site under statute for the conservation of natural or geological interests does not necessarily preclude the development of wind energy projects within that site. The guidelines stipulate that an assessment of the impacts of wind energy development on the integrity of a designated site and its natural heritage must be undertaken. The guidelines rationale for permitting developments on designated sites is underpinned by the government's recognition of the strategic importance of large wind farm developments in achieving the aims of the National Climate Change Strategy and compliance with the Kyoto protocol on climate change".

However the EU Habitats Directive (92/43/EEC) state that member states should take appropriate steps to avoid, "*in special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated*" (Article 6, EU Habitats Directive (92/43/EEC)). Furthermore, the Directive imposes restrictions on any developments on sites listed as priority habitats in Annex 1 of the Directive. It stipulates that the only projects that may be considered for development are those relating to human health or public safety, to beneficial consequences of

primary importance for the environment or, further to an opinion from the EU Commission, to other imperative reasons of overriding public interest.

Having regard to the requirements of the Habitats Directive, the Wind Farm Guidelines and the fact that there are alternative sites to location on priority habitats it is proposed not to include designated sites (including future extensions and new designations) as being suitable for wind energy development..

Given the combined potential ecological impact of wind farm developments on both designated and non-designated sites and taking note of the broad spatial distribution of these sites it is recommended that the wind energy strategy focus development attention on the eastern half of the county namely those areas which are largely represented by landscape protection policy areas 3 & 4 from the County Development Plan (See Figure 5.).

This is not to say that wind energy development is completely precluded from all other areas; scale of development could be taken into account to ensure that those projects which come in under the threshold of EIA i.e. 5 or less turbines or 5 or less megawatts power output, be considered as more sustainable. However such developments should be subject to the EIA process and particularly so where impacts are considered “*likely*”.

#### **4.6 BUILT HERITAGE AND ARCHAEOLOGY.**

Legislation relating to built heritage and archaeology is based on the National Monument Acts 1930 to 1994. The Planning and Development Act also requires planning authorities to have regard to designations derived from EU Directives and permits Development Plans to have objectives relating to the preservation and/or protection places of archaeological or historical significance. Mayo County Council has in place a Record of Protected Structures, illustrated in Figure 4: Built Heritage, to protect its built heritage, and this list has been considered and assessed as part of the capacity study.

The Wind Energy Planning Guidelines state that wind farm applications require an archaeological and architectural assessment as part of the planning process. These guidelines do not contain extensive guidance relating to archaeological and architectural heritage.

The impacts pertaining to built heritage and archaeology are generally site specific. However, one may also consider the impact of wind farm developments on cultural or ritual landscapes. These landscapes may be defined as

*‘the combined works of nature and of man and are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal’.*<sup>1</sup>

##### **4.6.1 Constraints within County Mayo.**

In many instances, there is a correlation between areas deemed of high visual sensitivity or landscape sensitivity and cultural heritage. For these reasons, the area and visual catchment around Croagh Patrick, including the Pilgrims route from Ballintubber to Croagh Patrick are excluded in large part due to their cultural and ritual significance to both the population of Mayo and visitors to the area. A second area, already excluded due to ecological and visual

1 UNESCO/ICOMOS, Expert Group 1995

constraints relates to the National Park and Ceide Fields in the north of the County. Bog areas are frequently repositories of artefacts from prehistoric times and are likely to contain a density of yet uncovered artefacts, particularly around the Ceide Fields complex. The Ceide Fields themselves are regarded as an archaeological landscape and as such should be afforded protection from wind farm development.

Elsewhere there are a number of sites and monuments currently under public ownership and guardianship that may be considered of cultural significance and present a current or future tourism resource to County Mayo. These sites are shown in Figure 4 Built Heritage). Whilst the presence of these sites does not necessarily preclude wind farm development, due care should be given to the visual impact of wind farms on the cultural or archaeological landscape surrounding these sites. In 2001, An Bord Pleanála overturned South Tipperary County Council's decision to grant permission for 17 wind turbines at Slieveardagh as *'the development would be visually obtrusive and would significantly detract from the cultural and visual amenity and landscape setting of the medieval Kilcooley Abbey which is a national monument in state care and a protected structure of significant heritage importance'* (Reference 26 126420).

#### **4.6.2 Recommendations.**

The site specific constraints in relation to built heritage may be considered under physical impacts and visual impacts. Mitigation measures are generally proposed at EIS stage and these are presented in *Section 5.1 Mitigation Measures*.

#### *Constraints within the Capacity Areas.*

Due to the general density of archaeological sites throughout the County it is essential that any development is accompanied by an archaeological assessment to ensure that damage to sites is mitigated during the wind farm design process. Figure 4 identifies a number of areas that have particularly high densities of archaeological sites, whilst this does not preclude development, it is recommended that applications within this site demonstrate sound archaeological investigations. Specific attention is drawn to an area located between the settlements of Ballyhaunis, Knock and Kilkelly (hatched in pink on Figure 4) which contains a specific cluster of cashels, souterrains, megalithic tombs and cills. This area is likely to contain further archaeological sites and any proposed development within this area should be subject to significant archaeological scrutiny.

### **4.7 LANDSCAPE.**

#### **4.7.1 Landscape Appraisal – Appendix X Mayo County Development Plan 2003-2009.**

This appendix of the County Development Plan comprises a baseline landscape characterisation of the County and includes a measure of landscapes and their sensitivity to development. This measure of landscape sensitivity is the basis for landscape policy which in turn is presented in the context of **landscape elements** (rivers, lakes, coastline etc) and **landscape policy areas**.

### ***Landscape elements.***

The County Development Plan and annex landscape appraisal draws attention to **‘Areas Designated as Vulnerable’** as follows:

- The coastline
- The shorelines of a range of lakes, rivers and estuaries
- Skylines and ridgelines
- Promontories and headlands

These features are highlighted for their contribution to the ‘character and distinctiveness of the surrounding landscape’ and the policy for that development

*‘To be considered for permission, development in the environs of these vulnerable areas must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings. Particular attention should be given to the preservation of the character and distinctiveness of these areas as viewed from scenic routes and the environs of archaeological and historic sites.’*

Reference is made in the landscape appraisal to **‘Main Areas designated as Sensitive’** and these relate to sensitive landcover types as identified in the CORINE landcover mapping for the County as follows:

- Natural Grassland
- Peat Bogs
- Moors and Heathland
- Transitional Woodland Scrub
- Beaches, Dunes and Sands
- Estuaries
- Broad leaved forest
- Mixed Forest
- Inland and Salt Marshes
- Intertidal Flats
- Water courses/bodies
- Agricultural lands with significant areas of natural vegetation

These areas are judged to have a distinctive homogenous character, dominated by natural processes. Specifically the policy for development stated the following;

*‘Development in these areas has the potential to create impacts on the appearance and character of an extensive part of the landscape. Applications for development in these areas must demonstrate an awareness of these inherent limitations by having a very high standard of site selection, siting layout, selection of materials and finishes.’*

The **‘Areas Designated as Normal’** identified in the landscape appraisal relate to the farmed areas (both arable and tillage) together with the coniferous plantations and the complex mixed cultivation areas. In terms of policy for development, the following is stated;

*‘These areas have a potential to absorb a wide range of new developments subject to normal planning and development control procedures.’*

The ‘**Areas Designated as Degraded**’ relate to areas used for mineral extraction, peat extraction and dumping sites. No specific development policy is identified.

Finally road routes in County Mayo are identified as ‘**Scenic Routes**’ from which views and prospects can be gained of areas of natural beauty. In terms of policy for development, the following is enshrined in the County plan;

*‘The onus should be on the applicant when applying for permission to develop in the environs of a scenic route, to demonstrate that there will be no obstruction or degradation of the views towards visually vulnerable features nor significant alterations to the appearance or character of sensitive areas.’*

### ***Landscape Policy Areas.***

The County is subdivided geographically into four ‘**Principal Policy Areas**’ for which ‘indicative policy’ in respect of development generally is presented. These are illustrated in Figure 5: Landscape Protection Policy Areas A landscape sensitivity matrix is also presented in respect of specific development types including wind farms.

**Policy Area 1 - Montaine Coastal Zone:** Visually distinct landscape comprising a steep rugged shoreline and mountains rising immediately above. It is highly desirable to visitors and particularly sensitive to inappropriate development. Policy objectives that are particularly pertinent to the development of wind farms include **Policy 5** ‘*Encourage development that will not interrupt or penetrate distinct linear sections of primary ridgelines and coastlines when viewed from areas of the public realm*’, **Policy 6** ‘*Preserve any areas that have not been subject to recent or prior development and have retained a dominantly undisturbed coastal character*’,

**Policy Area 2 - Lowland Coastal Zone:** This landscape has a visual association with the coastline and the policies 5, 6 and 7 that apply to the montaine coastal zone are also applicable in this area.

**Policy Area 3 - Uplands, moors, heath or bog:** An open moorland landscape with scenic vistas to principal ridgelines, uninterrupted by shelter vegetation or topography. Policies for development put forward include **Policy 14** ‘*Encourage development that will not interrupt or penetrate distinct linear sections of primary ridgelines when viewed from areas of the public realm.*’, **Policy 15** ‘*Facilitate developments that have a locational requirement to be situated on elevated sites (e.g. telecommunications and wind energy structures)*’ It is necessary however to ensure that adverse visual impacts are avoided or mitigated wherever possible.

**Policy Area 4 - Drumlins and lowlands:** This is recognised as a working landscape, for which development proposals would be considered with the exception of the constraints posed by Lakeland areas and indeed areas that have retained an undisturbed character.

The ‘Development Impact – Landscape Sensitivity Matrix’, when applied to each of the four principal policy areas in respect of wind farm developments specifically yielded the following results;

**Table 4.1 Development Impact - Landscape Sensitivity Matrix for Wind farms**

Sensitivity ratings	Policy Area 1	Policy Area 2	Policy Area 3	Policy Area 4
Low	High	High	High	Medium
Medium				- High
High				

**High** – High potential to create adverse impacts on the existing landscape character. Having regard to the intrinsic physical and visual characteristics of the landscape area, it is unlikely that such impacts can be reduced to a widely acceptable level.

**Medium** – Medium potential to create adverse impacts on the existing landscape character. Such developments are likely to be clearly discernable and distinctive, however with careful siting and good design, the significance and extent of impacts can be minimised to an acceptable level.

**Low** – low potential to create adverse impacts on the existing landscape character. Such development is likely to be widely conceived as normal and appropriate unless siting and design are poor.

#### **4.7.2 Development guidance for wind farms – Landscape.**

The landscape appraisal policy strongly discourages the development of windfarms in Policy Areas 1 and 2 owing to the unique scenic quality associated with these areas and as graded in the ‘landscape sensitivity matrix’. In terms of Policy Area 3, an overall landscape sensitivity rating in relation to windfarms is also judged to be high although and specific policy in relation to this area recognises that it is necessary to ensure that adverse visual impacts are to be avoided in the first instance or mitigated wherever possible (Policy 15). In this regard, the Bellacorrick Basin within Landscape Character Unit F (North Inland Bog Basin) which lies within policy area 3 is suitable for wind farm development based on the existing permission. Elsewhere in Landscape Character Unit F constraints relating to the ecology of the peat bogs are likely to restrict the development of wind farms in this area.

Policy Area 4 holds a variable score (medium to high) in terms of landscape sensitivity to wind farm development. It would appear that there are landscapes within this policy area that have the capacity to absorb such developments and hence this area became the subject of further field study.

Policy area 4 was evaluated in terms of the Landscape Character Units contained therein as follows:

- D – North Coast Plateaux
- G – Northern Drumlins
- H – East Uplands
- K – East Central Drumlin Spine
- L – South East Plains
- M – Lough Mask Lakeland Drumlins

#### **4.7.3 D – North Coast Plateaux.**

The character of this area is consistent throughout and exhibits key features as follows.

- Flat open landscape
- Absence of field boundaries in places
- Distinct and highly scenic coastline
- Towns of Ballycastle and Killala retain traditional character albeit a little run down.

In terms of wind farms, the impacts would be significant and largely unacceptable in this landscape owing to the scenic quality and extent of visual exposure both from land and water.

#### **4.7.4 G – Northern Drumlins.**

Within this landscape character unit, two local landscape character units are identified from the field survey and recommendations made as follows and as illustrated in Figure 6b

##### *Drumlin Farmland.*

Key features of this landscape are as follows;

- Undulating low drumlin landscape
- Combined rough grazing and pasture
- Low lying marshy areas
- Small industrial area near town of Killala
- Some ridgelines notes but not of high scenic quality

Wind farm developments could be accommodated in this landscape and the appropriate siting of same is assisted by the drumlin topography and more prominent ridgelines which can be used to confine visual impacts. Use of landscapes and landscape settings , degraded by industry should also be considered.

##### *Lough Conn shoreline.*

Apart from ecological constraints, the scenic quality of the lough environs and its status as enshrined in the County Development Plan Landscape Assessment sets limits on wind farm developments to either materially or visually affect this area.

#### **4.7.5 H – East Uplands.**

Within this landscape character unit, two local landscape character units are identified and recommendations made as follows and as illustrated in Figure 6b

##### *Ox Mountain Foothills and Loughs.*

- Highly scenic mountain foothills creating a ‘glen’ near Foxford
- Views further east to the Ox Mountain range
- Few settlements
- Some ridgelines further south of lesser visual quality

Wind farm development, in general, can be accommodated in this area in the context of a working farmed landscape. Specific attention is drawn to the scenic landscape setting associated with the loughs and the Ox Mountains and their foothills for which no windfarm developments should intrude upon.

#### *Flat Riverine Farmland.*

The characteristics of this landscape are as follows:

- Flat to undulating farmland with long range views in select locations
- Presence of pockets of commercial forestry
- River habitats

Apart from the ecological restrictions relating to rivers, loughs and bog areas, this would be considered as a working landscape in which windfarms could be accommodated. Any proposals in this area will require visual analysis in the interest of the more scenic foothills landscape already discussed.

#### **4.7.6 K – East Central Drumlin Spine.**

Within this landscape character unit, four local landscape character units are identified and recommendations made as follows and illustrated in Figure 6b.

##### *Drumlin Landscape with Loughs.*

- Drumlin farmland with scenic views of highly scenic mountain ranges including the Nephin Beg Mountains to the North, Croagh Patrick to the west and the Partry Mountains to the south.
- Loughs contribute localised high scenic quality

In line with policy set out in the landscape appraisal, it is recommended that the siting of wind farms do not interfere with the lake settings or indeed views of significant mountain ranges as identified. Siting of wind farms in this area is likely to be more feasible in the south eastern part of this Local Landscape Character Unit. It is recommended that applications present a thorough visual analysis aimed at guiding the design layout of the wind farm to avoid obstruction or intrusion on views of the scenic landscape elements mentioned.

##### *Low Drumlin Farmland with Afforestation.*

- Drumlin farmland with occasional wet patches or temporary waterbodies
- Small pockets of afforestation

This landscape is judged to be capable of accommodating wind farms. Advantage should be taken of the afforested areas (coniferous), these being the cause of a local deterioration in landscape quality present an opportunity for development.

##### *Drumlin Farmland with Ridgelines.*

- Medium scale drumlin farmland
- Ridgelines prominent visually but not of high scenic quality
- Occasional damaged landscapes as a result of quarrying
- Concentration of heritage (not visible) in east west ridgelines to the North West of Ballyhaunis.
- Views of the Partry Mountains from the N17 road route between Knock and Kilkelly

This is a landscape that could accommodate wind farms in general although attention is brought to the scenic views of the Partry Mountains which could result in limitations on development in this area. Advantage could be taken of damaged landscapes and their settings as a result of quarrying or indeed afforested landscapes which no longer reflect true character.



*Flat Farmland.*

- Small scale field patterns bounded by stone walls and hedge rows
- Pockets of active raised bog
- Good scenic quality
- Views of the Ox mountains

This would be judged to be a robust working landscape that could accommodate wind farms.

**4.7.7 L – South East Plains.**

Within this landscape character unit, two local landscape character units are identified and recommendations made as follows and as illustrated in Figure 6b

*Flat farmland with stone walls*

- Small scale field pattern
- Traditional stone wall boundaries
- Views of the Partry mountains
- Clumps of mature deciduous woodland
- Overall high scenic quality

The route extending from Ballinrobe to Neale and to Cross is significant in terms of scenic views. Proposals in this area should safeguard the integrity of these views. Overall, the high scenic quality and small scale nature of this landscape render it sensitive to wind farm development. Proposals in terms of turbine height and layout will need to complement the scale of the field patterns. Particular attention is drawn to areas of farmland that exhibit intact dry stone walling which defines field boundaries of a particular small scale. These landscapes of an historic kind were generally found to be in good condition but would exhibit the highest sensitivity to wind farm development overall within this landscape character unit. Applications for wind farm developments in this area ought to carefully consider these landscapes in order that their quality may not be visually or materially degraded.

Imaginative solutions towards the harnessing of wind energy, for example, the use of older style windmills (if deemed commercially feasible) could be considered in these landscapes and indeed could make a positive contribution to character.

*Undulating Farmland.*

- Undulating Pasture and Tillage
- Woodland clumps containing mature ash and beech
- Bogs in the vicinity of the River Robe

Overall this landscape is of a bigger scale in terms of field pattern and this together with its rolling nature render it capable of absorbing wind farms.

#### **4.7.8 M – Lough Mask Lakeland Drumlins.**

Within this landscape character unit, two local landscape character units are identified and recommendations made as follows and as illustrated in Figure 6b

##### *Lough Fringe Farmland.*

The essential characteristics of this landscape are as follows:

- Flat to undulating topography given over to farming uses and some recreation near the lake shore
- Wooded fringe to lake edge affords partial views in specific locations of the water and beach edge.
- Small scale field sizes associated with the farmland
- High scenic quality at the lake shore

In line with the annex landscape appraisal, the lake is a sensitive landscape element and no development by way of wind turbines should materially interfere with the lake or indeed its visual catchment.

##### *Drumlin Farmland.*

- Low drumlin landscape
- Clumps of woodland

The enclosed and rolling nature of this landscape render it capable of accommodating wind farms. Advantage will be taken of existing woodland areas to serve a vegetation screens thereby confining the visual influence of any give wind farm.

#### **4.7.9 Recommendations.**

The Landscape Appraisal annex to the County Development Plan subdivides the County into four policy areas in terms of policy for development. Of these, only Policy Area 4, located in the eastern party of the County is deemed to contain landscapes whose sensitivity and scenic quality are such that wind farm developments could be accommodated.

Policy Area 4 was the subject of further field survey as part of this study. The Character Units defined in the Landscape Appraisal in the County plan were examined. These are listed as follows:

- D – North Coast Plateaux
- G – Northern Drumlins
- H – East Uplands
- K – East Central Drumlin Spine
- L – South East Plains
- M – Lough Mask Lakeland Drumlins

All of these Character Units were judged to contain landscapes that could accommodate wind farm developments with the exception of Character Unit D – North Coast Plateaux.

Reference is also made specifically to the lake fringe landscapes of Lough Conn (located in G-Northern Drumlins) and Lough Mask (located in M-Lough Mask Lakeland Drumlins), the environs of which should be free of any wind farm developments.

## **5      *PROPOSED STRATEGY.***

### **5.1      *CAPACITY STUDY FINDINGS.***

As described above, the constraints to wind energy development relate to ecology, landscape and visual quality and built heritage.

#### **5.1.1      *Ecology.***

The capacity study findings in terms of ecology highlight a range of sites that are subject to statutory designation and for which, current European legislation on habitats together with national policy guidance indicate that such sites are extremely vulnerable to windfarm development and therefore unsuitable for wind farm development. Apart from these designated sites, attention is drawn to the extent of Atlantic bog cover located on the western half of the County. Policy guidance in respect of development generally advises that these areas would also be unsuitable for wind farm development owing to the potential negative impacts that would result. In terms of water bodies and rivers, the statutory designations that cover these are as important as those relating to terrestrial habitats and as such the development of wind farms in these areas is not recommended. These recommendations or constraints are likely to be further underlined by the River Basin Management Plan currently being prepared for the Western River Basin District which includes the County of Mayo. Relating these constraints to the policy mapped in the County Development Plan Landscape Appraisal, policy areas 1,2 and 3 would be deemed unsuitable for wind farm developments, thus leaving Policy Area 4 as being more capable of accommodating wind farms in the future.

#### **5.1.2      *Landscape and Visual Amenity.***

In terms of landscape and visual quality, the western half of the county, covered in policy areas 1 and 2 of the landscape appraisal to the County Development Plan is regarded as being highly sensitive to wind farm development.

Policy area 4 is identified as being capable of accommodating windfarms without causing unacceptable deterioration in the scenic quality of these landscapes. Within this area, however, the North Coast Plateaux and indeed the shorelines of the large lakes (Mask and Conn) would be considered highly sensitive to the development of wind farms.

#### **5.1.3      *Heritage.***

Specific heritage features in this western area are highlighted as worthy of protection from any impacts of wind farms on the landscape setting associated with same. Note is also made of the extensive areas of bog in the western part of the County in which, an unrecorded built heritage and archaeological resource lies preserved and is hence not necessarily mapped (ref Figure 4). This study recommends that the siting of windfarms, in the eastern part of the County is feasible from an archaeological standpoint, however the locations proposed for development ought to be subject to thorough archaeological and built heritage assessment. Particular emphasis, in this regard, is placed on the geographic area located between Ballyhaunis, Knock and Kilkelly which is particularly sensitive as previously outlined.

The constraints overall relate to the following as listed below and as illustrated individually in Figure 8: Environmental Constraints to Wind Energy Development:

- Sites that carry statutory protection
  - National Park
  - Natural Heritage Areas
  - Special Areas of Conservation
  - Special Protection Areas
  - Nature Reserves
- Peat bogs of Mayo County
- Protected routes and views

These constraints are presented in summary in Figure 9: Capacity Study which, in terms of Policy areas in the County Plan, identifies, Policy area 4 as having significant capacity for wind farm development.

#### **5.1.4 Grid Capacity and Wind Resource.**

The Garrad Hassan report of 2003 '*The Impacts of Increased Levels of Wind Penetration on the Electricity Systems of the Republic of Ireland and Northern Ireland*' reveals that there are no absolute technical limits on the percentage of wind generating capacity which may be connected to the combined electricity systems, all technical issues can be resolved at some cost.

There is a recognisable weakness in the electricity grid in the western part of the county and a corresponding strength in the eastern part. The ESB Transmission Development Plan 2006-2010 does not identify any grid improvements in the North-west region. The main project is Castlebar- Tonroe 110Kv line reinforcing the east. The Transmission Development Plan 2006-2010 does recognise that some of the projects in the ESB West Region will also help strengthen the North-West area but that further developments in the North-West should only be required within the plan period in the event that new as yet unknown generation or demand developments emerge.

#### **5.1.5 Strategy.**

The wind resource maps, prepared by SEI and included in this report reveal that windspeeds that are economically viable for the harnessing of wind energy are available in predominantly the western half of the county at 50 meters above ground level but are also available throughout the entire county at heights of 75metres and 100metres above ground level.

The environmental constraints, discussed and analysed above, favour the siting of wind farms in the eastern part of the county. The harnessing of wind energy, in these areas is economically feasible at heights of 75 and 100 metres above ground level, thereby suggesting a minimum turbine height of 75 metres. The development of energy in this area is further enhanced by the proximity and availability of the necessary electrical infrastructure, which, according to the constrained wind speed mapping, is better developed in the eastern half of the County compared with the western part.

Taking the above into account it is proposed to:

- |                              |                               |
|------------------------------|-------------------------------|
| Identify where windfarms are | (i) Acceptable in principle   |
|                              | (ii) Open for Consideration   |
|                              | (ii) Not normally Permissible |

In order to encourage the development of windfarms in areas where they are *Acceptable in principle* to permit, as a norm turbines of 75 m hub height.

## **5.2 WIND FARMS - DESIGN AND MITIGATION CONSIDERATIONS.**

### **5.2.1 Ecological.**

Annex 1 contains general scoping from the National Parks & Wildlife (NPWS) in relation to Wind Farm Development and appropriate Environmental Impact Assessment (EIA). This information was provided during consultation with the NPWS and should be taken into account when considering any wind farm application.

With the above recommendations in mind it is also important for the following water resource management issues to be considered with respect to planning applications within the strategic zone and planned developments of appropriate scale;

- Potential impacts on local hydrology in general and on water abstraction and private water supplies in particular need to be identified together with the protective/preventative measures proposed.
- Appropriate turbine positioning in relation to water courses or aquifers and in relation to significant habitats or species dependent upon ground and surface waters.
- Appropriate separation distances from water courses and significant receptors during construction.
- Siting and design of tracks, borrow pits, buildings and any power lines.
- Provision of alternative water supplies where appropriate.
- It may be necessary to undertake a hydrogeological study to establish the long-term impact of the proposal on ground and surface waters.

### **5.2.2 Fisheries and Water Quality.**

Considerations for fisheries and water quality should take into account the following;

- Drainage networks should not discharge directly but through an appropriate buffering riparian zone.
- Measures taken to reduce surface run-off so as to lessen the risk of bank destabilisation and erosion.
- Discharge of solids should be strictly controlled so as to avoid direct impacts on fish feeding, spawning and primary productivity within the river channel.
- Appropriate location of construction activities and on-site storage of fuels and lubricants.
- Environmental Management System should be put in place which would also include an emergency response plan in relation to spillages.
- Full consultation with regional fisheries staff regarding culvert/bridge design and mitigation measures with respect to the requirement of access roads for wind farm developments.

### **5.2.3 Ornithological.**

There is speculation about the particular risks to birds from wind turbines. The evidence to date would seem to suggest that the hazard to birds is no greater than other tall installations, although the cumulative impact of wind turbines on bird populations is an issue that needs to be considered.

The assessment of cumulative effects on birds is a complex and specialised process. It is likely that only species considered to be of high conservation value or vulnerable to wind farms by virtue of their behaviour will be considered. A cumulative assessment can apply at a number of levels, for example:

- an individual pair, or birds occupying a single breeding site;
- the qualifying interest of a Special Protection Area
- a regional or local population
- a national population

In some instances, assessing cumulative effects on a national population may require widespread consideration of wind farm developments nationally, and this would normally be too onerous a task to expect of a developer of a proposal which on its own may be unlikely to have more than a marginal effect. The assessment of impacts on national populations is likely best undertaken by specialists and would not be required in the context of assessing a single proposal.

It will be particularly important to assess effects in relation to breeding areas, roosting grounds and flight-lines in consultation with an appropriate authority.

### **5.2.4 Landscape and Visual mitigation.**

Methods employed to mitigate the impact of wind turbines in the landscape setting in general lie in the design layout of the proposed wind farm. In this regard, design criteria which will provide effective mitigation include the following:

- Turbine layout pattern to be designed to complement the existing landscape pattern
- Turbine height to be set to complement the scale of the receiving landscape. This relates to the size or scale of farmed fields or indeed the scale and size of the hills and undulations that define the landscape's topography.
- The number of turbines will be carefully selected to be in scale with the receiving landscape and to avoid cumulative impacts relating to other wind farms in the area.
- In terms of infrastructure, access will ideally be routed in a manner that agrees with the existing topography. Sharp changes in level caused by excavation or the construction of retention structures or walls will be avoided. A minimal approach on earthworks will minimise damage or scarring of the landscape.
- Screen planting to infrastructure will feature native species planting, consistent with the wider landscape setting.

### ***5.2.5 Archaeology and cultural heritage.***

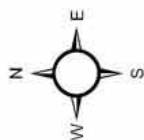
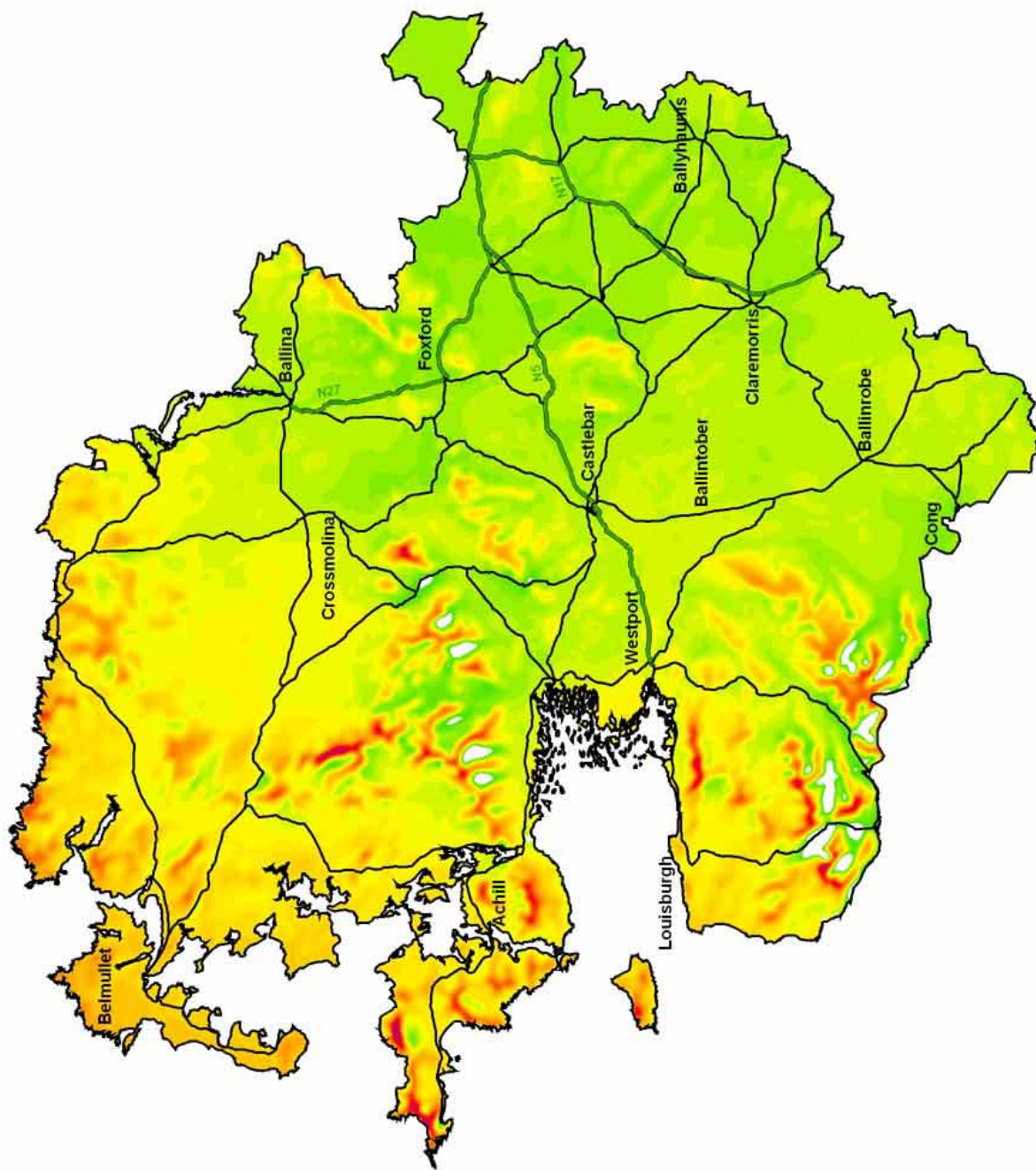
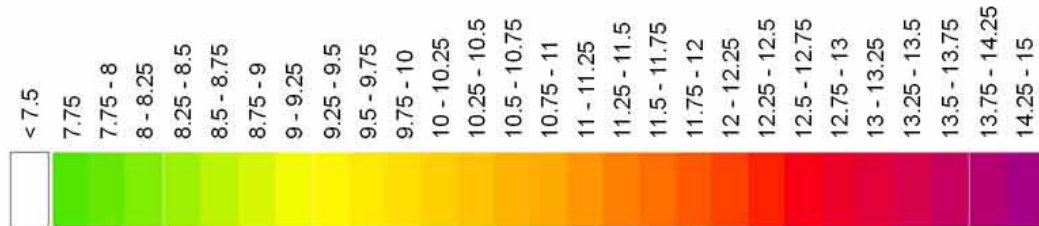
The site specific constraints in relation to built heritage may be considered under physical impacts and visual impacts. Mitigation measures are generally proposed at EIS stage and commonly relate to site design.

In the capacity areas, the following recommendations are made:

- The Wind Energy Guidelines recommend that a suitably qualified archaeologist should prepare an archaeological assessment of the development including mitigation at pre-planning stage.
- The planning authority will consider development impacts in riverine and lacustrine archaeological areas.
- Mitigation measures as part of the EIA process relate to the following:
  - the protection in situ of a site,
  - fencing off of a site during construction,
  - the relocation of a turbine to avoid direct impact on a site
  - and the presence of an archaeologist during excavation.
- The visual impact and the inter-relationship between built heritage sites and the landscape must be considered in the planning application.
- The impact of a wind farm development on a ritual or cultural landscape should be clearly demonstrated in areas with a high density of ritual features.
- Where a wind farm is proposed within the visual catchment of a site under public ownership/guardianship, particular care is required in order that the development does not overwhelm the setting of such sites.
- General guidelines recommend a distance of between 1½ to 3 times the height of the turbine so that the turbine does not dominate an archaeological site<sup>1</sup>.

(1) Aengus Parsons et al. 2002

CONSTRAINED ONSHORE WINDSPEED  
AT 100M ABOVE GROUND LEVEL (m/s)



**FIGURE 1A: WIND RESOURCE FOR COUNTY MAYO**

**MAYO WIND ENERGY STRATEGY**

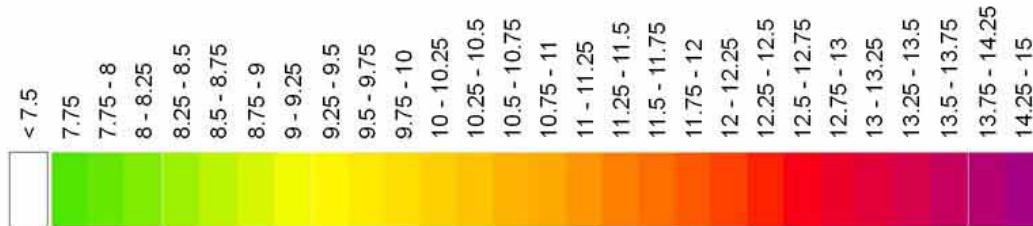
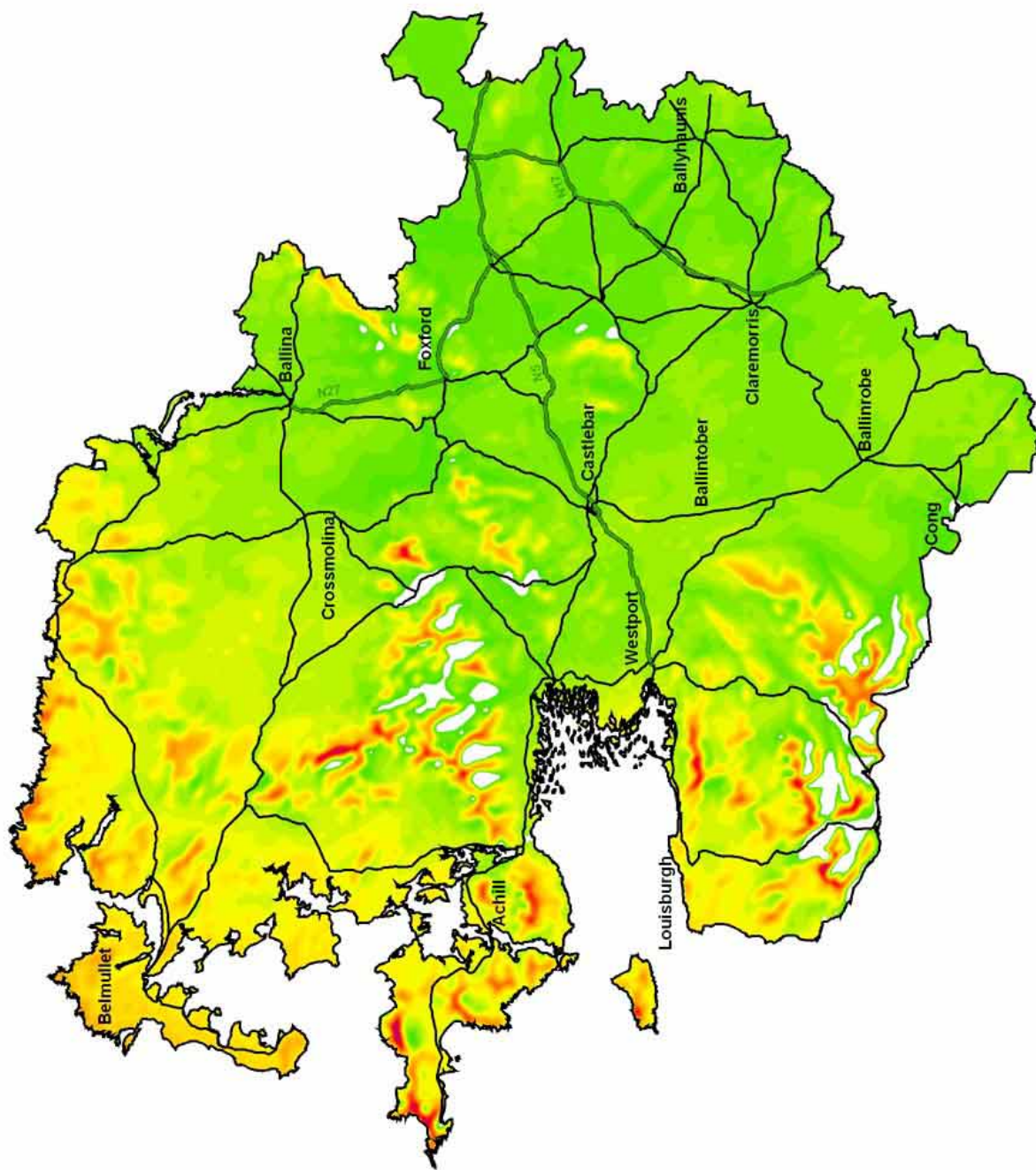


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DATE:	AUGUST 2005
PROJECT:	Mayo Wind Energy Strategy
SCALE:	1:450,000
DWG SIZE:	A3
APPROVED:	E. O'Connor
DRAWING No:	
DRAWN:	EV
REV:	1



# CONSTRAINED ONSHORE WINDSPEED AT 75M ABOVE GROUND LEVEL (m/s)



**FIGURE 1B: WIND RESOURCE FOR COUNTY MAYO**

## MAYO WIND ENERGY STRATEGY



DATE:	AUGUST 2005
PROJECT:	Mayo Wind Energy Strategy
SCALE:	1:450,000
DWG SIZE:	A3
APPROVED:	E. O'Connor
DRAWING No:	
DRAWN:	EV
REV:	1

CONSTRAINED ONSHORE WINDSPEED  
AT 50M ABOVE GROUND LEVEL (m/s)

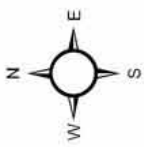
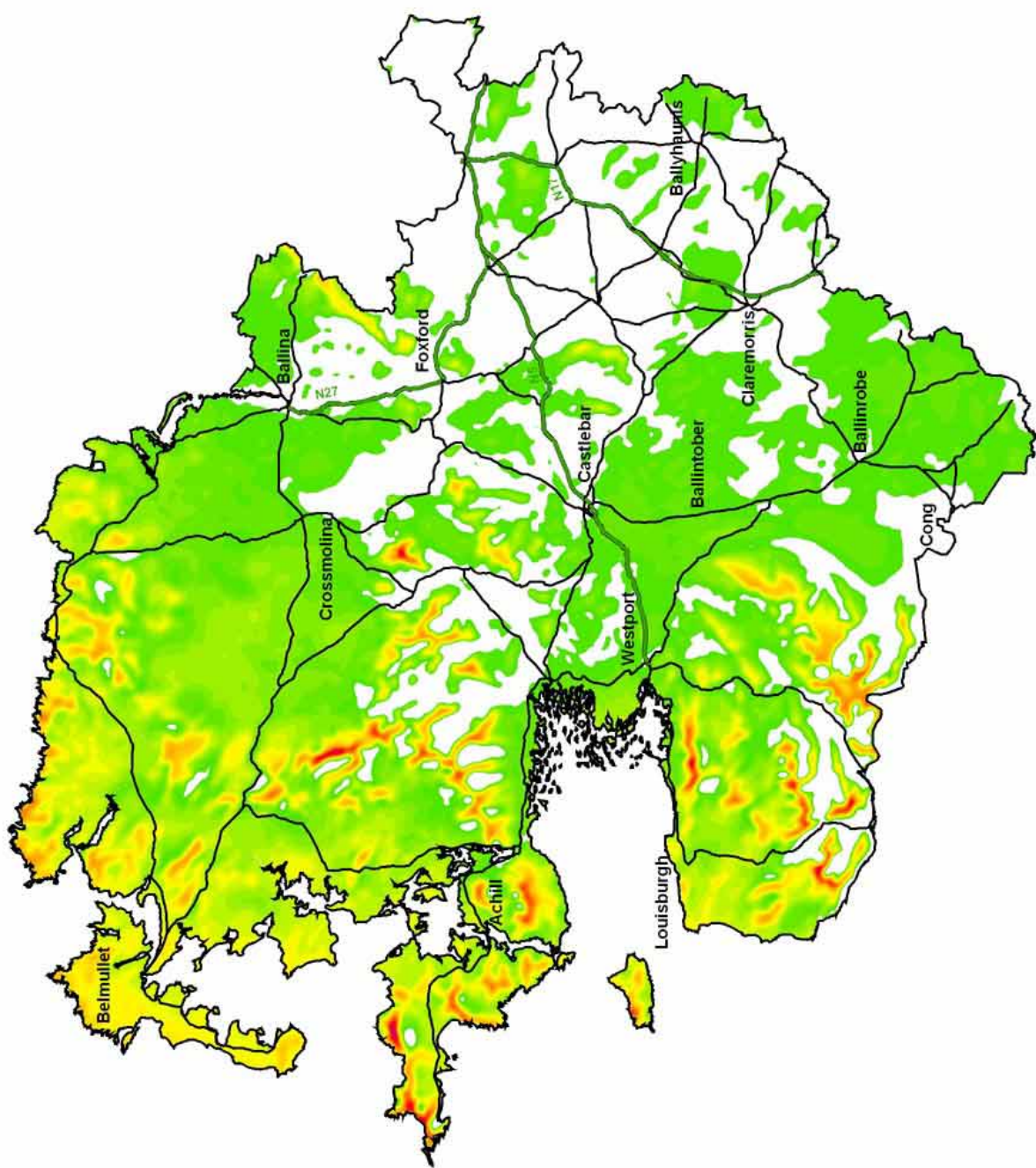
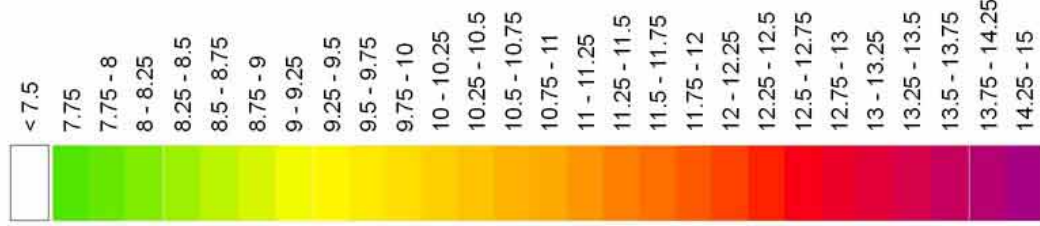


FIGURE 1C: WIND RESOURCE FOR COUNTY MAYO

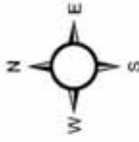
MAYO WIND ENERGY STRATEGY



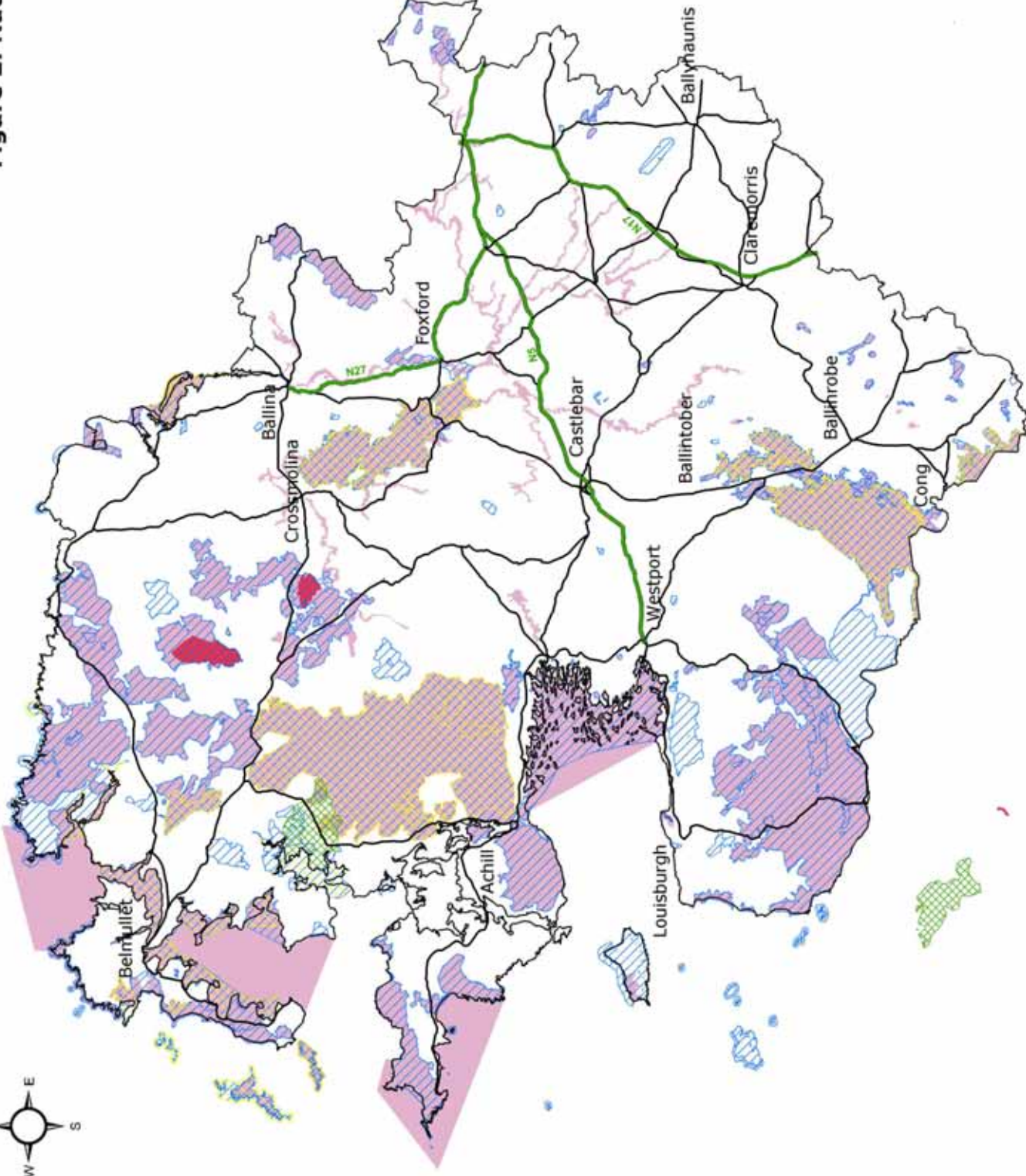
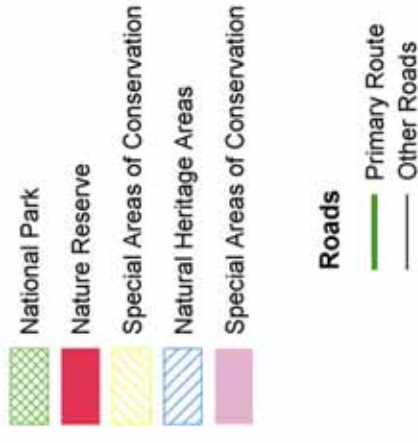
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PROJECT:	Mayo Wind Energy Strategy
SCALE:	1:450,000
DWG SIZE:	A3
APPROVED:	E. O'Connor
DRAWING No:	
DRAWN:	EV
REV:	1

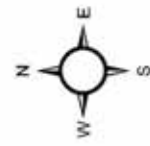




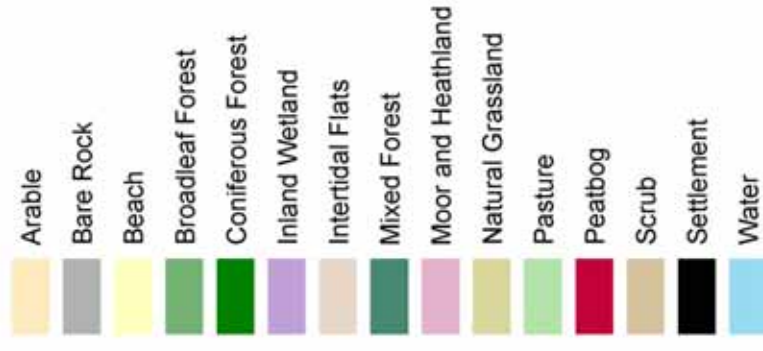
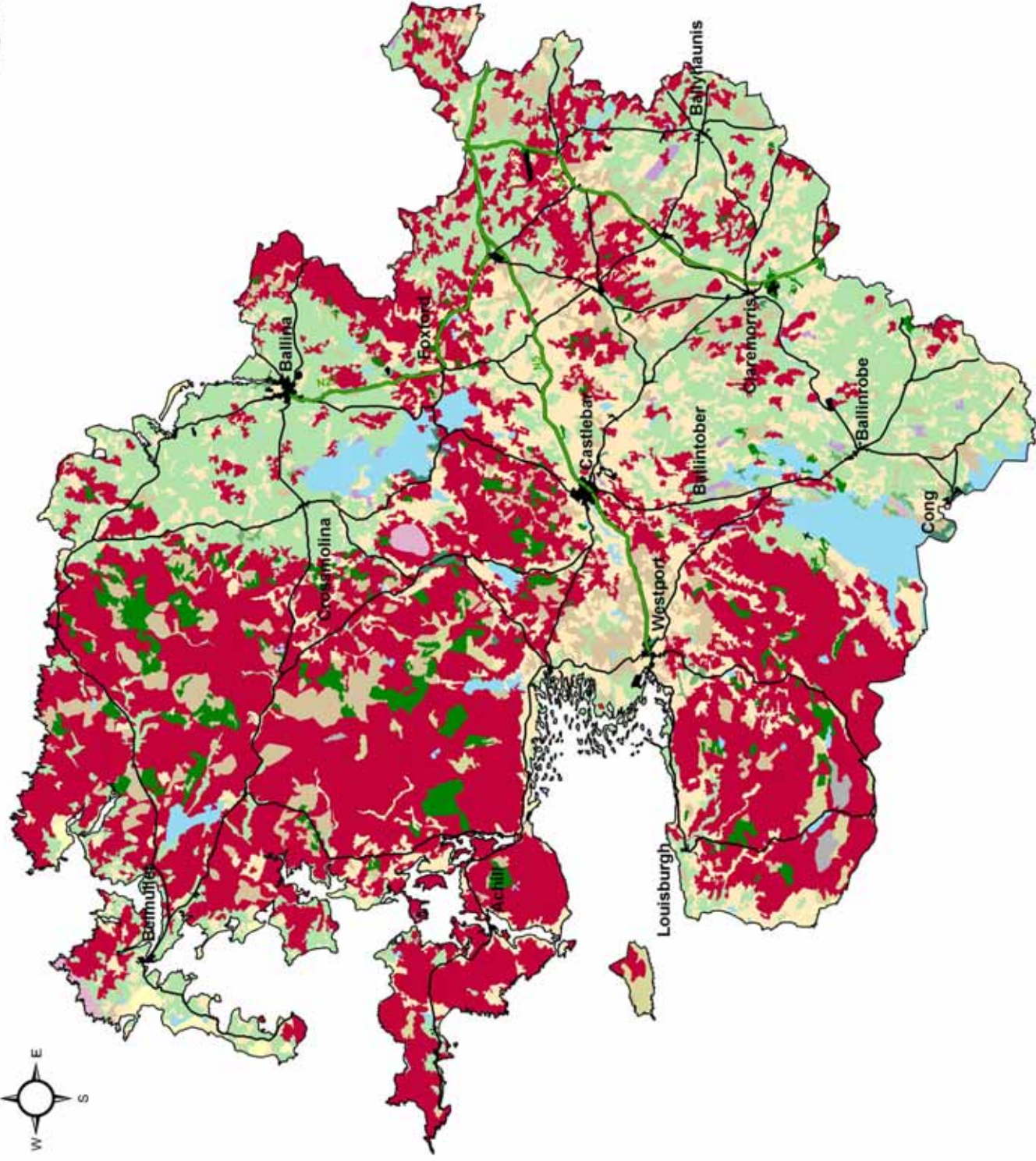
**Figure 2: Natural Heritage Designations**



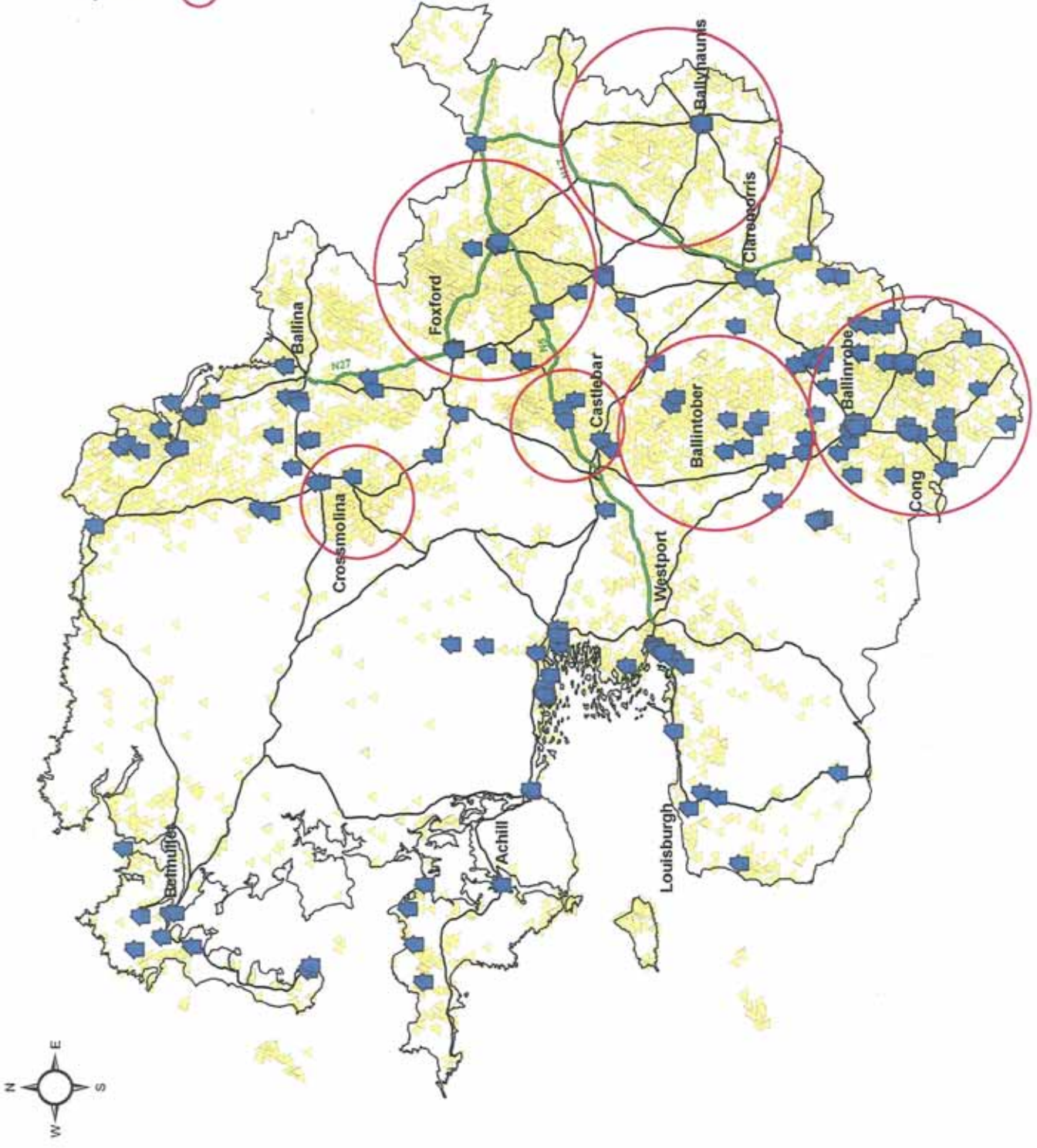




**Figure 3: CORINE Land Cover**

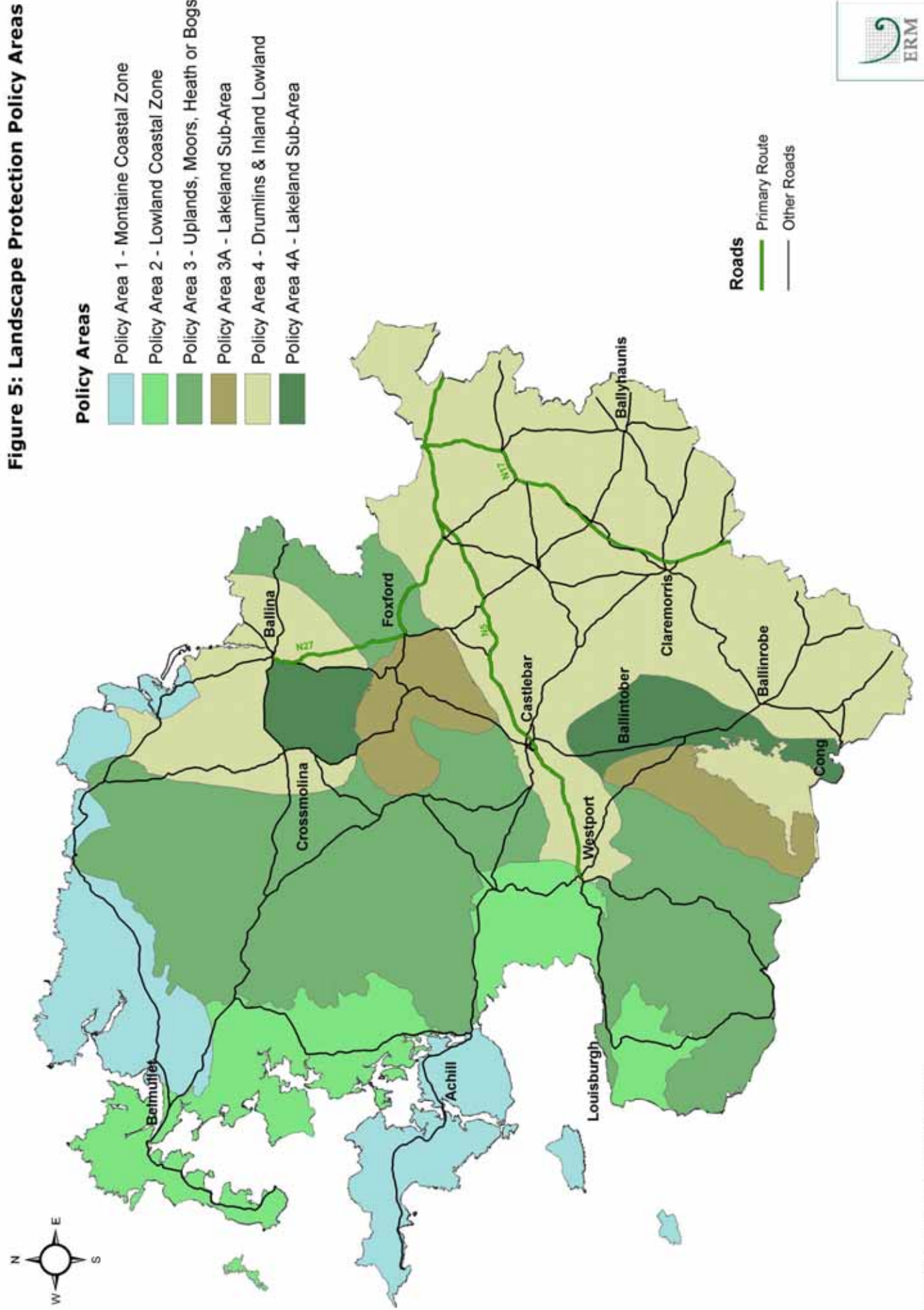


**Figure 4: Built Heritage**

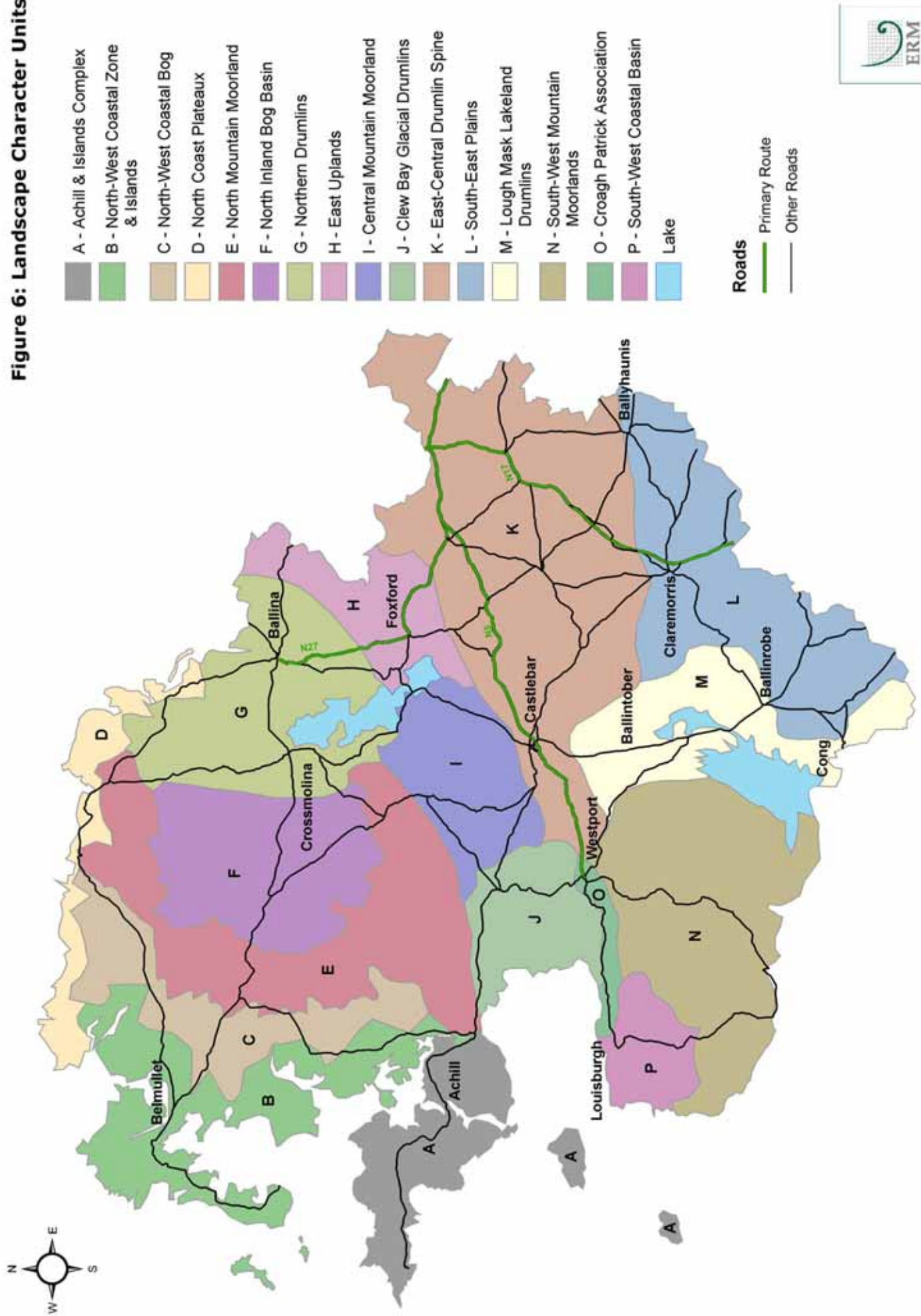




**Figure 5: Landscape Protection Policy Areas**

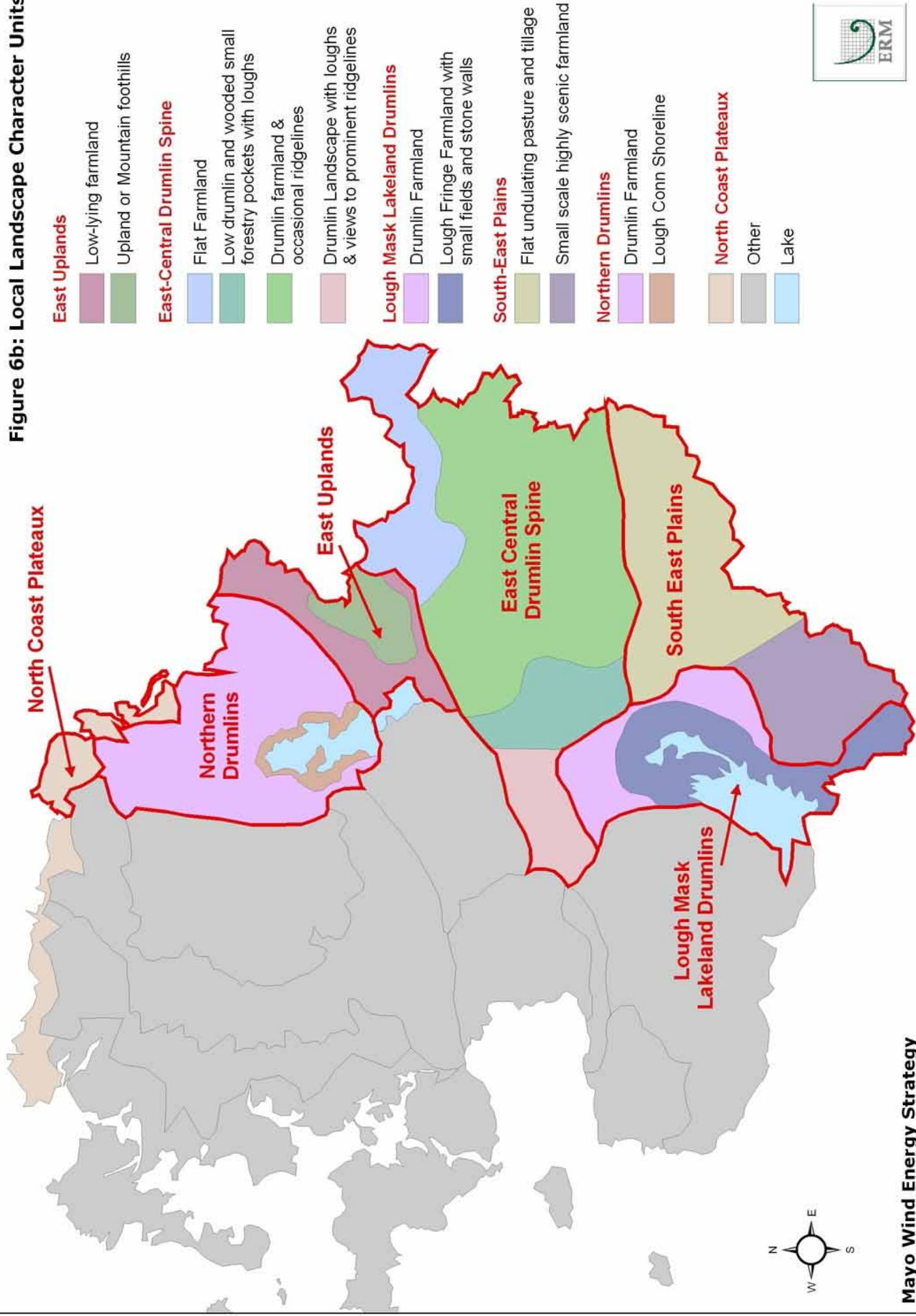


**Figure 6: Landscape Character Units**

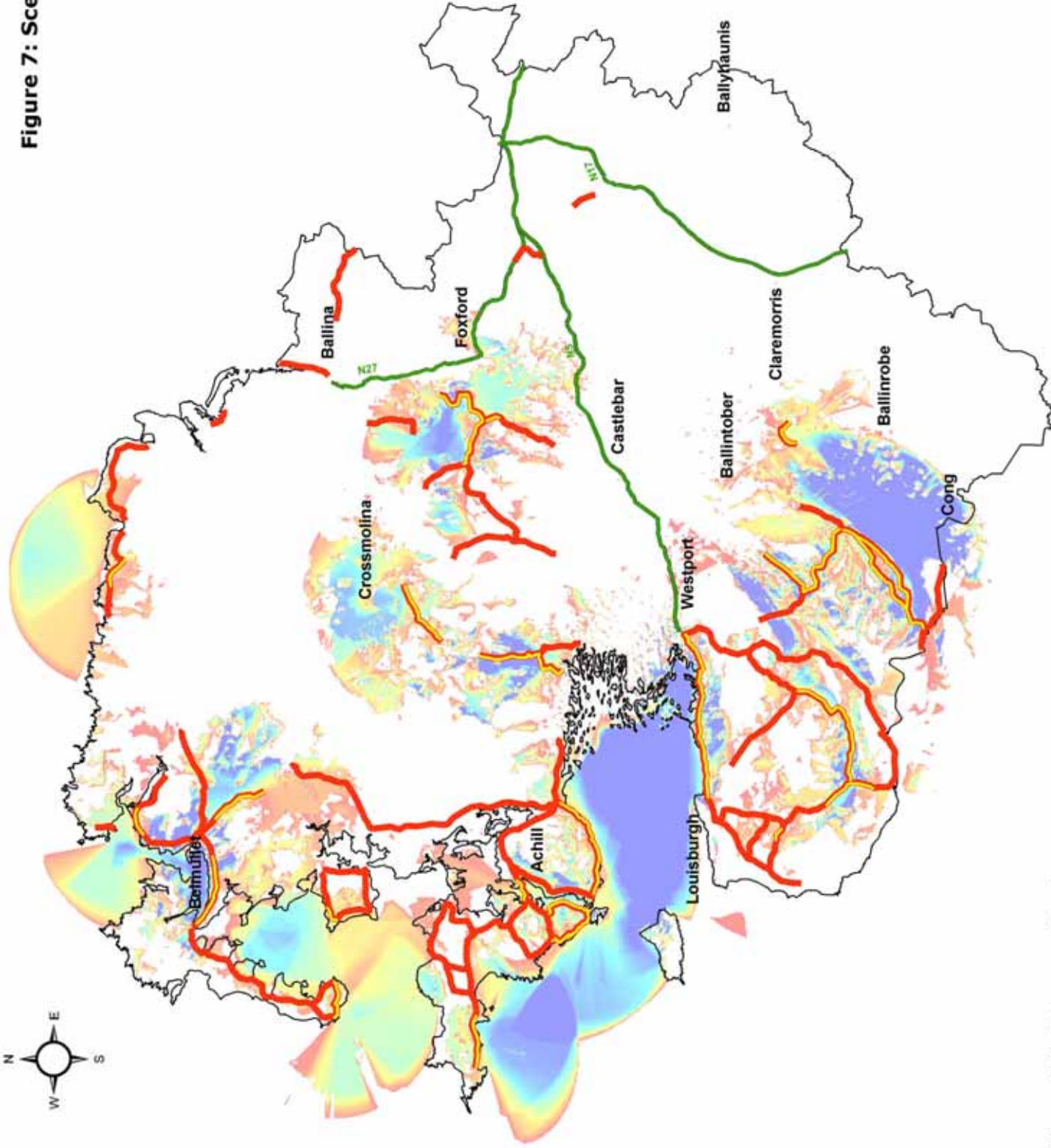
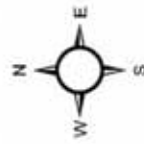




**Figure 6b: Local Landscape Character Units**







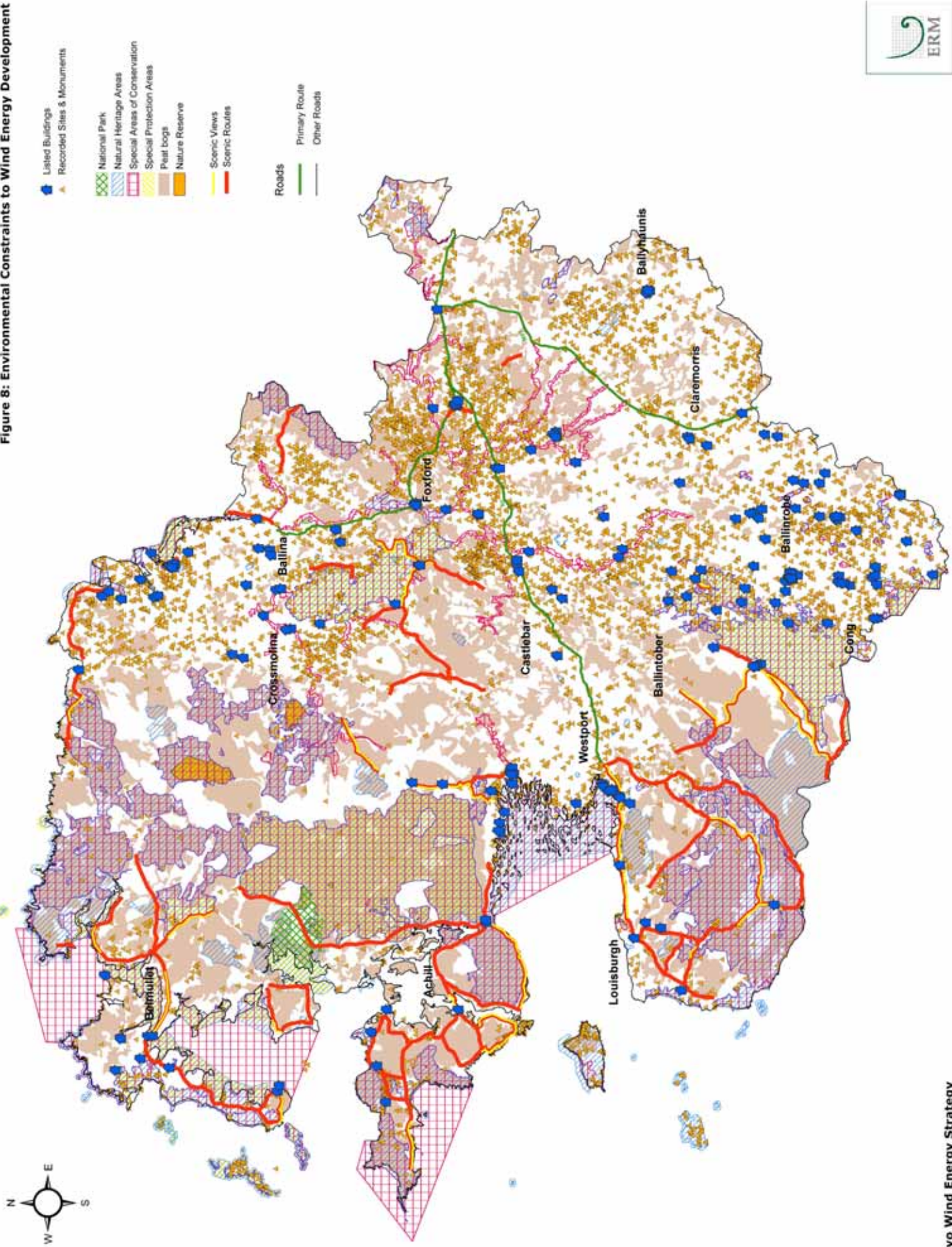
- Scenic Views  
Scenic Routes
- Visual Scenic Catchment  
High : 455  
Low : 0
- Roads  
Primary Route  
Other Roads



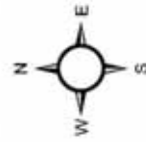
Figure 7: Scenic Routes & Protected Views



Figure 8: Environmental Constraints to Wind Energy Development







**Figure 9: Capacity Study**

Areas of County Mayo not suitable  
for Wind Energy Development



Scenic Routes



Scenic\_Views



Roads

Primary Route



Other Roads





## **ANNEX 1**

**General scoping from the National Parks & Wildlife Service in relation to Wind Farm Development and appropriate Environmental Impact Assessment (EIA).**

## MAYO WIND ENERGY STRATEGY – 2005

### **Ecological matters to be taken into consideration when preparing the strategy.**

1. The nature conservation designations for Co. Mayo (SACs, SPAs, NHAs, Nature Reserves and National Parks) are available from the NPWS website.
2. There are likely to be new or extended sites for the protection of the EU Habitats Directive Annex II species, Salmon (in freshwater only), in Co. Mayo in the near future. SPA boundaries are being reviewed and remapped by NPWS at present and are likely to result in significant boundary changes to many existing sites. Other new sites (particularly NHAs) may be selected and designated in the lifetime of the plan for habitats and/or species of international, national or regional significance.

The strategy should include provision for the recognition of new, extended or modified nature conservation sites in the future.

3. Mayo/Ballycroy National Park is likely to have target lands for future expansion. For National Parks, in addition to ecological impacts, visual impacts are also of significance and the strategy should recognise this fact.
4. Of the species groups, wind energy developments are likely to be of greatest significance for birds. Information on important bird sites should be obtained for Co. Mayo, including SPAs boundaries (NPWS) and the I-WeBS data (BirdWatch Ireland). Particular attention should be given to the bird species most that are most at risk of collision and disturbance/displacement, particularly Greenland White-fronted Geese (indicative areas may be available from NPWS). Other county-specific information may be available from BirdWatch Mayo. Important bird areas should be identified and mapped. In addition to such areas, any known or likely flight paths to and between these sites are likely to be of significance.
5. There are many areas of high and currently unknown ecological significance outside the network of designated sites. Surveys and other investigations may reveal sites that support habitats and/or species of national or international significance in the future. The precautionary principle should apply in relation to the strategy.
6. In addition to ecological NHAs, the GSI in conjunction with NPWS, is selecting and designating a suite of geological and geomorphological sites for Ireland. These should be included in the strategy.
7. In addition to CORINE data, FIPS habitat indicator maps, and soils, subsoils and geology maps are likely to be available for Mayo. These were prepared by a Teagasc research group and are available free from the EPA. The information and maps have greater resolution than CORINE, and they represent an important county-wide dataset.
8. Digital terrain models and contours are also likely to be available for Mayo. FIPS data on soils and subsoils can be overlain, together with information on hydrological catchment and sub-catchment boundaries (available from the Western River Basin District project), and nature conservation designations, to identify sensitive ecological, hydrological and hydrogeological areas (particularly for blanket bogs and other wetland habitats). This should be carried out as the basis for informing the strategy.

9. Wind energy developments and their associated road and drainage networks, particularly in upland areas, have the potential to have significant impacts on hydrology, hydrogeology and water quality.

These issues must be taken into account and, in addition to point 8 above, sensitive waters must be identified in the strategy.

10. In relation to the sensitivities of peatland sites to wind energy developments, and global stability of peat deposits, there should be reference in the strategy to the key findings of the University of East London's 2004 report<sup>1</sup> on the bog slide at Derrybrien and any other relevant reports.
11. The requirements of the EU Habitats Directive, and sections 2-4 of Article 6 in particular (see below), apply in relation to all SACs (including cSACs) and SPAs in Co. Mayo. A flow chart with guidance on how sections 3 and 4 of Article 6 should be applied is included on page 12 of the guidance document: *Assessing Plans and Projects Significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*.

#### **Article 6**

*2. Member States shall take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of this Directive.*

*3. Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

*4. If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

*Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.*

12. Unless it can be clearly demonstrated that the development of wind energy projects will not have a negative impact on the favourable conservation status of annexed

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<sup>1</sup> Lindsay, R. and Bragg, O. 2004. *Wind Farms and Blanket Bog – the Bog Slide of 16th October 2003 at Derrybrien, Co. Galway, Ireland*. University of East London.

habitats and/or species (EU Habitats and Birds Directives) for which the sites were designated, or any other annexed, rare or protected habitats and species present within or using these sites, the network of these sites should be seen as primary ecological constraints.

13. The DoEHLG Draft Planning Guidelines for wind energy developments in Ireland indicate that areas where peat depths exceed 50cm should be avoided when planning wind energy developments.
14. The Draft Planning Guidelines for wind energy developments are currently under review by the DoEHLG
15. A copy of a general scoping document outlining the key issues that must be considered when undertaking EIA for a wind energy development is attached, for information



## GENERAL SCOPING FOR EIA FOR WIND ENERGY DEVELOPMENT.

1. The developer should have regard to the *Guidelines on Information to be Contained in Environmental Impact Statements* (EPA 2002), the *Advice Notes on Current Practice (on the preparation of Environmental Impact Statements)* (EPA 2003), and the *Wind Energy Developments Guidelines* (DoEHLG 2006).
2. It should be remembered that a key element of EIA is the avoidance or reduction of negative impacts on the environment. EIA is an iterative process and the information gathered through assessments or surveys should be used to guide the planning and design of the windfarm so that sensitive ecological or hydrological areas are avoided, and the negative impacts are minimised insofar as is possible.
3. The EIS should consider the ecological impacts associated with all aspects of the development, including site access, temporary impacts during construction, disposal of wastes or surplus material, and any possible indirect impacts, including on watercourses.
4. The receiving environment should be described in terms of terrestrial and aquatic habitats, flora and fauna, as appropriate. The study area for ecological/botanical/faunal surveys should include all areas that are likely to be impacted, directly or indirectly, as a result of the development, and should include, at a minimum, the footprint, the entire works area, access routes, watercourse crossings, site drainage, storage or disposal areas, and any quarries, borrow pits or extraction areas. The likely impacts of grid connection should also be considered.
5. Information on the following should be provided:
  - Habitats of the development site, including a habitat map, concentrating on the footprint but describing and assessing habitat type and quality of the overall site. A standard scheme such as Fossitt (2000)<sup>1</sup> should be used for habitat nomenclature. Correspondence with EU Habitats Directive Annex I habitats should be indicated as appropriate;
  - Flora of the development site, including any rare plants. A rare plant survey should be carried out by a suitably qualified expert at the appropriate time of year;
  - Mammals that use the site or surrounding areas, with particular emphasis on rare or annexed (Habitats Directive) species;
  - Birds that use the site or surrounding areas, with particular emphasis on any rare<sup>2</sup> or Annex I (Birds Directive) species. Breeding and wintering bird surveys should be carried out by a suitably qualified expert at appropriate times of the year. See below in relation to recommended Hen Harrier survey methodology;
  - Other terrestrial and aquatic fauna (e.g. invertebrates, fish), as appropriate, and with particular emphasis on rare or annexed (Habitats Directive) species;
  - The aquatic environment and hydrology/hydrogeology, including lakes, rivers, streams, springs, flushes, headwaters or watersheds, aquatic and riparian habitats, water quality, and associated protected species.

<sup>1</sup> Fossitt, J.A. (2000). *A guide to habitats in Ireland*. Heritage Council, Kilkenny.

<sup>2</sup> To include red or amber listed species in the current list of Birds of Conservation Concern in Ireland

6. There should be an evaluation of the conservation interests of all aspects of the ecology of the receiving environment. Habitats and other features of ecological sensitivity or concern should be mapped. The site layout or footprint should be superimposed on the habitat/ecology map so that it is clear what areas/habitats will be impacted and to what extent. Quantitative estimates of habitat loss and disturbance should be given.

7. A peat depth contour map should be prepared for the site. In peatland areas, deep peat deposits should be avoided. This should also apply to damaged or degraded peatlands where areas of high bog should be avoided in order to minimise the amount of peat that requires excavation and disposal. There should be no impacts on areas of intact bog, wet bog with pool systems, or on flushes within the peat. Also, if areas of deep or wet peat will be impacted, the structural stability of the peat mass must be considered in the light of the construction methods and works proposed. In this regard, the findings of the technical assessments of the windfarm at Derrybrien, Co. Galway, should be taken into account

8. If areas of deep or wet peat will be impacted, the structural stability of the peat mass must be considered in the light of the construction methods and works proposed.

9. In peatland areas, the EIS should consider the amount of peat that has to be excavated and disposed of in the course of site works, and should include a detailed plan for the safe storage, disposal and rehabilitation of excavated peat. The spreading of excavated peat over areas of intact bog or other habitats or vegetation of ecological value is not acceptable. Excavated peat should not pose any threat to water quality.

10. The details of road construction should be given, particularly for peatland areas. The impacts of road construction should be considered in the ecology/flora/fauna section.

11. A detailed site drainage map should be provided to show all existing drains, new drains, any outfall points to watercourses and any settlement ponds. Measures to control or prevent siltation should be included.

12. The impacts on aquatic ecology should be considered. Many peatland sites contain flushes and the headwaters of streams and rivers and, as such, are sensitive to hydrological/hydrogeological disturbances in the surrounding peat. The EIS should provide full details of any watercourse crossings and culvert types.

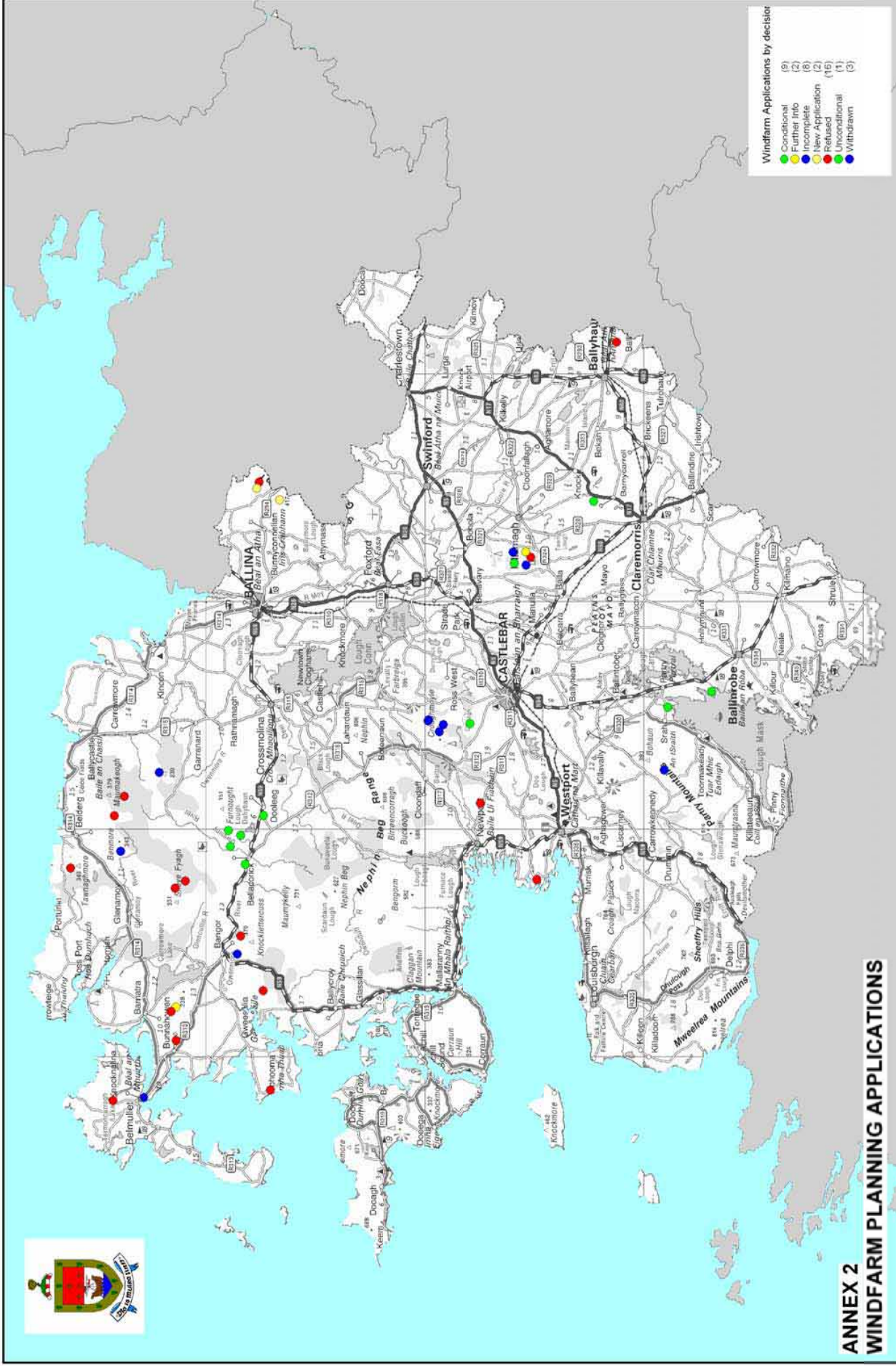
13. The EIS should consider the ecological effects of tree felling if this is required for windfarms in or close to conifer plantations, or other areas of woodland. If scrub or tree regeneration is to be prevented, the future use and management of cleared areas should also be considered.

14. The cumulative impacts of this windfarm and any other proposed or permitted developments in the area should be considered in the EIS.

15. It is noted that the connection to the National Grid may result in significant effects on sites, habitats and species of ecological importance. If the impacts of this component of the proposed development are not considered as part of the current EIS and planning application, it may be necessary to assess their impacts at a later stage.

## **ANNEX 2.**

### **A Survey of Planning Applications for Windfarms in County Mayo.**



## ANNEX 2 WINDFARM PLANNING APPLICATIONS