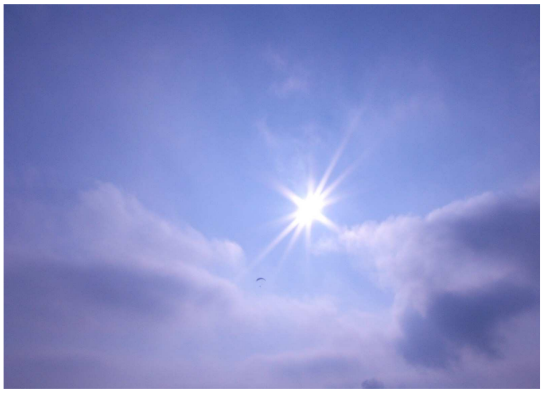
DRAFT ROSCOMMON COUNTY DEVELOPMENT PLAN 2014-2020

RENEWABLE ENERGY STRATEGY

May 2013



Roscommon County Council
Comhairle Chontae Ros Comáin

TABLE OF CONTENTS PAGE

LIST OF TABLES

LIST OF MAPS

CHAPTER ONE
INTRODUCTION, POLICY CONTEXT AND ENVIRONMENTAL CONSIDERATIONS

1.1 INTRODUCTION

The development of renewable energy offers sustainable alternatives to our dependency on fossil fuels; a means of reducing harmful greenhouse emissions; and, opportunities to reduce our reliance on imported fuels.

Renewable energy may be defined as energy which comes from natural resources namely; wind, rain, sunlight, the ocean and geothermal heat. The volatile nature of the fossil fuel markets combined with a global focus for a move towards greener and more sustainable forms of energy are the primary incentives for a greater recognition of renewable energy resources.

Renewable energy is generally recognised as a clean, sustainable and indeed infinite source of energy which can be produced continuously without unduly creating damage to the environment. This greatly differs from the perception of fossil fuels which are a finite source of energy, release carbon dioxide and other pollutants into the atmosphere and are becoming increasingly expensive.

Undoubtedly countries like Ireland will continue to have a level of dependence on fossil fuels and conventional methods of energy supply, primarily due to climatic, economic and societal factors. However Ireland has recognised the changing global demand for energy resources and the need to provide long term alternative solutions for energy and electricity production.

The Government has established national targets for the provision energy from renewable sources, which include:

- 16% of all energy consumed to be from renewable sources by 2020.
- 40% of all electricity consumption to be from renewable sources by 2020.
- 12% of all energy consumption to be from renewable sources for heating and cooling
- 10% of all energy from renewable sources used in transport by 2020.

It is clear that renewable energy will have an increasingly significant role in energy and electricity consumption throughout Ireland as we move into the future.

Roscommon County Council recognises the importance of renewable energy. County Roscommon has the potential to harness an extensive amount of renewable energy resources, primarily from wind, but also from biomass and to a lesser extent from hydro and solar energy. A Wind Energy Strategy was prepared by Roscommon County Council, but it was decided to incorporate the Wind Strategy into a more comprehensive Renewable Energy Strategy (RES), which will explore the potential of the aforementioned sources of renewable energy in County Roscommon.

As part of the County Development Plan, this document has undergone Strategic Environmental Assessment (SEA) and Habitats Directive Assessment (HDA) the findings of which are included in the SEA Environmental Report and Natura Impact Report which accompany the County Development Plan. Both the SEA and HAD reports should be read in conjunction with the Renewable Energy Strategy.

Roscommon County Council has prepared this Strategy with the aim of fulfilling the following objectives:

- To ensure Roscommon contributes towards meeting the national targets for the harnessing of renewable energy, set out by Government

- To actively assist in the move away from a dependence on fossil fuels which are contributing to climate change
- To provide opportunities for individuals, communities and commercial businesses to establish renewable energy initiatives and create employment opportunities in the expanding renewable energy sector
- To provide information on alternative renewable energies available along with the technological advances which are taking place in the field of wind farm development
- To provide a plan led approach to renewable energy development in Roscommon and clarity on the Council's commitment to developing renewable energy in a sustainable manner
- To assist in the realisation of the potential Co. Roscommon has to develop renewable energy by harnessing the existing natural resources available within the County
- To identify strategic areas for the development of renewable energy

What is Renewable Energy?
The main forms of renewable energy currently used are addressed in this Strategy, along with micro renewables. Renewable energy is energy which comes from the earth's natural resources namely wind, sunlight, ocean (waves and tide), and geothermal heat. All of these resources are naturally replenished. Each of these renewable resources has its own characteristics and dependencies which in turn influence their ability to be utilised in different areas and different climates.

Significance of Renewable Energy
Governments throughout the world now recognise and accept that the burning of fossil fuels has directly impacted upon global warming and damage to the ozone layer. Efforts are underway to explore as many options as possible to address global warming and reduce the man-made impacts upon the environment.

From an economic perspective the encouragement of a 'green economy' is now globally recognised as Governments establish climate change policies and provide incentives for innovation and investment in low-carbon technologies.

Renewable energy offers the possibility of providing lower carbon energy with the security of an infinite supply. The global recognition and move towards a more sustainable energy supply ensures that renewable energy will play an increasing role in our everyday lives as this industry expands.

1.2 POLICY CONTEXT

This Renewable Energy Strategy is guided by the relevant international, national, regional and local directives, policies and guidelines, including inter alia;

1.2.1 International Policy

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on climate change. Under the Protocol, the European Union (EU) is committed to achieving a reduction in total greenhouse gas emissions.

Directive 2009/28/EC relates to binding renewable energy targets for each member state by 2020. Member states must achieve their individual targets by developing renewable energy through the heat, transport and electricity sectors.

1.2.2 National Policy

Strategy for Renewable Energy 2012-2020
Published by the Department of Communications, Energy and Natural Resources in May 2012, this document sets out five strategic goals – increasing on and offshore wind, building a sustainable bio-energy

sector, fostering Research and Development in renewables such as wave and tidal, growing sustainable transport and building robust and efficient networks.

National Development Plan (NDP) - 2007-2013: Transforming Ireland-A Better Quality of Life for All
The NDP promotes the use of renewable energy resources and increased energy efficiency. The Sustainable Energy Sub-Programme allocates €276 million funding towards to facilitating strategic wind energy development, bio-mass and bio-fuel development, ocean energy, solar and geothermal development.

The National Climate Strategy 2007-2012
The primary objective of this strategy is to minimise greenhouse gas emissions which are contributing to global warming. The National Climate Change Strategy 2007-2012 identifies various approaches to achieving reduced greenhouse gas emissions. This strategy identifies the need for research, development and investment in renewable energy resources to aid Ireland in achieving its renewable energy targets set out and adhere to the binding commitments of the EU in relation to the Kyoto Protocol.

National Renewable Energy Action Plan (NREAP)
Article 4 of Directive 2009/28/EC on renewable energy requires each Member state to adopt a National Renewable Energy Action Plan (NREAP). This document sets out the each Governments' strategic approach and measures to deliver renewable energy targets. Ireland's NREAP sets out its aims and objectives for achieving a 16% target of energy consumption from renewable sources by 2020 as required under the European Directive.

The National Biofuel Obligations Scheme 2010
The National Biofuel Scheme requires all road transport fuel suppliers to use biofuel in the fuel mix to ensure that biofuel represents 4% per annum of their annual fuel sales.

Ocean Energy in Ireland 2005 and Draft Offshore Renewable Energy Development Plan 2010
This document outlines a strategy to advance Ireland's research and development capabilities to ensure ocean energy contributes to meeting national renewable energy targets up to and beyond 2016.

Grid 25 - A Strategy for the Development of Ireland's Electricity Grid for a Sustainable and Competitive Future
Grid 25 is a strategy for the development of Ireland's electricity grid to provide a sustainable and competitive future for this country. Eirgrid, along with all key national agencies and stakeholders, including the Energy Regulator, the distribution and transmission systems operators are working with the Government to deliver Ireland's target of 40% of electricity generated through renewable sources by 2020. The provision of a strategic grid connection and distribution network is vital to achieving this target. The Grid 25 programme sets out a total investment of 4 billion euro over the period 2010-2025.

1.2.3 Regional Policy

The West Regional Authority has included some information on wind farm development and the resultant energy in the Regional Planning Guidelines for the West Region 2010 – 2022 (made October 2010).

These Regional Planning Guidelines state the following in relation to renewable energy:

Securing indigenous renewable energy supplies will generate a more sustainable economy, lower carbon emissions, combat climate change and help meet national government and EU renewable targets.
Ireland and the West Region have the potential to become net energy exporters through harnessing our renewable energy resources.

1.2.4 Local Policy

The Roscommon County Development Plan (RCDP) sets out the framework for the sustainable development of the County. The RCDP and the associated Landscape Character Assessment, supports the development of renewable energy at appropriate locations throughout the County.

Chapter 4 of the RCDP provides a broad discussion on renewable energy and energy policies and objectives are provided within the Plan.

This Renewable Energy Strategy provides the specific framework for the development of renewable energy throughout the County and is incorporated as part of the County Development Plan. This Renewable Energy Strategy is consistent with the policies and objectives of the County Development Plan in relation to the promotion and facilitation of renewable energy in County Roscommon.

1.3 ENVIRONMENTAL CONSIDERATIONS

The Roscommon Renewable Energy Strategy is informed by Strategic Environmental Assessment (SEA) and Habitats Directive Assessment (HDA). These assessments inform decision makers and interested parties of the likely impacts associated with the implementation of the (RES) on the various elements of the environment.

The SEA and HDA are available for inspection at Roscommon County Council. A description of each of the assessments and how these have been integrated into the Roscommon Renewable Energy Strategy is set below.

1.3.3 Strategic Environmental Assessment

Strategic Environmental Assessment (SEA) is the formal systematic evaluation of the likely significant environmental effects which need to be taken into account at every stage i.e. preparation, implementation, monitoring and review of plans or programmes (in this case the RES). Essentially the SEA process aims to address all the environmental consequences of the (RES) prior to a decision being made to adopt it.

Due to the diverse nature, scale and locational elements of renewable energy development a range of potential adverse impacts on the environment exist. The SEA enabled the identification of these potential environmental impacts. The SEA process facilitated the development of a (RES) which provides the appropriate balance between the development of renewable energy and the protection of environmental values. This ensures that renewable energy development carried out on foot of this Strategy will be consistent with the proper planning and sustainable development of County Roscommon.

The SEA assessed the likely significant effects of implementing the strategy on key environmental elements as identified in Schedule 2B (f) of SI No 436/2004. These are: biodiversity (flora, fauna), population/human health, geology/soils, hydrology/hydrogeology, air/climatic factors, material assets; cultural assets (architecture and archaeology), landscape and the interrelationship between all factors.

The policies and objectives set out in this document have also been used to assess the likely significant effects of implementing the (RES) on the environment. Also, alternative scenarios to the preferred (RES) underwent a similar assessment for likely significant effects. The alternative scenarios are outlined below.

Scenario 1 – Ad-Hoc Planning for Renewable Energy Development
This scenario involves determining each application for renewable energy developments on a site-by-site basis.

Scenario 2 – Use Renewable Energy Sources Other Than Wind
This scenario considers the potential of generating sufficient energy from renewables other than wind, including bio energy, hydro power, solar energy and geothermal energy.

Scenario 3 – Apply a Strategic Consideration of Renewable Energy Development
This scenario assesses the potential within Roscommon to develop renewable energy from a combination of all energy sources.

The SEA process identified Scenario 3 - Apply a Strategic Consideration of Renewable Energy Development, as the preferred scenario and the Roscommon (RES) has been prepared based upon this.

1.3.4 Habitats Directive Assessment

Under the provisions of Article 6(3) of the Habitats Directive 92/43/EEC a Habitats Directive Assessment (HDA) was undertaken for the Roscommon (RES). This was undertaken to assess the impact of the implementation of the (RES) and ensure that developments arising from this Strategy would not give rise to an adverse affect on Natura 2000 sites.

The HDA determined that the implementation of the (RES) in relation to bio energy, solar, heat pump/geothermal energy is unlikely to adversely affect Natura 2000 sites. The HDA also determined that hydroelectric schemes by virtue of their nature and scale could significantly affect Natura 2000 sites, particularly sites with annexed water dependent habitats and species.

Natura 2000 sites are therefore not considered suitable for the development Pumped Hydro Electric Storage (PHES) schemes. All other proposals for hydroelectric schemes within or adjacent to Natura 2000 sites will be required to undergo Habitats Directive Assessment. Only proposals that determine no adverse affects on Natura 2000 sites will be permitted.

In relation to wind energy development the HDA determined significant effects, including cumulative effects, were likely from the identification of Most Favoured Areas and Less Favoured Areas. The AA concluded that the integrity of Natura 2000 sites could be adversely affected by wind energy developments within and adjacent to these designated sites. Thus it was determined that all Natura 2000 sites and their surrounding buffers shall be designated as areas not favoured for wind energy development.

Additional mitigation measures have also been recommended to preclude indirect effects on any Natura 2000 sites, for all other renewable energy developments outside designated areas, arising from this (RES).

The AA concluded that, with the implementation of these measures, there would be no adverse effect on Natura 2000 sites. Notwithstanding the HDA undertaken for this Strategy, individual renewable energy development proposals may be required to undertake HDA at project stage. Only proposals that determine no adverse affects on Natura 2000 sites will be permitted.

1.4 POLICIES AND OBJECTIVES OF THE STRATEGY

Roscommon County Council recognises the need to assist the aim to meet national targets for achieving energy from renewable resources and reducing greenhouse gas emissions associated with energy production. Thus in accordance with the principals of proper planning and sustainable development and recognition of the need to provide a framework for renewable energy development within the County, policies and objectives have been prepared for this Strategy. These policies and objectives along with all relevant policies and objectives in the County Development Plan will apply when assessing planning proposals for renewable energy developments.

Renewable Energy Strategy Policies and Objectives

Policy 1 – Climate Change
Support the National Climate Change Strategy 2007-2012.

Objective 1.1
It is an objective of the Council to assist in the national targets for achieving energy from renewable resources and reducing greenhouse gas emissions associated with energy production.

Objective 1.2
It is an objective of the Council to encourage and facilitate the various forms of renewable energy development explored in this Strategy, provided they are in accordance with the principals of proper planning and sustainable development.

Objective 1.3
It is an objective of the Council to encourage energy efficient designs and integration of renewable energy components into new and existing developments.

Policy 2 – Built and Natural Environment
Ensure that renewable energy developments do not undermine the preservation and conservation of the natural and built environment and an appropriate balance is achieved between development and preservation of the natural environment.

Objective 2.1
It is an objective of the Council to fully comply with the relevant EU and National legislation regarding renewable energy development and environmental protection.

Objective 2.2
It is an objective of the Council to provide a framework for renewable energy development within the County through the adoption and implementation of this Strategy, which guides renewable energy developments to the appropriate areas of the County and provides development management requirements for all renewable energy proposals.

Objective 2.3
It is an objective of the Council to ensure all renewable energy proposals are assessed having due regard to the presence and requirement to protect all Natura 2000 sites, Natural Heritage Areas and, proposed Natural Heritage Areas. Projects considered to impact upon these sites will be subject to Habitats Directive Assessment, as deemed appropriate.

Policy 3 Strategic Infrastructure
Encourage and assist the provision of strategic infrastructure in appropriate areas of the County to facilitate the provision and potential exportation of renewable energy.

Objective 3.1

It is an objective of the Council to work in collaboration with EirGrid and other service providers and statutory bodies to facilitate a modern electricity network within the County, in line with recognised best practice. The Council aims to ensure that comprehensive studies are undertaken for all technical and environmental considerations when assessing preferred transmission routes.

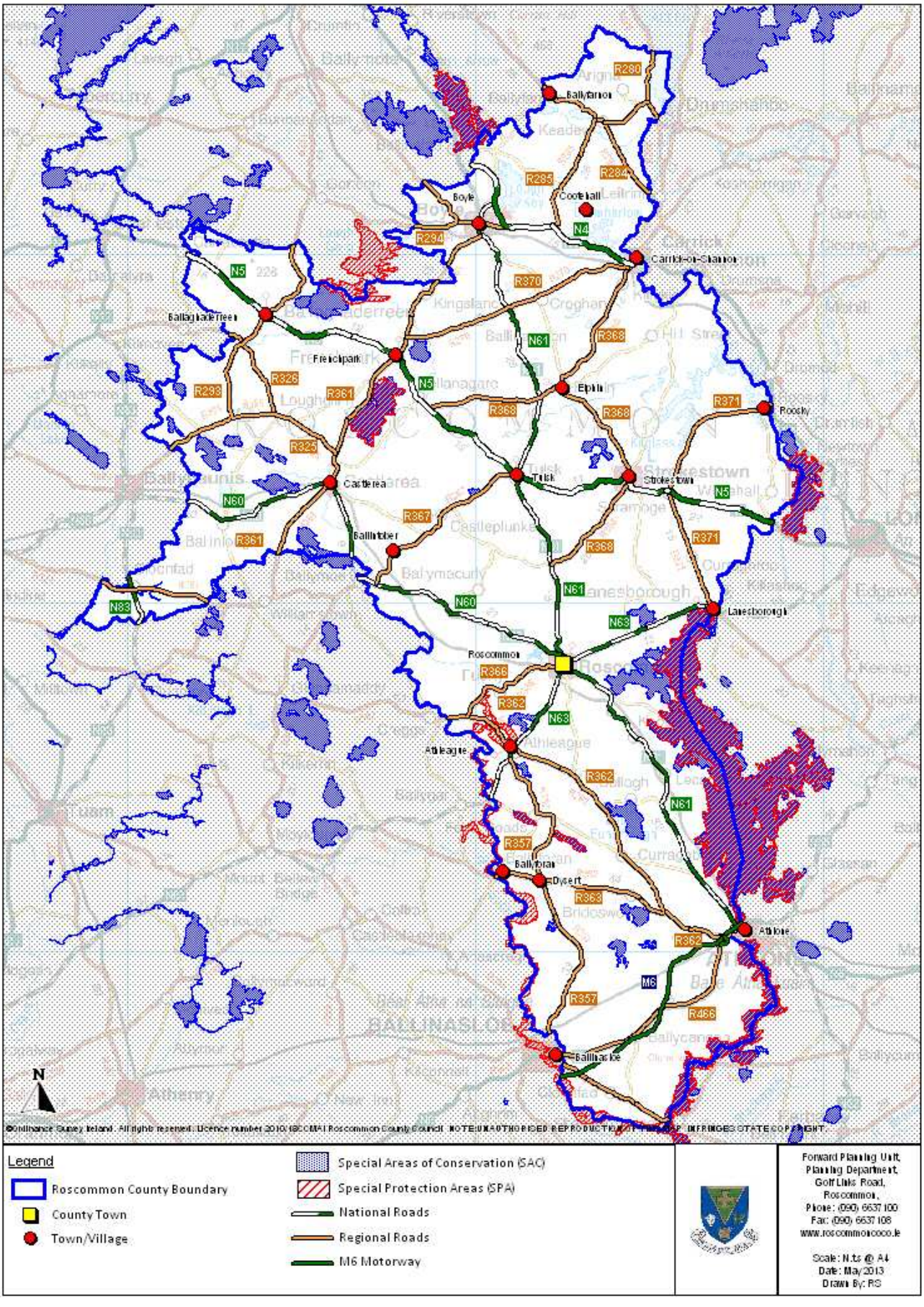
Policy 4 Research and Development

Encourage and facilitate research and development proposals for renewable energies in accordance with the principals of proper planning and sustainable development.

Objective 4.1

It is an objective of the Council to support the development of facilities within the County dedicated to the exploration and advancement of renewable energy technologies. Such facilities could assist in expanding public awareness of the sustainable benefits of renewable energy, provide training, research and development facilities for renewable energy.

Draft Roscommon Renewable Energy Strategy
Map 1 Ecological Designations



CHAPTER TWO
PHYSICAL CONTEXT AND RENEWABLE ENERGY DEVELOPMENT

2.1 PHYSICAL CONTEXT

2.1.1 Existing Renewable Energy Developments in Roscommon

Renewable energy activity is evident in Roscommon at both a strategic scale and micro level. In terms of large scale renewable energy production in the County, windfarms are the main provider. The existing wind farms operating in County Roscommon collectively generate almost 29MW, which is just over 1.1% of the total wind energy capacity generated from 22 Counties in Ireland[1]. When compared with Cavan (i.e. another inland County) which generates approximately 116MW, it shows that there is significant scope for increased wind energy development in Roscommon.

Over recent years Roscommon County Council has received a number of applications for wind energy developments (see Map 4). These mostly relate to individual turbines (micro generators, some of which are exempt) for individual businesses or dwellings, however recently, proposals for the development of three wind farms; one at Sliabh Bawn and two towards the south of the County have been put forward. These recent applications along with other applications for wind speed monitoring masts which have been received indicate recognition from the wind energy industry of the potential for development in the County. At present the existing wind energy developments operating in Roscommon are located at: Kilronan, Largan Hill, Altagowlan, Spion Kop and Tullynahaw.

Various forms of renewable energy at a micro-level, namely micro wind turbines, solar panels, heat pumps and bio-mass technologies have already been developed throughout Roscommon. To date wind farms have dominated renewable energy developments in Roscommon however as technology in other renewables continues to advance, it is feasible that other forms of hydro, bio and solar energy can be developed on larger scale in Roscommon. For that reason this RES will examine all the main forms of renewable energy currently available.

2.2 TYPES OF RENEWABLE ENERGY

2.2.1 Wind Energy

There is a growing acceptance in Ireland that wind energy currently offers the greatest potential for establishing large scale renewable energy development. On a global scale wind energy is one of the most developed forms of renewable energy. This is primarily due to the level of availability of wind throughout many different countries and continents. Ireland is regarded as have the premier wind resource in the EU due its location in Western Europe.

There are two location possibilities of wind energy i.e. on-shore and off-shore. The main issues relating to each of these are as follows: -

Off-Shore Wind Energy
The wind energy generated off shore is harnessed for use by the development of off-shore wind turbines. Off-shore wind turbine developments are much more expensive and technologically challenging to construct than on-shore wind turbines. However as winds generally tend to be stronger and more consistent off-shore, turbines at sea produce higher energy output for longer periods. According to Irish Wind Energy Association (IWEA) website information, in order for off-shore wind turbines to be feasibly developed, a seabed slope not greater than 5% and a water depth not greater than 35 metres is required.

[1] Figure obtained from Irish Wind Energy Association Website – Correct as of 11/02/2013

These physical requirements dictate the level of development that can reasonably take place off-shore, at a price that is cost effective for the developer and not unduly onerous on the natural environment of the seabed.

Website for this image – thegreenenergycollective.com

On-Shore Wind Energy

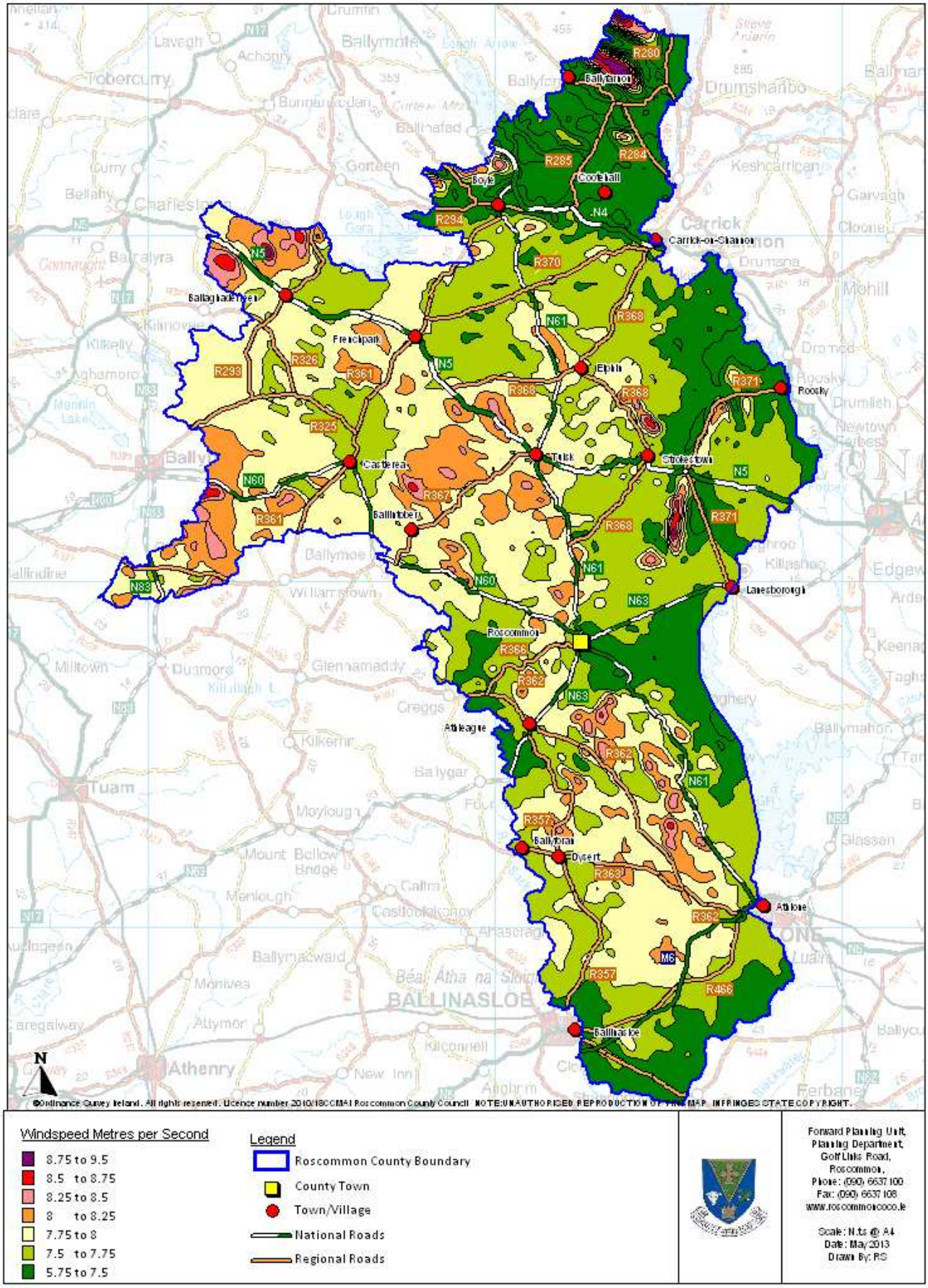
On shore wind energy is developed from winds which have come from the sea onto land, hence coastal areas generally have the strongest wind speeds. On-shore wind turbine developments harness this energy by choosing the optimum locations on land to erect turbines. Generally the more elevated areas tend to provide the most favourable wind speeds, however open low lying areas can also produce wind speeds which would be considered commercially viable. Wind speeds at approximately 75m to 100m above ground level are primarily researched by prospective developers. This is done by placing anemometers (devices used for measuring wind force and velocity) on potential wind farm sites for periods ranging from 2 – 3 years, to gauge the commercial viability of harnessing the wind speeds.

The advantages of wind energy is that it produces virtually no air pollution in their operation and the carbon energy associated with the development of a turbine i.e. transport of turbines, construction machinery etc., is offset by the energy generated by the turbine operating for approximately 3 months. Relatively speaking on shore wind farms is considered one of the most economically feasible forms renewable energy.

However there is a significant amount of negative impacts perceived with wind farm developments namely; visual impact, wildlife/birdlife impact, residential impact (noise, shadow flicker), significant land uptake and electromagnetic interference. It is considered that appropriate guidance and management of wind farm developments can address the aforementioned negative aspects associated with this form of renewable energy. Areas of known conservation value e.g. Natura 2000 sites can be precluded from wind farm developments and appropriate buffer zones/separation distances can be applied between wind turbines and for example; lakes, rivers, amenity areas and dwellings. Development management guidance and criteria relating to wind energy is addressed in Chapter 5 of this RES.

Website for this image – tomorrowisgreener.com

Draft Roscommon Renewable Energy Strategy
Map 2 Windspeeds in Roscommon



2.2.2 Renewable Energy from the Ocean

The ocean offers a wide range of alternative means of harnessing its vast energy. Two types of energy are produced from the ocean: thermal energy from the sun's heat and mechanical energy from the tides and waves generated. More than 70% of the earth's surface is covered by oceans. The ability to harness a fraction of the energy generated by the earth's oceans and convert to a usable energy source would mean the provision of an energy supply capable of providing power to the world.

Ocean Thermal Energy
Ocean thermal energy is evolving as a method of producing a renewable source of electricity generation. This system operates on three different ways, which are: closed-cycle, open-cycle and hybrid.

Closed-Cycle – This system uses the ocean's warm surface water to vaporize a low-boiling point fluid, such as ammonia. The vapor produced expands and turns a turbine. The turbine then activates a generator to produce electricity.

Open-cycle – This method involves the boiling of the seawater operating at low pressures. The boiling process produces steam that in turn feeds to a turbine/generator.

Hybrid – As the title suggests the hybrid system combines both closed-cycle and open-cycle systems.

Ocean Mechanical Energy
Ocean Mechanical Energy is generated from the solar activities of the sun, but more importantly by the gravitational pull of the moon which affects ocean tides and winds which create waves. Unlike ocean thermal energy which is generally a constant energy source, tides and waves are intermittent sources of energy.

The conversion of both tidal and wave energy to electricity involves the following mechanical devices:-

Tidal energy is created by forcing ocean water through turbines in a barrage/dam, which activates a generator, resulting in electrical power. Wave energy conversion operates using three basic systems:-

Channel system - this funnels waves into reservoirs

Float system – this method utilises hydraulic pumps

Oscillating water column system – this uses waves to compress air within a container

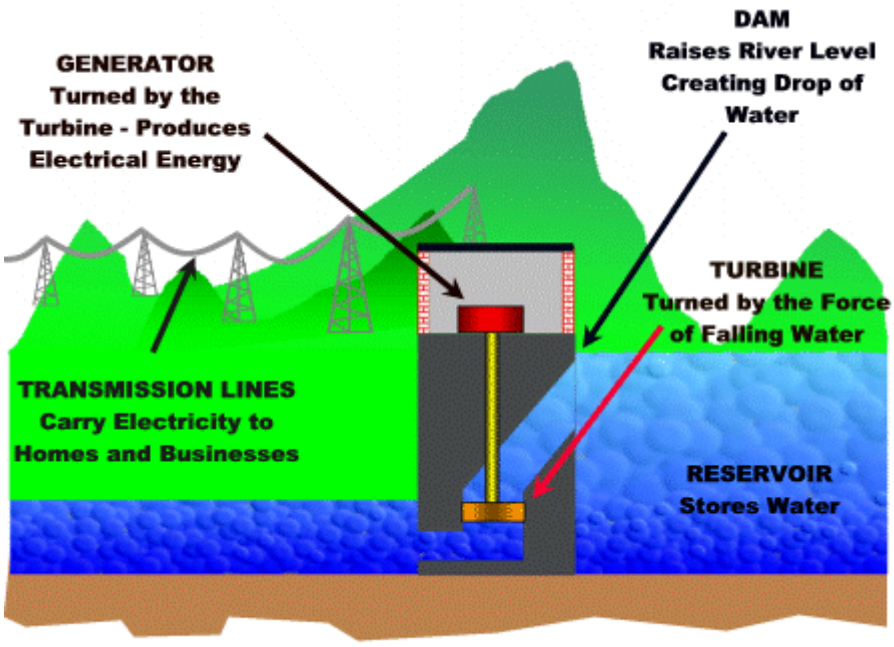
All of the these three systems generate mechanical power which either directly activates a generator or transfers to a working fluid, water, or air, which then drives a turbine/generator.

The advantages of ocean energy include inter alia:-

- It is reliable source of energy – tidal activity is a constant
- Once developed, no other fuels are required as the power of the ocean creates the energy to generate power
- Maintenance of infrastructure associated with this form of energy is minimal
- This form of energy is not associated with residential or significant visual impacts, which differs greatly with on-shore forms of renewable energy

Negative impacts are generally accepted as minimal, however there are concerns associated with the on-shore infrastructure associated with ocean energy, as well as potential impacts on marine activity and biodiversity.

2.2.3 Renewable Energy from Hydropower



Website for this image – self-sufficient-blog.com

Hydropower may be defined as power derived from the energy created by moving or falling water. This energy can be harnessed to generate electricity. Unlike other relatively new forms of renewable energy, hydropower or waterpower has been used for various purposes dating back many years. Irrigation systems water wheels are early examples of harnessing water power for a specific purpose.

The methodology applied to hydropower is relatively simple. Falling or moving water is used to turn waterwheels or modern turbine blades which, in turn is used to power a generator to produce electricity. For example, a water turbine captures the energy in the falling water and converts the hydraulic energy into mechanical energy at the turbine shaft. The turbine then powers an alternator which converts mechanical energy into electrical energy. The water power is used to generate electric power. The electricity produced by hydro-power is called hydroelectricity.

Hydro-power is a clean source of energy system that does not create pollution nor require fuel to function during its operation. As long there is a water source, namely a river hydropower can be generated. As the rivers throughout Ireland are relatively small, they provide a limited hydro energy capacity which would fall far short of meeting national demands.

Ardnacrusha power plant is a hydroelectric power station which was originally referred to as The Shannon Scheme. It is located near Ardnacrusha within County Clare approximately 1.5 miles from the Limerick border. It is Ireland's largest river hydroelectric scheme and is operated on a purpose built canal connected to the River Shannon.

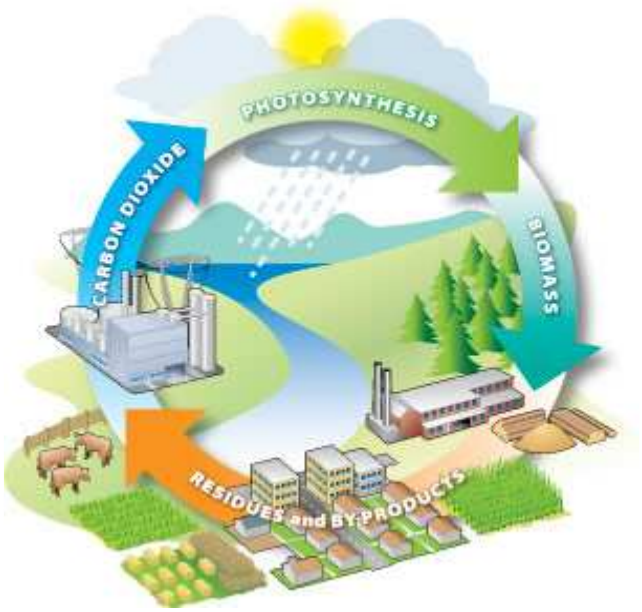
Ardnacrusha Hydro Electric Power Plant

The advantages of Hydropower are as follows: -

- Once constructed, the hydropower plant produces no direct waste and has a significantly lower output of carbon dioxide than plants powered by fossil fuels.
- Operational costs are low
- Reservoirs have a significant life span with little maintenance required

Depending on the scale of the development, a hydropower plant can have varying levels of impact upon the natural environment, geology and marine and terrestrial life. There are also contrasting opinions on the visual impact associated with hydropower facilities.

2.2.4 Renewable Energy from Bio-energy



Website for this image – cleantechloops.com

Bio-energy may be defined as energy derived from biological matter such as plants, animals, wood, waste, hydrogen (gas) and alcoholic fuels. The three principal forms of bio-energy are biomass, biogas and bio-fuel.

Biomass – this is the use of plants for energy production. Biomass is regarded as a form of renewable energy as the solar energy trapped in the plant is released when burned. Plants can be grown specifically for this purpose but biomass can also be derived from forest residues such as dead trees, branches, tree stumps wood chips and pellets.

The largest source of energy from wood is pulping liquor which is a bi-product of the processes involved in making paper and cardboard. Biomass can be converted to other usable forms of energy like methane gas or transportation fuels such as ethanol and bio-diesel.

The advantages of Biomass include: -

- It is an abundant source of energy and marginal lands which are not suited for agricultural or other uses may be used to facilitate forestry
- Fuels derived from bio-mass produce very few emissions
- Biomass can be harnessed throughout the world
- Biomass can offer a secondary use of agricultural wastes, which in turn adds value to the agricultural crop

The main disadvantages of biomass are that in order to be cost effective, significant tracts of land are required to harvest biomass products. Essentially biomasses harvesting needs to operate on a large scale to address the associated negative impacts such as, fuel consumption to harvest and transport the product to large storage facilities.

Biogas – Biogas typically refers to a gas produced by the biological breakdown of organic matter. It is produced by the anaerobic digestion of organic materials such as farm manure, food waste, sewage and organic waste from municipal sources.

Biogas can be transformed into renewable heat or electricity. Biogas can also be compressed, much like natural gas, and used to power motor vehicles.

Biogas is developed on a micro-scale, directly at the source, for example on a farmyard. On a larger scale, biogas plants can be developed where agricultural and municipal wastes are brought to site for the purposes of creating this form of renewable energy.

The main advantage and disadvantage of biogas are inextricably linked in that biogas production allows for the burning and removal of waste products; however the potential odours arising from this burning process are the subject of huge concern for people.

Biofuel – Biofuels include fuels derived from biomass conversion however biofuel is generally associated with either bioethanol or biodiesel.

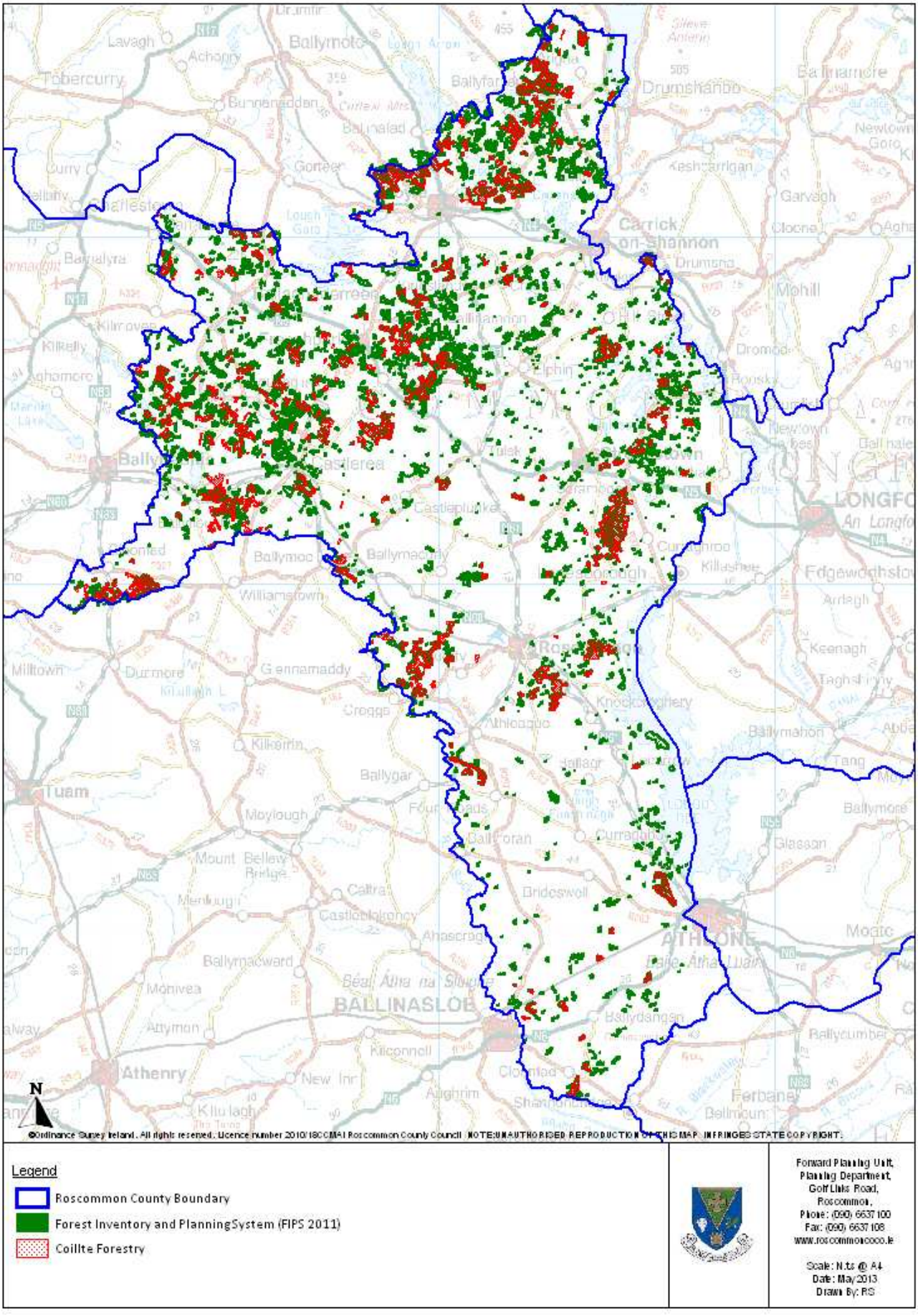
Bioethanol - Bioethanol is an alcohol made by fermentation, mostly from carbohydrates which are produced in sugar or starch crops, for example corn or sugarcane. Cellulose biomass, derived from non-human consumption food sources such as trees and grasses, is also being developed as a feedstock for ethanol production. Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a fuel additive to increase octane and reduce vehicle emissions.

Biodiesel – Biodiesel is made from vegetable oils and animal fats. Biodiesel can be used as a fuel for vehicles in its pure form, but it is usually used as a diesel additive to reduce levels of particulates, carbon monoxide, and hydrocarbons from diesel-powered vehicles. Biodiesel is the most common biofuel in Europe.

The advantages associated with biofuel are that it can be manufactured from a broad range of materials such as, crop waste, animal fats and recycled grease.

As already highlighted the disadvantages associated with biofuels is the significant amount of lands required for growing the associated plant material, when this method of biofuel production is applied. Furthermore biofuels have a lower energy output than that of fossil fuels and as such greater quantities of biofuel are required to produce the same levels of energy.

Draft Roscommon Renewable Energy Strategy
Map 3 Potential Bio Energy Sources



2.2.5 Solar Energy and Solar Thermal Energy

Nellis Solar Power Plant, the second largest photovoltaic power plant in North America

Solar energy has been harnessed since ancient times for different uses, the most simplistic uses being for heating and drying. Solar technology has two broad categories which are, passive solar or active solar. The difference between the two is the way they capture, convert and distribute solar energy.

Active Solar Energy – This process involves the use of solar panels (referred to as photovoltaic panels) and solar thermal collectors to harness the energy created by the sun.

Passive Solar Energy – This method of harnessing the sun's energy relies on orientating a building in such a way that it avails of as much sunlight as possible as well as selecting materials with favorable thermal mass or light dispersing properties. Designing spaces that naturally circulate air is also classified as passive solar energy.

Examples of large scale active solar energy developments can be found in the deserts of the United States on the periphery of large cities such as Las Vegas. Vast energy reserves are harnessed by this method, where hundreds of solar panels are set out to capture the sun's energy.

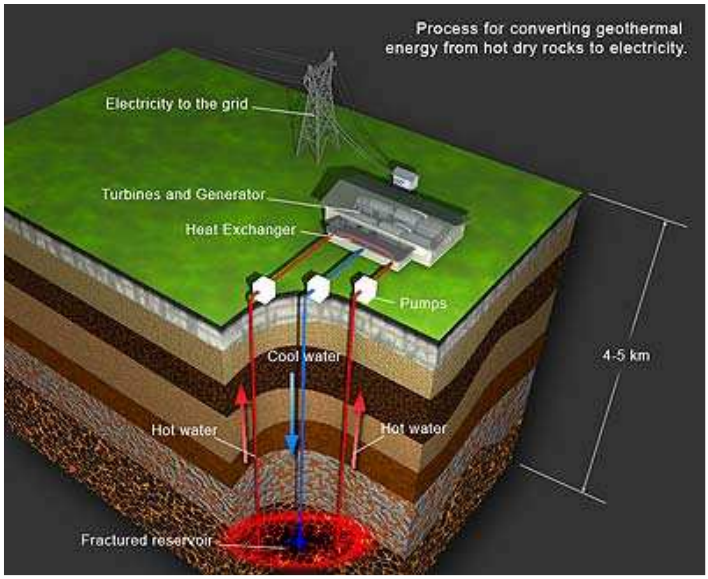
On a micro level, solar panels attached to houses are used to heat water and in some instances heat radiators. Depending on the scale solar panels can generate enough renewable energy to provide electricity for a building and also have an excess, which can be exported to the grid.

Solar Thermal Energy essentially utilises the suns energy as an efficient renewable heat source. By using heat pumps the suns heat is captured and can be stored for longer use i.e. in the evenings or on cold days when there is no sunshine. There are three levels of what are referred to in the industry as thermal collectors. Low-temperature collectors are flat plates generally used to heat swimming pools. Medium-temperature collectors are also usually flat plates but are used for heating water or air for residential and commercial use. High-temperature collectors concentrate sunlight using mirrors or lenses and are generally used for electric power production.

The major advantage of solar energy is its infinite source. If designed into a building project at an early stage it can also be a cost effective energy source in a development.

The main disadvantage is that depending on its scale the cost effectiveness of incorporating it into a design solution is questionable. Furthermore in countries like Ireland where sunlight is not reliable its energy input varies. Thus storage and back up sources of energy will invariably be necessary.

2.2.6 Geothermal Energy



Website for this image – energysolve.ie

Geothermal energy is energy generated and stored in the earth. Geothermal energy has been used since ancient times for bathing and space heating, but its modern application is now primarily for electricity generation. The intense heat and pressure at the earth's core causes the conduction of this heat to the cooler surrounding rock closer to the earth's surface. The high temperature and pressure cause some of this rock to melt, which in turn creates magma convection upward since it is lighter than the solid rock.

Granite is regarded as a particularly good rock for geothermal energy extraction, but this type of rock is sparse in Roscommon, which is predominantly characterised by less effective limestone and sandstone.

In theory there is sufficient geothermal energy to supply the earth's energy requirements, however due to the costs associated with exploration and drilling only a small fraction of this energy can be harnessed.

The advantages of geothermal energy are that at suitable locations i.e. where deep drilling is not required, geothermal extraction is a cost effective, reliable and environmentally friendly source of renewable energy. Ongoing technological advances have opened further opportunities for geothermal to be used on a micro level, namely as a source for home heating.

Disadvantages associated with this form of energy relate to the potential emission of greenhouse gases trapped deep within the earth when drilling takes place. However these emissions are much lower per energy unit than those of fossil fuels. The energy sourced from a geothermal well can be exhausted and according to the geothermal association website, the lifespan attributed to geothermal wells is approximately 20-30 years.

CHAPTER THREE
ENERGY INFRASTRUCTURE

3.1 ENERGY INFRASTRUCTURE

3.1.1 The National Grid

The Electrical Transmission System in Ireland, more commonly referred to as "The National Grid", is a meshed network of approximately 6,500km of high voltage, 110,000 volts (110kV), 220,000 volts (220kV) and 400,000 volts (400kV), overhead lines and underground cables and over 100 transmission stations.

The system can be compared to Ireland's motorway network – delivering power to over 100 bulk transfer points or "nodes" all over Ireland where power can be taken onwards on lower voltage, distribution system, lines to individual customers' premises[2].

There are two bodies in Ireland responsible for the supply of electricity. The Transmission System Operator (TSO) for the Republic of Ireland is **EirGrid.** The Distribution System Operator is **ESB Networks.** This body is responsible for supplying Ireland's domestic, commercial and industrial customers.

3.1.2 Electricity Infrastructure in County Roscommon

The following electricity transmission substations are located within County Roscommon:
Carrick-on-Shannon 110 kV substation;
Flagford 220 / 110 kV substation;
Arigna 110 kV substation;
Tonroe 110 kV substation; and
Athlone 110 kV substation.

The following stations are on the border with County Roscommon:
Lanesboro 110 kV substation, County Longford;
Shannonbridge 110 kV substation, County Offaly and
Gilra 110 kV substation, County Leitrim.

In County Roscommon there is approximately 60 km of 220 kV lines (this includes the Flagford to Srananagh 220 kV line currently under construction and due for completion in 2012, 15 km of which will be in County Roscommon) and approximately 190 km of 110 kV lines.

3.1.3 The Gate 3 Grid Connection Offer Programme

The Gate 3 Grid Connection Offer Programme is the third round of connection offers issued to generators under the Group Processing Approach introduced by the Commission for Energy Regulation in 2004. It allows applications to be processed by the System Operators in groups or batches known as "Gates".

The Gate 3 Programme was completed by EirGrid in June 2011. EirGrid holds licences as independent electricity Transmission System Operator (TSO) and Market Operator (MO) in the wholesale energy trading system in Ireland. If realised, the Gate 3 grid connections offered to developers, has the potential to result in a three-fold increase in the amount of renewable energy on Ireland's electricity network.

[2] www.eirgrid.com

Interestingly Sliabh Ban in Roscommon was the location where the final offer of 94 offers was issued by EirGrid under the Gate 3 Programme. Coillte were issued with an offer from EirGrid to connect a 58MW windfarm, granted by Roscommon County Council, to the grid.

The collective 94 offers represent a total of over 5,400 MW of electricity to both renewable and conventional energy generators. This amount of energy would be more than Ireland's peak demand load, which would allow for the exportation of surplus energy generated.

Over 4,000 MW of the 5,400 MW potentially to be developed is from renewable energy generators. This represents nearly three quarters of all offers under the Gate 3 Programme. Of the 4,000 MW of potential renewable energy contracted, approximately 3,900 MW of this energy, is wind energy.

At present there is approximately 1,500 MW of renewable energy connected to the transmission system. Completion of the Gate 3 Programme represents a significant step towards meeting Ireland's renewable energy targets. The Government has mandated that 40% of all electricity consumption must be met from renewable sources by 2020, the highest target in Europe[3].

3.2 FUTURE DEVELOPMENT OF THE NATIONAL GRID – GRID 25

Website for this image – thejournal.ie

Grid 25 is a strategy for the development of Ireland's electricity grid to provide a sustainable and competitive future for this country. Eirgrid, along with all key national agencies and stakeholders, including the Energy Regulator, the distribution and transmission systems operators are working with the Government to deliver Ireland's target of 40% of electricity generated through renewable sources by 2020. The provision of a strategic grid connection and distribution network is vital to achieving this target. The Grid 25 programme sets out a total investment of approximately €4 billion euro over the period to 2025.

According to the document Grid 25 – A Strategy for the development of Ireland's Electricity Grid for a Sustainable and Competitive Future, the Grid 25 programme is essential to:

- Supporting growth in the regions and ensuring continued reliability and security of supply
- Providing high-quality, high voltage bulk power supply for Ireland that will enable the different regions to attract in future industry and boost existing industry

[3] www.eirgrid.com

- Exploiting Ireland's natural renewable sources of energy (wind and wave)
- Reducing Ireland's carbon emissions by transmitting renewable energy in line with Government policy
- Increasing Ireland's connectivity to the European Grid, allowing for both bulk exports of electricity and imports of electricity when appropriate.

This document also cites the consequences of not implementing Grid 25. It states that the consequences of non-action are:

- Within the next five to ten years key parts of the Grid will have reached capacity and will be in danger of overloading, resulting in loss of supply to customers
- High-tech industry that requires secure, high quality energy supplies will be limited to locations with strong grid infrastructure
- The needs of new and current residential clients will not be met
- The power system will not be able to guarantee security of supply
- Access to the market will not be possible for all low-cost generators limiting competitiveness in the electricity market
- The drive to reduce Ireland's CO2 emissions and meet its targets for the use of renewables in compliance with legislation will be seriously undermined
- Ireland will not be strongly connected to the European Grid and will be unable to participate fully in a pan-European electricity market.

3.3 FUTURE DEVELOPMENT OF THE NATIONAL GRID IN CO. ROSCOMMON

EirGrid has divided up the infrastructure network into seven regions. The majority of the land mass of Roscommon forms part of the North West Region, however a significant portion of the south of the County lies within the Midlands Region.

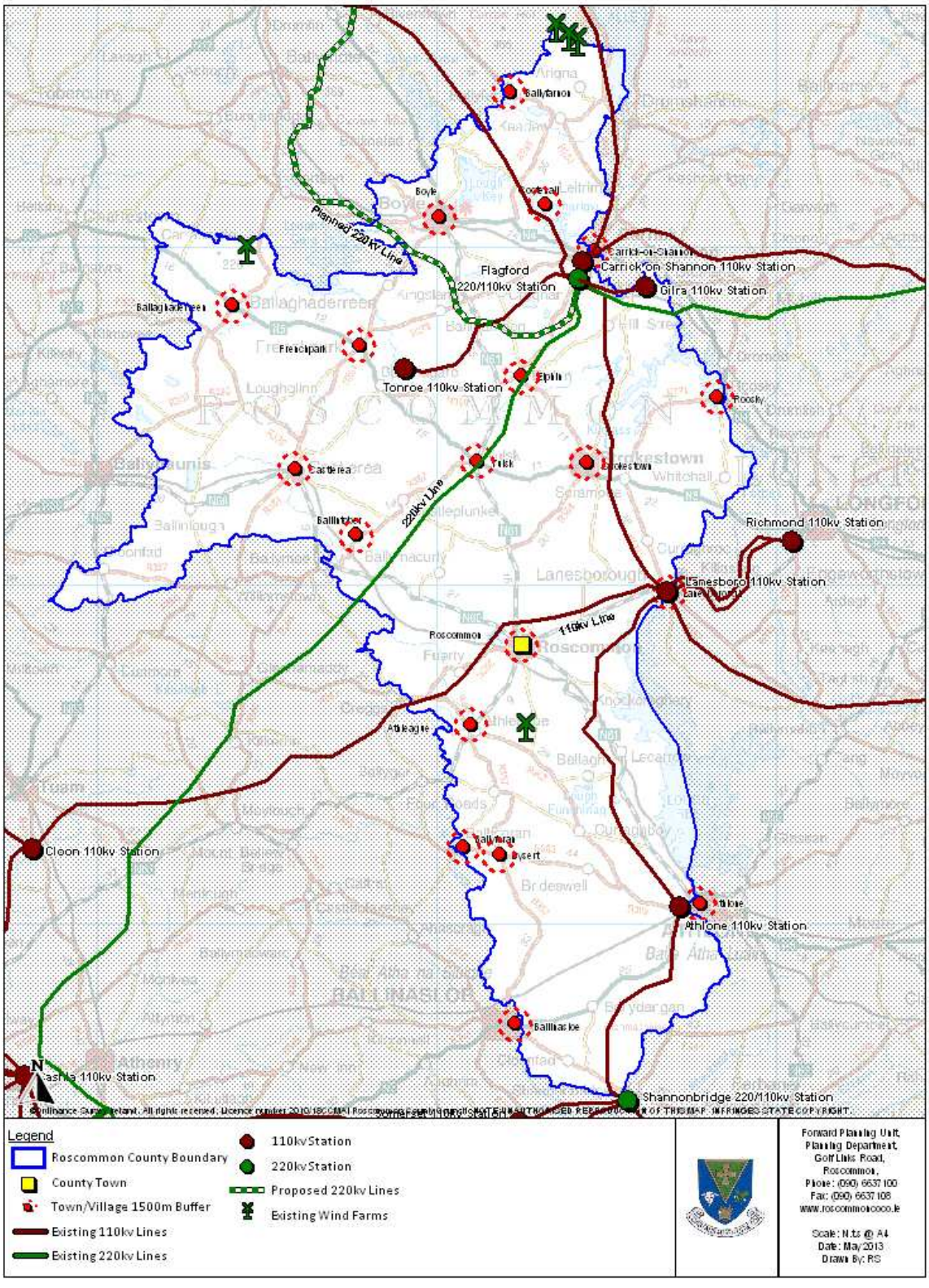
The entire 110kV network requires uprating to ensure that the assets are being utilised to their maximum level. This will include both restringing conductors on existing support structures and replacement of whole sections of existing 110kV assets. The Carrick-on-Shannon 110kV station does not provide sufficient capacity for the flows expected as a result of wind generation connections in the North West of the country. Solutions for a redevelopment of this station are being investigated by EirGrid.

Eirgrid have identified that up to two high capacity 400kV lines from the Bellacorick area in North West County Mayo to the existing extra high voltage network are required and are planned to be provided under the Grid West Project. A solution being considered as part of the Grid West project is a 400kV overhead line between Bellacorick and Flagford Substations. It is envisaged that the route of this line is likely to traverse the north of the County. These projects were at an early stage of development in 2013, route corridors have not been identified. Eirgrid are presently liaising with the Council as the project progresses.

The potential benefits of implementing the transmission projects within Roscommon and the wider region include inter alia:

- This region of the country can become a net exporter of power to the rest of the island, reducing its reliance on generation from outside the region.
- The development of new and upgraded transmission networks will facilitate the growth of renewable energy connections in the County.
- An increase in power supply will accommodate and help attract future industry to the County.

Draft Roscommon Renewable Energy Strategy
Map 4 Electrical Transmission Network



CHAPTER FOUR
LOCATIONS FOR RENEWABLE ENERGY DEVELOPMENT

4.1 INTRODUCTION

Chapter Two examined the primary forms of renewable energies currently being developed throughout the world. This chapter aims to address the issues facing the location of the various types of renewable energy which could be developed in County Roscommon.

Studies already undertaken along with documents such as the Landscape Character Assessment of County Roscommon (Draft 2014-2020) have helped to inform the process involved in identifying areas throughout the County which would be suitable for renewable energy development. An evaluation of the landscape and its sensitivity to potential renewable energy developments was carried out. Renewable energy developments were considered from a planning perspective and this involved inter alia assessment of:

- Ecological and Natural Heritage
- Biodiversity
- Peatlands
- Water Resources
- Archaeology and Built Heritage
- Landscape Value
- Infrastructure Constraints

Roscommon County Council recommends that the pre-planning process, available to potential developers of renewable energy developments in the County, should be availed of. Proposals will be assessed at a pre-planning stage and where deemed necessary further investigation such as information sourcing from the Council's GIS database will be undertaken. Particular forms of renewable energy may be deemed suitable or unsuitable for areas within Roscommon, when assessed against the potential impact the particular form of renewable energy proposed may have upon the points set out above.

Having regard to the scope of alternative lands available and the importance of ensuring that developments do not undermine or adversely impact upon the integrity of Natura 2000 sites, Roscommon County Council has decided that no wind energy development will be considered on Natura 2000 sites or their surrounding buffer areas.

Hydroelectric schemes by their nature and scale could significantly affect Natura 2000 sites, particularly sites with annexed water dependent habitats and species. Natura 2000 sites are therefore not considered suitable for the development a Pumped Hydro Electric Storage (PHES). All other proposals for hydroelectric schemes within or adjacent to Natura 2000 sites will be required to undergo Habitats Directive Assessment. Hydroelectric schemes shall be required to be in compliance with all relevant environmental protection legislation including the Water Framework Directive.

In relation to bio energy, solar, heat pump/geothermal energy it is considered that these forms of renewable technology are unlikely to significantly affect Natura 2000 sites and may be open to consideration within or adjacent to Natura 2000 sites. These schemes shall be required to be in compliance with all relevant environmental protection legislation including the Water Framework Directive.

Notwithstanding the HDA undertaken for this Strategy, individual renewable energy development proposals may be required to undertake HDA at project stage. Only proposals that determine no significant affects on Natura 2000 sites will be permitted.

The following sections examine the potential for renewable energy development and consideration is given to the siting of the various forms of renewable energy development. Roscommon County Council will consider all proposals for renewable energy development. Proposals will be assessed having regard to the relevant planning, environmental, infrastructural etc. considerations. Having regard to the scope of alternative sites available for renewable energy development and the requirement to ensure the protection of Natura 2000 sites, no renewable energy developments will be considered on Natura 2000 sites.

4.2 WIND ENERGY

It is accepted that wind energy will dominate the renewable energy sector in Ireland for the foreseeable future. Having regard to the geographical location and the nature of the underlying geology of Roscommon it is recognised that wind energy development currently offers the most viable solution for renewable energy expansion in the County. It is also recognised that the siting of wind farms is a cause for significant debate, not only for the communities surrounding proposed windfarm locations but also on a national level. Chapter Five sets out Development Management Standards aimed at ensuring wind farms are developed in a manner that does not unduly compromise the existing natural and built environment where such development is proposed.

From a development perspective in relation to the siting of windfarms, the key issues for consideration include:

- Commercial Viability
- Grid Connection
- Ecological and Natural Heritage
- Biodiversity of Peatlands
- Water resources
- Archaeology and Built Heritage
- Landscape
- Community/Residents

4.2.1 Commercial Viability of Wind Farms

Firstly in order to consider wind farm development in an area, the average wind speed must be established and accurate results kept for at least one calendar year. Wind turbines generally start operating at 3-5m per second and achieve a maximum power output at 11-14m per second. The average wind speed which is generally considered viable for a commercial enterprise is above 8 metres per second at hub height.

As outlined earlier an anemometer is used to record the wind speed data which is then compared with long-term weather data and analyses of the SEI Irish Wind Atlas. This which generally has an accuracy of 5-7% from that of long term measured data. Wind speed data can also be sourced from Met Eireann, which has weather and climate recording stations throughout the country.

Map 2 provides the wind speed information for County Roscommon and it indicates that viable areas in terms of wind speed are to the west and north-west of the County with the highest recorded speed of 9 metres per second at the northern most tip.

Secondly, connection to the national electricity grid is necessary. Electricity market prices are set by the Single Electricity Market Operator (SEMO). All electricity is traded through a pool system where licensed generators sell their electricity to a licensed supplier. The supplier then sells it to the pool and receives a single marked price (SMP). Under the terms of the Trading and Settlement Code of the Utility Regulator, a wind farm with a maximum export of less than 10MW can sell either directly to the pool or can agree a contract with a supplier who will take over the selling of the energy onwards.

If a wind farm can export more than 10MW of electricity the operator is obliged to register with the electricity pool, but may still enter a power purchase agreement with a supplier who will act on the operator's behalf.

Generally speaking, the potential returns available to a windfarm developer include the following:

- Direct Energy Payment – the market price per MW sold per half hour
- Capacity Payment – Compensation for being available to generate electricity upon instruction from the grid operator.
- Constraint Payment – Compensation for being constrained from exporting your scheduled amount of energy onto the system (due to grid stability issues)[4].

All the relevant details regarding the sale of electricity, including information on registered suppliers is available on the Irish Wind Energy Association website.

Micro generators e.g. domestic, small business and community wind turbines, may also be connected and sell the electricity generated to the grid. As outlined in the ESB guidelines, those seeking to connect micro-generators are not required to apply to the Commission for Energy Regulation (CER) in order to receive an Authorisation to Construct/Licence to Generate as they are deemed to be automatically authorised and licensed by Order. The ESB have support initiatives in place to incentivise micro-generation which reinforce its commitment to sustainability strategy, development of smart networks and support for the government sustainability strategy.

4.2.2 Grid Connection for Wind Farms

Securing a grid connection from a system operator such as Eirgrid or ESB Networks is a pre-requisite for viable wind farm development.

The process for securing a connection to the grid entails a lengthy application process through either Eirgrid or ESB Networks, depending on the scale of the development and the proximity to a transmission or distribution system. This issue is considered a major constraint as there have been instances where the grid connection consent application has taken so long that the original planning permission period of five years has withered.

Since December 2004, large scale commercial renewable generators (i.e. > 0.5MW) wishing to connect to the transmission or distribution systems have been subject to a group processing of connection applications through a series of successive "Gates". The Gate 3 Programme was completed by EirGrid in June 2011. These applications which have met the defined criteria are processed in one batch. The system operators study the groups and assess their overall impact on the electrical system. The system operator then identifies the connection assets required for each group before connecting that group to the network. A thorough explanation of the grid connection process is covered in Econnect Ireland's "A Guide to Connecting Renewable and CHP Electricity Generators to the Electricity Network". The electrical distribution network for Roscommon is available for viewing on the ESB website (See www.esb.ie).

4.2.3 Ecological and Natural Heritage

A wind farm development may potentially have a significant impact upon the ecological and natural heritage of an area. In respect of natural heritage impacts and wind farm development in Roscommon, the areas of sensitivity identified include the following designated sites:

Special Areas of Conservation (SACs) are the prime wildlife conservation areas in Ireland, considered being important on a European as well as Irish level. The RCDP states that any developments in, near or adversely

[4] Irish Wind Energy Association – Website www.iwea.com

affecting an SAC should avoid any significant adverse impact on the features for which the site has been designated or proposed for designation. There are currently 29 SACs in County Roscommon.

Special Protection Areas (SPAs) are sites of importance for birds (and are often also important for other types of wildlife). The EU Birds Directive (79/409/EEC) requires designation of SPAs for listed rare and vulnerable species, regularly occurring migratory species and wetlands, especially those of international importance, which attract large numbers of migratory birds each year. Any developments in, near or adversely affecting an SPA should avoid any significant adverse impact on the features for which the site has been designated or proposed for designation. There are currently 7 designated SPAs in County Roscommon.

Collectively SACs and SPAs are known as Natura 2000 sites which are protected under EU legislation and which are required to undergo Appropriate Assessment screening.

Natural Heritage Areas (NHAs) are sites that support elements of our natural heritage which are unique, or of outstanding importance at a national level. Any developments in, near or adversely affecting an NHA should avoid any significant adverse impact on the features for which the site has been designated or proposed for designation. There are currently 11 designated NHAs and 31 pNHAs in County Roscommon.

In relation to designated sites, the Wind Energy Development Guidelines indicate that windfarm development may proceed on such sites, provided there is a full assessment of the likely impact a development may have on the designated site, i.e. both AA and SEA.

4.2.4 Windfarms and Biodiversity of Peatlands

The designated sites as described above are dispersed throughout Roscommon and many are peatland areas such as Active Raised Bogs or Upland Blanket Bogs. Peatlands are wetland ecosystems, comprising 95% water with the remaining 5% characterised by the accumulation of organic matter called ‘peat’ which derives from dead and slowly decaying plant material. Due to their biodiversity, peatlands are very sensitive to development, which includes wind farm development. Boglands with large peat levels such as Raised Bogs are considered more susceptible to disturbance than those with shallow peat deposits, such as Blanket Bogs. An example of such lands is found north of Castlerea, in LCA 27 as identified in the RCDP LCA (Draft 2014 – 2020).

The development of wind farms on bogland impacts upon its hydrological activity which in turn impacts upon all the living organisms in the bog. A bog should essentially be thought of as a living breathing area, rich in biodiversity and as such, is vulnerable to damage when works take place which affect the living habitats there.

The infrastructure necessary to develop wind farms such as roads and electrical infrastructure, will invariably impact upon the ecosystem of a bogland through the associated excavation, drainage and construction works necessary. Peatland sites are also generally associated with high landscape sensitivity. The combination of ecological and landscape sensitivity provide a justified argument for precluding such areas from any significant wind farm developments.

Appendix Four of the Wind Energy Development Guidelines acknowledges that development on most peatland sites will generally lead to impacts on natural heritage. However, it does not state that development may not take place on such lands and sets out guidelines to reduce the impact a windfarm development may have upon peatlands, should such lands be considered for a windfarm enterprise.

In accordance with the Wind Energy Guidelines, the Roscommon LCA (Draft 2014 – 2020) outlines the following in relation to wind energy developments on peatlands:

Where wind energy developments are permitted on peatlands, the implementation of the following construction guidelines (along with others that are recommended in the Environmental Impact Statement) may serve to reduce impacts, including minimising habitat disturbance and loss, hydrological disruption and the risk of erosion:

- *A thorough ground investigation, including hydro-geological investigations where appropriate, and a detailed evaluation of the nature of the peat, its geotechnical properties and the associated risk of instability and habitat loss or disturbance during construction and operation of the wind energy development, is to be carried out where the depth of peat is in excess of 50cm.*
- *Avoid construction, if possible, on wet areas, flushes and easily eroded soils.*
- *Avoid the excavation of drains, where possible, unless it is necessary for geotechnical or hydrological reasons.*
- *If drains are unavoidable, ensure that silt traps are constructed and that there is only diffuse discharge of water.*
- *Avoid blocking existing drains.*
- *Where blasting is being used in or near a peatland area for borrow pits, foundations etc, the possible effect on the peat stability should be assessed.*
- *Avoid stock grazing on any disturbed peat until local peatland vegetation has recovered (e.g., by use of temporary electric fencing).*

4.2.5 Windfarms and Water Resources

Wind farms and the ancillary development works have the potential to adversely impact upon the hydrological environment.

Many of the designated sites identified throughout Roscommon are water resource sites. Roscommon also sources c. 86% of its drinking water from groundwater resources so it is essential to provide for the protection of the waters in the County.

It is essential that the appropriate exclusion zones are put in place around lakes and rivers, not only to preserve the scenic amenity of the water resource but also to protect the water quality and any habitat in or around the water resource.

- It is recommended that a buffer zone is applied along water features such as rivers and around lakes. These buffer zones will serve as a corridor for the protection of water quality and the protection of habitats in and around the water courses. Buffer zones will also serve to preserve the amenity value of lakes and rivers by protecting views from these water courses.
- Depending on site topography and the surrounding landscape, buffer zones may vary. As such the extent of the buffer zones, if and when required, shall be assessed and agreed with Roscommon County Council.

In all instances relating to the construction of wind farm developments it is essential that in the interests of protecting water courses, a source-pathway-receptor model is adopted. Adopting this approach will help to identify the potential risks to water resources. The source-pathway receptor model would examine: soil types, topography and proximity of development to a potential receiving water or receptor. This model is used in risk assessment to identify the source of any contamination, what the source may affect (receptor) and how the source may reach the receptor (pathway).

Source
The cause or source of the contamination is identified. For example, the source might be a contaminated soils or water. The location of the contamination is identified, such as in soils, ground or surface waters or ground gases.

Pathway
The pathway is the route the source takes to reach the receptor. Pathways may include for example, air, water, soil, animals, crops and eco-systems.

Receptor
If contamination is to cause harm, it must reach a receptor. A receptor may be a person, animal, plant, ecological-system, property or water. Each receptor must be identified and their vulnerability to the contaminant must be established.

From analysis of the information above, a source-pathway-receptor conceptual model is created and conclusions are drawn about the potential risks caused by the source of contamination. Conceptual models are used to inform and drive site investigations and to assist with remedial strategies.

4.2.6 Windfarm – Construction Impacts

The construction of a wind farm necessitates assessment of a wind range of potential impacts which may arise as a result of commencing development. Excavation and treatment of rock and soil on site is a key consideration. The provision of site and turbine access tracks and the erection of the turbines necessitate the importation of materials including; stone, steel, pipes, turbine components etc. The impact of the construction phase involves assessment of inter alia; noise impact, hours of construction, transport and transport routes of materials, pollution prevention (to ground or surface waters) etc.

4.2.7 Windfarms - Built Heritage and Archaeology

The Heritage Act (1995) includes in its definition of heritage; ‘monuments’, ‘archaeological objects’, ‘heritage objects’, ‘architectural heritage’, ‘inland waterways’ and ‘heritage gardens and parks’. In addition, wind farm development will be considered in terms of its potential impact on Protected Structures and Monuments and Places for the County

The Wind Energy Development Guidelines (2006) provide comprehensive detail regarding wind farm development and archaeological heritage. Windfarm development is not precluded in areas of built heritage and archaeological heritage; however the Guidelines outline the necessity for an archaeological and architectural assessment as part of the planning process. The potential impact as a result of a development is generally site specific with regard to built heritage and archaeology and as outlined in the Guidelines, can be addressed by on-site archaeological assessment to identify and mitigate against a significant impact as a result of a wind farm development.

Due to the volume of recorded monuments and places throughout Roscommon, for example Rathcroghan, a prerequisite of a planning application will in most cases involve an archaeological assessment, to ensure that sites and monuments are protected.

4.2.8 Windfarms and Landscape Appraisal

Section 10, Planning and Development Act 2000[5] requires that all Local Authorities consider the character of the landscape when drawing up objectives for their new County Development Plans, in the interests of proper planning and sustainable development. Hence Landscape Character Assessments (LCAs) form part of these plans. The overall aim of a LCA is to inform decision making regarding development control and to influence landscape protection policy at Local Authority level.

A landscape character assessment (LCA) is defined by the DoECLG as "all that is visible when looking across areas of land". A Landscape Character Assessment (LCA) is a study of a given landscape to ascertain its 'character'. Landscape character is the combination of physical, as well as, perceived aspects of the landscape. Landscape character maps and an accompanying document with descriptions and recommendations is the end product of the assessment process. The aim of the County Roscommon LCA, which forms part of the Roscommon CDP (Draft 2014-2020), is to provide a tool for decision making regarding development control and to influence landscape policy at Local Authority level.

The European Landscape Convention (ELC), which Ireland ratified in 2002, requires signatories to assess and map their landscapes in the interest of wider European landscape planning and sustainable development. An important aspect of the ELC was to engage in widespread public consultation when assessing landscape value, which is a key component of the Roscommon LCA.

The importance of the landscape characterisation process in identifying suitable wind farm locations is underpinned in the Wind Energy Development Guidelines (DEHLG, 2006). One of the primary functions of this (RES) is to protect the landscape of the area, but also identify areas where wind energy development shall be considered. These guidelines also identify landscape character types, which relate to the landscapes identified in the Roscommon Landscape Character Assessment.

The LCA for Roscommon identified 36 different Landscape Character Areas which are unique, geographically-specific areas of a particular landscape type. These areas each possess their own individual character and identity, even though they share the same generic characteristics with other areas of the same type. Having regard to the objective to identify areas suitable for wind energy development, the characteristics of these landscapes were assessed according to the following;

- Landform and Elevation
- Landcover
- Nature Designations with Landscape Value
- Historical Landscape Types
- Landscape Values

The LCA identified seven Landscape Character Types i.e. distinct landscapes that are relatively consistent in character in that they broadly share similar combinations of geology, topography, drainage patterns, vegetation, historical land use and settlement patterns. They are as follows:

1. River Corridor (located along eastern and western boundaries)
2. Hills and Upland (mostly located in the north of the County but also including relatively confined areas in the middle and west of the County)
3. Drumlin Lakelands (concentrated in the northeast)
4. Bogland (located throughout including along river corridors as well as in the east and northwest)
5. Wet Farmland (concentrated in the northern half of the County)
6. Dry Farmland (located in the middle of the County stretching from north to south)

[5] Part II, s10 (e) of the Local Government Planning and Development Act 2000

7. Bog and Farmland Complex (located in the south and middle of the County highlighting the interface between wetter and drier land)

The LCA will be a guiding tool in terms of identifying the capacity of each area to assimilate a windfarm development. The LCA will be applied to the areas identified as Most Favoured Areas, Less Favoured Areas and Areas Not Favoured (See Table below).

Notwithstanding the areas identified below as potentially suitable for development, all proposed wind energy applications will be assessed subject to the principals of proper planning and sustainable development, ensuring minimal adverse impact to the natural and built environment. Full consideration of the presence and protection of all Natura 2000 and other designated sites in the context of the development shall be required. Proposals for wind energy developments shall be subject to Habitats Directive Assessment and Environmental Impact Assessment where considered appropriate.

4.2.9 Community/Residents

Proposals for renewable energy development, particularly wind energy development, can give rise to significant concerns for the local residents. Community engagement and interaction between all the relevant stakeholders at the earliest stage in the development process is important.

Developers should provide clear and transparent information relating to their proposals. Open meetings in a local community hall for example, can provide opportunities for local and interested parties to air their views and gain a clear understanding in relation to the development proposed.

Developers should ensure that suitably qualified people are present at such public meetings to address concerns or issues people may have regarding a proposed development. The provision of such public meetings should serve to ensure local residents have a clear understanding of the development proposed within their locality.

Draft Roscommon Renewable Energy Strategy
Map 5 Landscape Values, Scenic Views and Routes in Roscommon

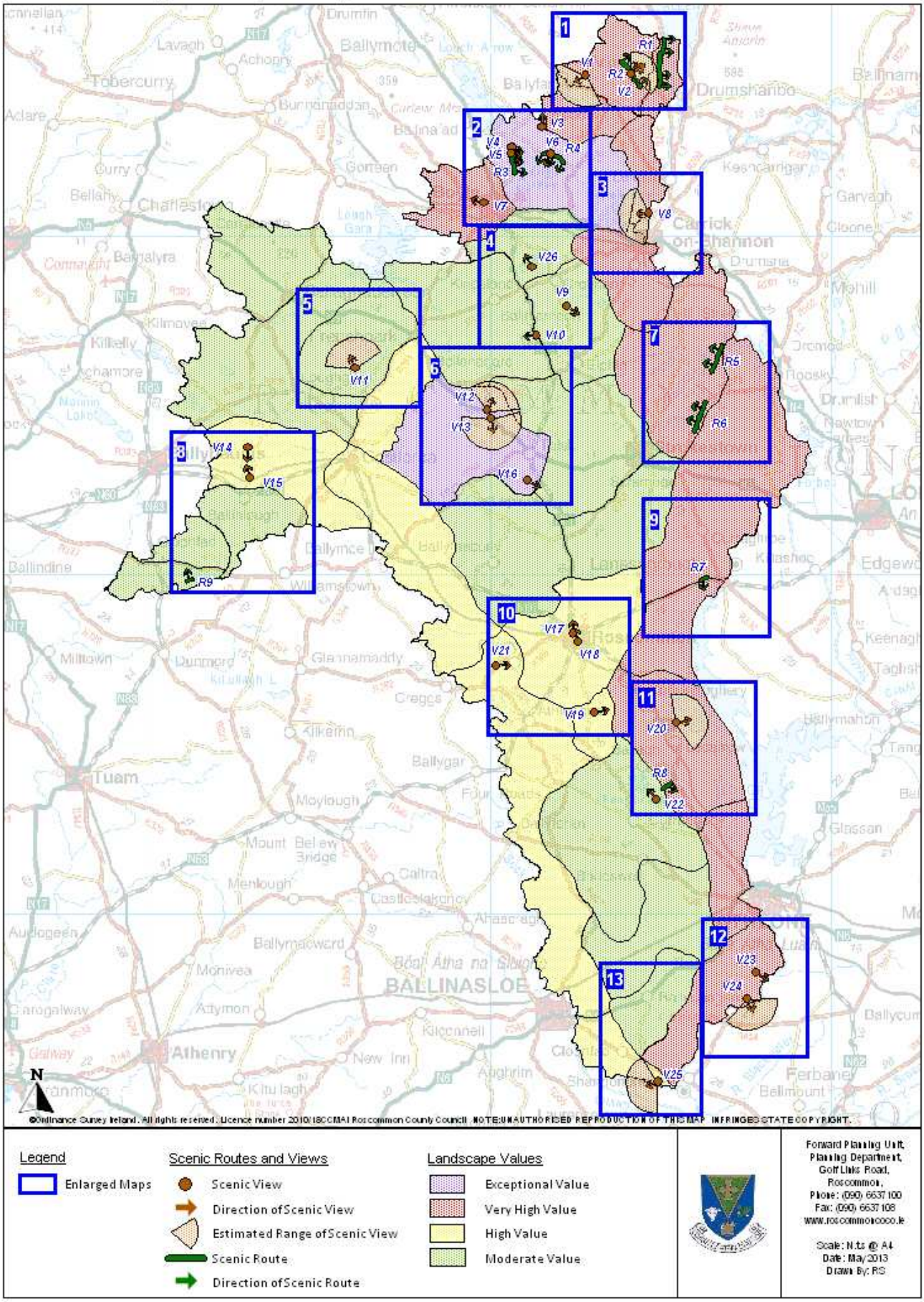


Table 1: Strategic Guidance on Landscape Capacity in relation to Wind Energy Development

1. MOST FAVOURED AREAS:

Wind farm proposals should be primarily focused in these areas and shall be favourably considered subject to normal planning considerations. These areas do however contain areas which are precluded from development (designated as *Not Favoured Areas)*, which include designated Natura 2000 sites (SPAs and SACs) and surrounding buffer areas.

LANDSCAPE CHARACTER AREA (LCA)	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Most Favoured*. (Note – Many *Most Favoured Areas* currently contain no designated Natura 2000 Sites).
LCA 14 Arigna Mountains	Medium	This is one of the most elevated character areas in Roscommon and existing commercial wind turbines are located in this LCA. This area records suitable wind speeds for commercial wind farm development and subject to careful siting there is scope for further wind farm development in this area.	Hills and Upland **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 19 Elphin Drumlins	Medium	Characterised by rolling drumlin hills and lakes. The drumlin landscape allows for glimpses rather than prolonged and dominant views of developments and this could be applied to wind turbines in this LCA, subject to appropriate siting. The elevated nature of this area and its good wind speeds lend favourably to the consideration of wind farm developments.	Hills and Upland Drumlin Lakelands **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 23 Ballaghaderreen and Bockagh Hills Uplands	Medium	There is an existing windfarm in this LCA which has a variety of landscapes i.e. Hills, wet and dry grassland, raised bog and blanket bog. This area records favourable wind speeds and is relatively sparsely populated. This LCA does provide for scenic views over a mixed	Hills and Upland Wet Farmland **Wind Energy Development Guidelines** Mountain Moorland	SAC – 002298 – River Moy Qualifying Interest (Species in bold) • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the

LANDSCAPE CHARACTER AREA (LCA)	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Most Favoured*. (Note – Many *Most Favoured Areas* currently contain no designated Natura 2000 Sites).
		landscape of wet and dry grassland and bogland and therefore careful consideration for siting must be afforded in this LCA.		*Rhynchosporion* • Old sessile oak woods with Ilex and *Blechnum in British Isles* • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* • **Atlantic salmon** • **Sea lamprey** • **Brook lamprey** • **Otter** • **Freshwater crayfish**
LCA 5: Slieve Bawn and Feorish Bogland Basin	Medium	The rolling hills, low level of settlement, existing industrial character of the bogland and grid connection facilities lend favourably to windfarm development. Subject to careful and appropriate siting of turbines this area could accommodate a wind farm development particularly along the western boundary.	Hills and Upland Bogland River Corridor **Wind Energy Development Guidelines** Moorland Mountain	SPA – 004101 – Ballykenny-Fishertown Bog* • **Greenland white-fronted Goose** *Site currently under review by NPWS
LCA 31 Scramoge River Basin	Medium	This central LCA has the highest ridge in County Roscommon i.e. Slieve Bawn. The central area is characterised by flat raised bog, whilst the higher ground is dominated by extensive areas of wet grassland. The elevated lands within this LCA would facilitate a wind farm development particularly at Slieve Bawn and towards the south west.	Hills and Upland Bogland Wet Farmland **Wind Energy Development Guidelines** Mountain Moorland Hilly and flat farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 34 Lough	Medium	Located centrally in the south of the County this LCA is characterised by rolling stonewalled grassland with a distinctive esker area towards	Dry Farmland **Wind Energy Development**	SAC – 001625 – Castlesampson Esker • Semi-natural dry grasslands and scrubland facies on calcareous substrates

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Funshinagh, Stone Wall Grasslands and Esker Ridges		the south. Lough Funshinagh is designated as an NHA and a cSAC and so is not just of aesthetic interest but also of high ecological quality, and as such development in this part of this LCA is precluded. Proposals in proximity to Lough Funshinagh must demonstrate appropriate siting, to ensure the wildlife and habitat of this area are not unduly affected. Proposals considered to give rise to potential impacts upon the Lough Funshinagh cSAC, will be required to carry out Appropriate Assessment under Article 6(3) and 6(4) of the Habitats Directive. The recorded wind speeds in this area indicate that a wind farm development would be viable.	**Guidelines** Hilly and flat farmland	(*Festuco Brometalia)*(important orchid sites) • Turloughs SAC – 002339 – Ballymona Bog and Corkip Lough • Turloughs • Degraded raised bogs still capable of natural regeneration • Bog woodland • Active raised bogs • Depressions on peat substrates of the *Rhynchosporion* SAC – 000610 – Lough Croan Turlough • Turloughs SPA – 004139 – Lough Croan Turlough • **Greenland white-fronted Goose** • **Shoveler** • **Golden plover** SAC 000611 – Lough Funshinagh • Turloughs
LCA 33 Skrine Hill and Limestone Pavement	Medium	This LCA is defined by its relative elevation compared to the surrounding lowlands. The land form comprises hills and hollows with limestone geology throughout. There are no designated sites in this LCA and it is relatively sparsely populated. Its elevated nature ensures sufficient wind speeds however this is a very open LCA, thus visual impact is a critical issue in the context of wind farm proposals. Development may be feasible on the side slopes of the elevated areas of this LCA.	Hills and Upland **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.

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LCA 7: Mid Lough Ree Pastureland	Medium	There are locations within this LCA which are designated and have significant heritage value, however the high elevation of the hills in the west and high recorded wind speeds lend favourably to the consideration of wind farm development. The shoreline of Lough Ree is designated as an NHA, SPA and SAC and as such wind farm development in the designated area is precluded.	Hills and Upland Dry Farmland River Corridor **Wind Energy Development Guidelines** Hilly and Flat Farmland	SAC – 000440 – Lough Ree • Natural euthrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation • Alkaline fens • Old sessile oak woods with *Ilex* and *Blechnum in British Isles* • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia)* (important orchid sites) • Bog woodland • Limestone pavements • Degraded raised bogs still capable of natural regeneration • **Otter** SPA – 004064 – Lough Ree • **Whooper swan** • **Wigeon** • **Teal** • **Mallard** • **Shoveler** • **Tufted Duck** • **Common Scoter** • **Goldeneye** • **Coot** • **Golden Plover** • **Lapwing** • **Common Tern**

LANDSCAPE CHARACTER AREA (LCA)	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Most Favoured*. (Note – Many *Most Favoured Areas* currently contain no designated Natura 2000 Sites).
LCA 24 Ballinlough Bogland and Esker Ridges	Medium	The predominant image of this LCA is that of a low lying esker landscape; however there are elevated landforms towards the west of this LCA which could accommodate wind farm development. The eskers towards the south of this LCA are considered to have significant landscape value. Developments considered to impact upon the visual amenity of the esker landscape will not be permitted.	Bogland, Dry Farmland **Wind Energy Development Guidelines** Flat Peatland, Transitional Marginal Land	SAC – 000218 – Coolcam Turlough • Turloughs
LCA 25 Cloonfad Hills and Esker Ridges	Medium	This LCA comprises elevated pasture lands and built development is quite sparse. The landscape value is moderate. The wind speeds recorded in this area would justify consideration for wind farm development within this LCA.	Hills and Upland **Wind Energy Development Guidelines** Hilly and Flat Farmland	SAC – 000297 – Lough Corrib • Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)* • Active raised bogs • Old sessile oak woods with llex and Blechnum in British Isles • *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils *(Molinion caeruleae)* • Alkaline fens • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* • Limestone pavements • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia)* (important orchid sites) • Bog woodland

LANDSCAPE CHARACTER AREA (LCA)	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Most Favoured*. (Note – Many *Most Favoured Areas* currently contain no designated Natura 2000 Sites).
				• Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • Petrifying springs with tufa formation (Cratoneurion) • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion* • **Atlantic salmon** • **Sea lamprey** • **Brook lamprey** • **Otter** • **Freshwater crayfish** • **Freshwater pearl mussel** • **Slender naiad** • **Slender green feather moss *(Drepanocladus vernicosus)*** • **Lesser Horseshoe Bat**
LCA 26 Cloonfad Bog and Upland	Medium	This LCA has a mixture of forestry lands, raised bog, reclaimed bog, and wet grasslands. There are locally valued scenic amenities and a scenic route overlooking forest plantation and stonewalled field patterns. There may be capacity to accommodate small wind farms towards the south east where the land form is more undulating.	Wet Farmland, Bogland **Wind Energy Development Guidelines** Flat Peatland	SAC – 000297 – Lough Corrib • Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)* • Active raised bogs • Old sessile oak woods with llex and Blechnum in British Isles • *Molinia* meadows on calcareous, peaty or

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				clavey-silt-laden soils *(Molinion caeruleae)* • Alkaline fens • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* • Limestone pavements • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia)* (important orchid sites) • Bog woodland • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation • Petrifying springs with tufa formation (Cratoneurion) • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion* • **Atlantic salmon** • **Sea lamprey** • **Brook lamprey** • **Otter** • **Freshwater crayfish** • **Freshwater pearl mussel** • **Slender naiad** • **Slender green feather moss *(Drepanocladus vernicosus)*** • **Lesser Horseshoe Bat**

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LCA 21 Mullaghnashee Wet Farmland Plateau	Medium	Landcover in this LCA is a complex of raised bogland on higher ground near Mullaghnashee and otherwise a patchwork of both wet and dry grassland. There is a viewpoint in this LCA looking north and north west from Fairymount Hill and proposals should be designed to ensure that they do not unduly impact upon the visual amenity offered by this viewpoint. There is potentially significant scope in this LCA, particularly towards the south and south east, to accommodate windfarm development.	Bogland, Dry Farmland **Wind Energy Development Guidelines** Hilly and Flat Farmland	SAC – 000595 – Callow Bog • Degraded raised bogs still capable of natural regeneration • Active raised bogs • Depressions on peat substrates of the *Rhynchosporion* • **Marsh fritillary**
LCA 22 Cloona Lough and Lung River Bogland Basin	Medium	Landcover varies in this LCA with much of the area being raised bog and reclaimed raised bog, but there are areas of both wet and dry grassland. Owing to the remoteness of many areas of this LCA and declining agricultural activity this LCA may provide scope for windfarm development.	Bogland, Wet and Dry Farmland **Wind Energy Development Guidelines** Flat Peatland, Hilly and Flat Farmland	SAC – 000595 – Callow Bog • Degraded raised bogs still capable of natural regeneration • Active raised bogs • Depressions on peat substrates of the *Rhynchosporion* • **Marsh fritillary** SAC – 002354 – Tullaghanrock Bog • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion*

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LCA 35 Brideswell Esker Belt	Medium	The overall image of this LCA is one of bogs and eskers experiencing localised development pressure from nearby Athlone, however there are elevated areas located to the east and west and the wind speed map indicates viable speeds for wind turbine development. Castlesampson Esker is a cSAC as the importance of the site lies in its almost intact structure; something that is very rare in Irish eskers. It is regarded as being one of the most intact eskers left in the country. As such this designated site within this LCA is precluded from wind farm development. Ballynamona Bog and Corkip Lough is another SAC situated towards the north of this LCA. This site is considered to be of considerable conservation significance given the presence of a raised bog which is listed as a priority habitat in Annex I of the E.U. Habitats Directive. Windfarm development in this site is precluded.	Bogland, Wet and Dry Farmland **Wind Energy Development Guidelines** Flat Peatland, Hilly and Flat Farmland	SAC – 001625 – Castlesampson Esker • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia)*(important orchid sites) • Turloughs SAC – 002339 – Ballymona Bog and Corkip Lough • Turloughs • Degraded raised bogs still capable of natural regeneration • Bog woodland • Active raised bogs • Depressions on peat substrates of the *Rhynchosporion*

2. LESS FAVOURED AREAS:

Proposed wind farm developments will be considered in these areas but the sensitivities identified throughout these areas should not be unduly compromised to facilitate wind farm developments, when more suitable sites have been designated. Proposals shall be assessed in the context of their designation (i.e. less favoured) and decisions should be informed by upon viable wind speed, grid connectivity, environmental and physical constraints, and visual/cumulative impacts.

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
LCA 10 Suck River Source and Lough O'Flynn Boglands and Esker Ridges	High	Having regard to the ecological sensitivities in this LCA which also has nature designations, a scenic route and scenic views around Lough O'Flynn, this area is not considered generally suitable for wind energy developments. However this LCA is sparsely populated and has viable recorded wind speeds allowing for the consideration of development if carefully sited. The following SAC sites situated within this LCA have been precluded; 1. Drumalough Bog, which is an active raised bog, listed as a priority habitat on Annex I of the E.U. Habitats Directive. 2. Corliskea/Trien/Cloonfelliv Bog, which is of international ecological significance as a largely intact complex of raised bogs. 3. Cloonchambers Bog is regarded as a good example of a western raised bog and one whose importance is greatly elevated by the presence of a large alkaline fen running through its centre.	Bogland **Wind Energy Development Guidelines** Flat Peatland	SAC – 000597 – Carrowbehy / Caher Bog • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion* • **Marsh fritillary** SAC – 002338 – Drumalough Bog • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion* SAC – 000600 – Cloonchambers Bog • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion* • **Marsh fritillary** SAC – 002110 – Corliskea / Trien / Cloonfelliv Bog • Bog woodland • Active raised bogs

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
				• Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion*
LCA 11 Castlerea and Upper Suck Valley	High	Having regard to the high landscape value of this LCA associated with the Suck River Valley and its associated ecology and habitats it is considered that development in this area could significantly impact upon its ecology and environment. Should applications be sought in this LCA it must be demonstrated using the AA procedure that the existing ecology, landscape value and tranquil nature of this LCA will not be exploited to facilitate wind energy development.	Dry Farmland **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 3 Lough Corry Drumlin Basin	High	This relatively diverse landscape is characterised by well drained drumlin farmland, areas of wet grassland and areas of reclaimed blanket bog. Having regard to the very high scenic value of this landscape, and it's boating, fishing and tourism amenities, it is considered that inappropriately sited developments could detract from the character of this LCA. There may be scope for windfarm development towards the centre and western boundary of this LCA, which are less sensitive to development generally because views do not extend from the River Shannon or Lough Corry.	Wet and Dry Farmland, Bogland **Wind Energy Development Guidelines** Flat Peatland Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 4	High	This unique and diverse LCA is defined by high	Hills and Upland, Dry	There are currently no designated Natura

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
Kilglass Drumlin Lakelands		ground in the south, waterways in the east and north and a cluster of three hills towards the west. The tourism and scenic value of this LCA justifies a very high value landscape classification and this should not be exploited to facilitate wind farm development. The drumlin landscape towards the west may provide potential for wind energy development subject to careful siting and consideration of the visual amenity of this area.	Farmland **Wind Energy Development Guidelines** Hilly and Flat Farmland	2000 Sites within this LCA.
LCA 29	High	This LCA is defined by a series of rounded hills to the east, an area of high ground to the west at Rathcroghan and otherwise by the clustering of lakes and turloughs. This area is susceptible to water level changes throughout the year as the many turloughs fill and empty. This vulnerability to flooding excludes many areas from development. The heritage value of this LCA is significant given its proximity to Rathcroghan as well as having Strokestown House towards the east. Having regard to the level of natural and built heritage and the Lakeland nature of this LCA, it is considered that inappropriately sited developments could detract from the character of this LCA. Good wind speeds towards the east are recorded and this may offer potential for development. However, developments which are considered to undermine the integrity of the existing built and natural heritage of the area will not be permitted. Furthermore Annaghmore Lough, a candidate SAC, is located in this LCA. Wind	Wet Grassland, Hills and Upland **Wind Energy Development Guidelines** Hilly and Flat Farmland	SAC – 001626 – Annaghmore Lough • Alkaline fens • **Geyer's whorl snail *Vertigo geyeri***

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
		energy developments are precluded on these protected lands.		
LCA 30 Oran Undulating Open Farmland	High	Although this LCA displays favourable wind speeds like many areas of the Roscommon landscape, it is particularly open and vulnerable to visual impact. The northern portion of this LCA adjacent to the highly sensitive LCA 28 has a number of NHA's. The integrity of this landscape should not be exploited and the assimilation of a wind farm development would be challenging. Thus should proposals be submitted, careful consideration of siting must be demonstrated in this very open LCA.	Dry Farmland **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 17 Boyle and Curlew Mountains	High	The western and northern boundaries of this LCA display adequate wind speeds to justify consideration for wind farm development. However this LCA presents a sensitive landscape with NHA designations, scenic/tourist amenity and proximity to Lough Key in the east. Consideration of wind turbine development within this LCA may be given, only if it is demonstrated that's its siting will not impact upon the sensitivities of this area.	Hills and Upland **Wind Energy Development Guidelines** Mountain Moorland	There are currently no designated Natura 2000 Sites within this LCA.
LCA 18 Plains of Boyle	High	The characteristics of this LCA are elevated rolling dry grasslands with significant views to Cavetown Loughs and other water courses in and around the area. Viable wind speeds are recorded towards the north and in the extreme west of this LCA. This LCA offers significant lake views and the area generally does not offer good assimilation opportunities for wind turbines. Due to the elevated nature of this	Hills and Upland, Dry Farmland **Wind Energy Development Guidelines** Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
		area visual impact of turbines from amenity areas is a key consideration but there may be potential towards the west and north for development.		
LCA 20 Breedoge Bogland Basin	High	The primary feature of this LCA is the vast amount of bogland with a potentially sensitive ecological landscape. Cloonshanville Bog (SAC) is a large raised bog, a priority habitat listed on Annex I of the EU Habitat Directive. This designated site is precluded from wind energy development. There is also a designated scenic view overlooking this LCA which has a sense of tranquility and remoteness. Given the lack of viable wind speeds throughout most of this LCA and its high ecological value evidenced throughout the boglands, it is considered that wind farm developments in this LCA may not be suitable. There may be scope for consideration of a wind farm development towards the north western and south eastern corners of this LCA, subject to ensuring the intrinsic ecological qualities of this LCA are protected. Careful consideration of the designated scenic view on the N61 and the general openness of this area must be borne in mind in this LCA.	Bogland, Wet and Dry Farmland **Wind Energy Development Guidelines** Flat Peatland Hilly and Flat Farmland	SPA – 004048 – Lough Gara • **Whooper Swan** • **Greenland White-fronted Goose** SAC – 000614 – Cloonshanville Bog • Bog woodland • Active raised bogs • Degraded raised bogs still capable of natural regeneration • Depressions on peat substrates of the *Rhynchosporion*
LCA 32 Roscommon Town and Hinterland	High	Given the level of infrastructure in Roscommon Town, key routes through the town, continued expansion and population levels, wind turbines would not be considered close to the town core. Autonomy should be maintained between the	Dry Farmland **Wind Energy Development Guidelines**	SPA – 004097 – River Suck Callows • **Whooper Swan** • **Greenland white-fronted Goose** • **Wigeon**

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
		urban core and a wind farm. Should turbines be considered viable towards the south of this LCA i.e. Skrine Hill, west or north west of this LCA, careful consideration of height and scale to avoid any significant impact upon the cultural heritage of the Roscommon Town is required. Ballinturly Turlough (SAC) is situated towards the south west of this LCA. This is regarded as an exceptional site which contains a wide range of habitat types, vegetation communities and plant species. As such wind energy development is precluded on these designated lands.	Hilly and Flat Farmland	• **Lapwing** • **Golden plover** SAC – 000588 – Ballinturly Turlough • Turloughs
LCA 12 Athleague and Lower Suck Valley	High	The River Suck meanders through this relatively open LCA which comprises gently undulating dry grassland towards the north and raised/reclaimed bog further south. Having regard to the existing nature designations along the Suck River and a proposed scenic view just south of Castlecoote, priority must be given to maintaining the scenic and ecological significance of this area. Developments deemed to compromise this will not be permitted. The Suck River Callows SPA is situated along the western boundary of this LCA. Having regard to the ornithological significance of this SPA, wind energy developments are precluded on these designated lands.	Dry Farmland, River Corridor **Wind Energy Development Guidelines** Hilly and Flat Farmland	SPA – 004097 – River Suck Callows • **Whooper Swan** • **Greenland white-fronted Goose** • **Wigeon** • **Lapwing** • **Golden plover** SAC – 001637 – Four Roads Turlough • Turlough SPA – 004140 – Four Roads Turlough • **Greenland white-fronted Goose** • **Golden plover** SAC (00213) 002214 Killeglan Grassland • Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco Brometalia)* (*important orchid sites) * Site currently under review by NPWS

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment	LCTs in Roscommon (definition in Wind Energy Dev. Guidelines)	Natura 2000 Site Information relevant to each LCA identified as *Less Favoured*. (Note – Many *Less Favoured Areas* currently contain no designated Natura 2000 Sites).
LCA 36 Ballydangan Pastures	High	This LCA is characterised by generally good farming lands with small patches of wet grasslands and reclaimed boglands. There are two locations i.e. towards the west and north of this LCA which have adequate wind speeds for a viable commercial wind farm development. There are no nature designations in this LCA, which is identified as having moderate value. There has been significant residential development in this area in recent years, which would necessitate careful consideration of the siting of a wind farm development here.	Dry and Wet Farmland, Bogland **Wind Energy Development Guidelines** Flat Peatland Hilly and Flat Farmland	There are currently no designated Natura 2000 Sites within this LCA.

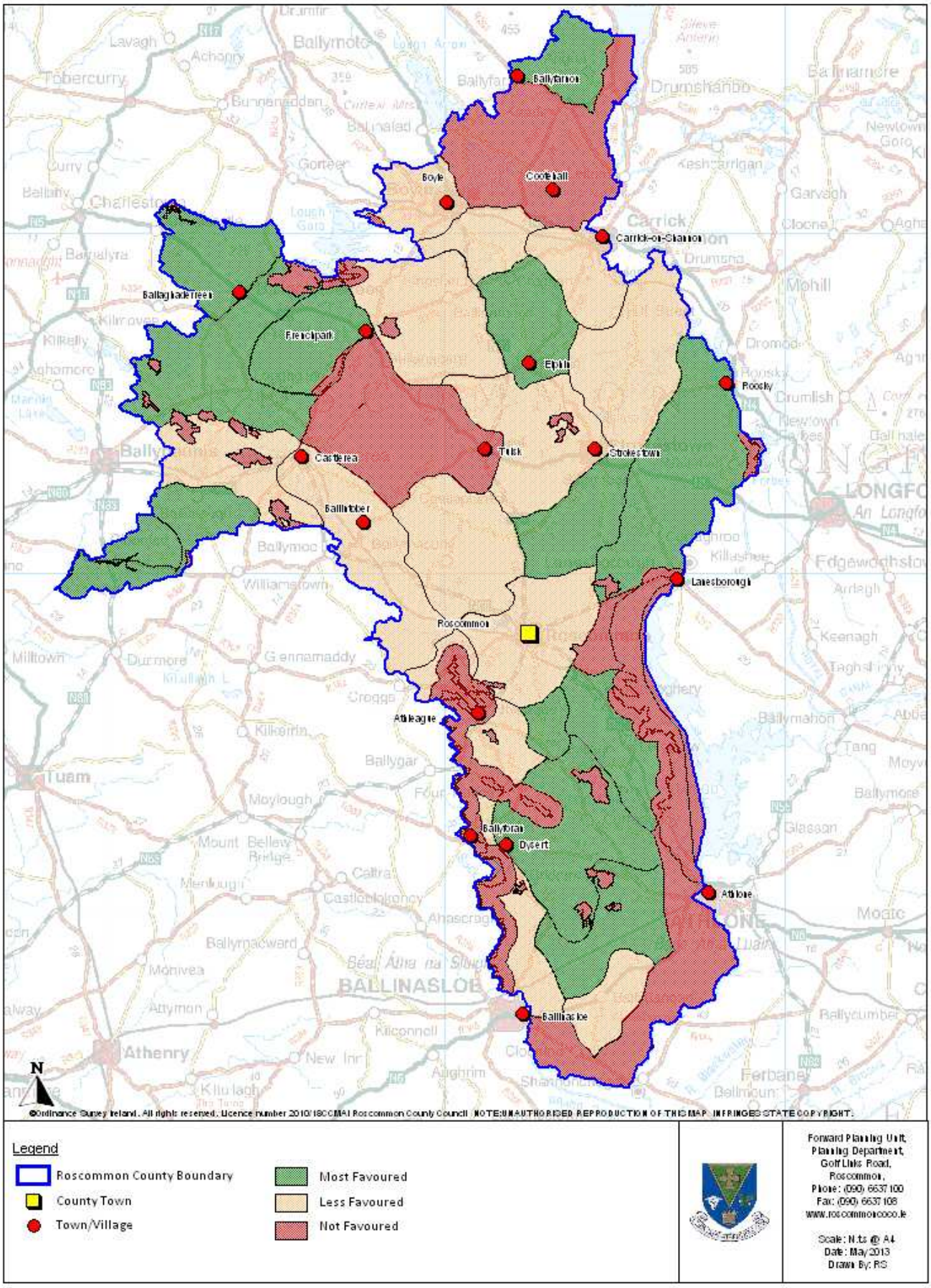
3. AREAS NOT FAVOURED:

These areas are identified as particularly unsuitable for wind farm development and will not be favourably considered. This may be due to factors such as; landscape sensitivity, lands of ecological protection/significance, areas of recreational, cultural and/or archaeological significance. Micro Generation i.e. the installation of an individual wind turbine to offset energy costs to a dwelling or business will be considered in these areas, subject to normal planning considerations.

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment
LCA 16 Lough Key and Boyle River Network	Very High	This LCA has recognised heritage value, ecological and archaeological significance and is generally regarded as the primary tourist location in the County. This landscape of exceptional value is highly sensitive to windfarm development. Such proposals shall not be permitted in this LCA.
LCA 28 Tulsk and Rathcroghan Plateau	Very High	This LCA contains Europe's largest, best preserved Celtic royal site of Rathcroghan. The historic, archaeological significance of this LCA is nationally and internationally recognised. This landscape is of exceptional value and given its archaeological significance, windfarms shall not be permitted in this LCA.
LCA 6 Upper Lough Ree Bogland	Very High	This LCA is one of the flattest areas in the County. The predominant character of the area is flat bogland. There are NHA, SAC and SPA designations and a scenic route (R7) in this LCA. Having regard to the extensive nature designations and openness of the area, this LCA is not suitable for wind farm development.
LCA 27 Castlerea Raised Bogland	Very High	This LCA is regarded as a very distinct character area in that it is a very isolated, remote and tranquil bogland. It is highly valued for its natural heritage, designated as an NHA, SPA and cSAC. This predominantly bogland area would be highly sensitive to change and as such wind farms should not be considered within this area.
LCA 1 Lough Allen and Arigna Foothills	Very High	The primary feature of this LCA is Lough Allen which forms a major portion of this area. As such this area has significant tourist and scenic amenity value with designated scenic routes. Whilst not regarded particularly sensitive from a natural heritage perspective, the tourism and scenic value and lack of viable wind speeds would render exploitation of this area for wind farm development inappropriate.
LCA 2 Upper Shannon and Derreenannagh Drumlin Belt	Very High	The general landform of this area is of low undulating drumlins with a mixture of woodland scrub, raise bog, fens and farmland. The very high landscape value classification is attributed to the recreational and amenity value of the area. The openness of the area, its many critical view points and lack of requisite wind speeds reinforce the lack of suitability of this area for wind farm developments.
LCA 15 Lough Meelagh Drumlins	Very High	This LCA like many of its surrounding LCAs is characterised by a drumlin landscape with a mixture of forestry lands, bog and grasslands. There are two large lakes i.e. Lough Skean and Lough Meelagh towards the north of this LCA, which provides a designated scenic view. This area is regarded as a significant tourist area with fishing facilities, historical trails

LCA	General Sensitivity to Wind Farm Development	Considerations and Assimilation Capacity Assessment
		and the general tranquillity of the area. Owing to these factors and coupled with inadequate wind speeds, this area is not considered suitable for wind farm development.
LCA 13 Suck Callows	Very High	The overall image of this character area is a farming and bogland landscape which is highly susceptible to flooding. Large portions of this LCA i.e. along the western and southern boundaries are designated as SPA and NHA sites and are a habitat for wintering birds. The ecological significance of this area combined with its relatively poor infrastructure and low wind speeds justify the preclusion of this area from wind farm development.
LCA 9 Cloonown and Shannon Callows	Very High	Located in south Roscommon, this LCA comprises mostly raised bog with areas of wet and dry grassland. There is a NHA located towards the north eastern boundary of this LCA and the entire southern and eastern boundary is designated as SAC. The flood plain habitats and the unique ecology of this LCA combined with its openness and scenic view value, reinforce the high sensitivity of this area to wind farm development which should not be undermined.
LCA 8 Lower Lough Ree and Athlone Environs	Very High	This LCA is low lying with a mixture of wet grassland, wet lands, reclaimed bog and dry grassland. The LCA runs to the boundary with Westmeath and most notably Athlone Town. As such, development pressure in this area is significant. This area also has significant portions designated as NHA, SAC and SPA. Wind speeds towards the western boundary indicate that a wind farm may be viable, however given the sensitivity of this LCA, its ecological designations, level of development pressure, and tourist amenity facilities, this LCA should not be considered suitable for wind farm developments.

Draft Roscommon Renewable Energy Strategy
Map 6 Areas of Wind Energy Development Potential



4.3 HYDROPOWER

The potential for the development of a large scale hydro-electrical scheme is feasible in Roscommon, particularly when one considers the River Shannon. Apart from the River Shannon the scope for development is limited because the remaining rivers in Roscommon are relatively small and would provide only limited hydro energy capacity.

Any proposals for small scale hydro-electric schemes will be assessed having regard to the Planning, Design, Construction and Operation of Small Scale Hydro-Electric Schemes and Fisheries Guidelines or in accordance with specific recommendations of Inland Fisheries Ireland as site specific conditions dictate.

4.4 BIO-ENERGY

Bio-energy because of its diverse source of fuels and methods used to create energy provides a feasible form of renewable energy development in Roscommon. However because of the varied nature and scale of bio-energy developments, proposals will have to be considered on a case by case basis.

Apart from site specific issues such as residential and visual amenity other key planning considerations for bio-energy developments would include access to the national grid environmental impact and transportation infrastructure.

Transportation is a key consideration as in many instances the point of use of biomass and other biofuels may not be directly beside the point of production. Smaller scale bio-energy developments may function with locally sourced bio-fuels, however for large biomass projects, the logistics of receiving large quantities of biomass in a cost-effective and low-impact manner becomes a significant consideration. As such logistical considerations will be a significant element when considering large-scale biomass production and biomass use projects in County Roscommon.

4.4.1 Bio-energy and District Heating

The use of biomass to facilitate district heating is an expanding sector in producing heat and electricity simultaneously. This form of energy production is generally produced in a combined heat and power (CHP) plant. The CHP generates heat and electricity simultaneously. The combination of CHP and district heating is very energy efficient.

District heating is a system for distributing heat generated in a centralized location for residential and commercial heating requirements such as space heating and water heating. This system usually involves a centralised boiler with a pipe network distributing heated water to surrounding end-users (end users can be residential, commercial or industrial). In most instances those availing of a district heating system are metered and charged through a similar method to electricity distribution, on a kWh basis, so they can measure and control their heat use on a similar basis.

District Heating Schemes provide a feasible form of development in areas of higher-density population and where high heat demand from industry or commercial enterprises is required. Retro-fitting for district heating may not present a viable proposal as it is considered that ideally district heating should form part of new developments.

The most conventional design for district heating is an enclosed pipe work system supplying heat to users; thus twin pipes will be installed for users: one to deliver hot water and one to take away the cooled water. Thus the space that a district heating system takes up can be significant when compared to other utilities and services.

The Council will encourage CHP plants for industrial developments to allow the industry to generate its own energy requirements, provided it is demonstrated that the development will not create an adverse impact upon the receiving environment. Shared CHP plants and district heating will also be encouraged where site conditions allow and the Council is satisfied that there will not be a significant impact upon the receiving environment.

When assessing district heating proposals considerations should include both existing and planned services. The proposed routing and installation of district heating pipes must be strategically considered insofar as the potential of the system to encroach and damage potential services and utility corridors need to be assessed.

The approval of district heating infrastructure will thus likely be decided by the local authority through existing mechanisms commonly used for water and other pipe-based developments.

4.5 SOLAR AND THERMAL ENERGY

Solar energy developments throughout County Roscommon are generally encouraged providing they are in accordance with the principals of proper planning and sustainable development.
Solar energy development in the form of public infrastructure should be incorporated as much as is reasonably possible e.g. solar panels on traffic warning signs.

Developments demonstrating designs incorporating solar gain, which may be as simple as predominantly south facing glazing, are encouraged. Instances where solar energy proposals will require careful consideration include works to a protected structure or works which may affect a protected species or habitat for example the installation of equipment and materials that passes through a roof void where a bat roost is located within the development.

4.6 GEOTHERMAL ENERGY

As outlined in Chapter 2 the scarcity of granite which is regarded as the most productive rock type for producing geothermal energy reduces the feasibility of geothermal energy harnessed to produce electricity or heat on a large scale in County Roscommon.

Furthermore it should be noted that currently there is no deep geothermal electricity generation in Ireland and REFIT (Renewable Energy Feed-In Tariff - the primary means through which electricity from renewable sources is supported in Ireland) is not currently available for geothermal power.

Tests undertaken in various locations throughout Ireland indicate that depths of up to 4km might be required to harness deep geothermal power. Thus the large scale development of this form of energy in Ireland is unlikely to take place for the foreseeable future. It is not envisaged that electricity from deep geothermal sources will contributing significantly to Ireland's 2020 renewable energy target.

4.6.1 MICRO RENEWABLES

Micro renewables are generally defined as small scale developments which generate energy from renewable sources. Subject to specific conditions certain forms of micro renewable developments serving dwellings, industrial premises, commercial premises and agricultural holdings are exempt from planning permission. Any form of renewable energy development not falling with the exemptions set out in the Planning and Development Regulations will require planning permission.

The incorporation of micro renewable technologies into developments will be encouraged by the Council providing the proposal has regard to the principals of proper planning and sustainable development. Planning exemptions for micro-renewables are addressed in Chapter 5 of this RES.

CHAPTER FIVE
DEVELOPMENT MANAGEMENT STANDARDS FOR RENEWABLE ENERGY DEVELOPMENTS

5.1 INTRODUCTION

Like all developments, renewable energy developments have the potential to create an impact across a range of areas. Renewable energy developments may affect the natural and built environment on a number of different levels. The following points highlight inter alia the main issues associated with renewable energy developments and their potential impact. Mitigation measures aimed to address adverse impacts which may be associated with such development are also set out.

5.2 WIND ENERGY

5.2.1 Towns and Villages

In the case of wind energy development being proposed within or adjacent to towns and villages the planning authority will have regard to the Wind Energy Development Guidelines (WEDG-2006), when determining any planning application for wind energy development, in addition to the policies of the relevant Development Plan in force for the proposed area. Consideration will be given to small scale wind energy developments within urban and industrial areas for small community based proposals. However the continued growth, development and investment into the existing settlements are of primary importance to Roscommon County Council. As such, any wind energy development proposals which are considered likely to affect the future growth and development of an existing settlement, will not be permitted.

5.2.2 Dwelling Houses

A minimum separation distance of 500m between the nearest wind turbine and an existing or permitted dwelling house shall be required. Consideration will be given to exceptions to this where there are adequate protections for residential amenity.

5.2.3 Separation Distance from Adjoining Boundaries

The impact of a proposed wind farm on the development potential of adjacent sites will be a material consideration in assessing an application. Where permission for wind energy development has been granted on an adjacent site, the principle of the minimum separation distances between turbines in crosswind and downwind directions as set out in the WEDG (2006) may be applied i.e. the minimum distances between wind turbines will generally be three times the rotor diameter (=3d) in the crosswind direction and seven times the rotor diameter (=7d) in the prevailing downwind direction.

5.2.4 Shadow Flicker

Section 7.14 of the WEDG (2006) outline that shadow flicker is generally not a critical issue. The Guidelines advise that where in exceptional circumstances, calculations indicate that dwellings would be significantly affected, a condition requiring the non-operation of turbines at times when predicted shadow flicker may adversely impact upon an inhabited dwelling within 500m of a turbine may be appropriate.

Assessments of the theoretical shadow flicker shall be submitted for all dwellings within 500m of any turbine proposed. If deemed necessary, mitigating measures regarding shadow flicker impact upon affected dwellings shall be proposed.

5.2.5 Cumulative Effect

Cumulative effect is the perceived effect on the landscape of two or more wind energy developments visible from any one place.[9] Roscommon's elevated areas tend to be open to view from considerable distances and in the absence of screening and a varied landscape cumulative effect is more pronounced. Cumulative effect will be a material consideration in assessing applications, to ensure that the integrity of rural areas is not unduly compromised to facilitate a multiplicity of wind farms in specific areas.

5.2.6 Archaeology

In order to ensure that sites of archaeological significance are not adversely affected to accommodate a wind energy development an archaeological assessment will be required for all sites within close proximity to areas of archaeological influence. Mitigation measures will have to be submitted where it is considered that a development may impact upon an archaeological site and these will be subject to the agreement of the planning authority and the National Monument Service.

5.2.7 Bird Migratory Routes

The WEDG (2006) recognises the main potential impacts to birds from wind energy developments. The potential impact of a development on all birds i.e. their migratory patterns, flight paths etc. will need to be assessed in all wind farm applications. Where a flight path of wild birds, migratory wild fowl or bats is identified, mitigating measures such as re-location of wind turbines or reduction in the number of turbines will be required.

5.2.8 Fencing

Fencing associated with a wind energy development should be minimised as much as possible (having regard to relevant protocols for farming practices and the control of stock, farm disease etc.) to ensure that the environment in and around wind energy developments are not significantly altered i.e. the sense of openness and access to the countryside remains. Where temporary fencing is required, for example, to keep out grazing stock during construction, this should be removed and the lands rehabilitated to their original state as soon as possible. Where permanent fencing is required i.e. around a substation, chain link fencing is preferable to palisade as it is more transparent.

[9] Wind Energy Development Guidelines – Guidelines for Planning Authorities, June 2006, p 41.

5.2.9 Noise

There are two sources of noise associated with a wind turbine. These are; the aerodynamic noise caused by the blades passing though the air; and, the mechanical noise emitting from the mechanical elements of the nacelle i.e. the generator, gearbox and other parts of the drive-train. The Wind Energy Development Guidelines set out the parameters for acceptable noise levels for wind turbines, which are as follows:

A lower fixed limit of 45dB (A)[10]or a maximum increase of 5dB(A) above background noise at nearby noise sensitive locations shall be required. It is considered that noise should not be a significant problem, when the separation distance of 500m from turbine to dwelling is applied.

Once wind turbines are commissioned the development will be monitored. In the event that the monitoring shows that any turbine is exceeding its projected noise levels and is creating an adverse noise impact, it shall be taken out of service.

5.2.10 Environmental monitoring

Environmental monitoring can relate to a range of considerations such as wildlife, noise or vegetation. Environmental monitoring measures will vary as different sites will display different environmental sensitivities. It is considered that environmental monitoring is very important particularly in the initial construction and operational phases of the development. Where specific environmental conditions are attached to wind energy developments, monitoring will be required to ensure compliance with these conditions. The responsibility of environmental monitoring shall primarily be given to the developer/operator and the results communicated to the Planning Authority.

5.2.11 Construction Phase.

The following issues will need to be addressed with regard to the construction phase of wind energy developments:

- Hours of construction
- All construction vehicle movements associated with the development, including removal routes of excavated materials, routes proposed for turbine delivery, waste and excess spoil removal.
- Monitoring and supervision of sites deemed to be environmentally or ecologically sensitive
- Storage and transfer of materials associated with the development, including the use of waterproof/bunded areas for safety
- Use of on-site borrow pits
- Land slippage
- Drainage issues related to the development
- Site reinstatement works including land reparations, planting etc.
- Removal of ancillary site equipment, site storage and site accommodation facilities after works are completed

The developer should consider all of the points above, and any other construction issues considered relevant by the Local Authority, at a pre-planning stage to establish the feasibility of the proposal and to assist in streamlining the application process. It is essential that all construction related conditions attached to a wind energy development are fully complied with, to the satisfaction of the Planning Authority.

5.2.12 Roads

Access roads and tracks are necessary ancillary developments associated with wind farms. It is important that the impact of roads and tracks is minimised from both an environmental and visual perspective. Routing, design, materials and the extent of roads necessary are the key issues which need to be considered for proposed developments. Access roads constructed to facilitate a wind energy development should relate to the characteristics of the landscape i.e. the road should follow the contours of a slope rather than cutting through the slope.

The materials used should be sourced locally and ideally should be crushed local stone which will minimise the visual contrast between the road and surrounding land cover.

If the wind energy development is decommissioned, consideration shall be given to the removal of the roads and tracks ancillary to the development, unless an alternative use for the roads/tracks has been agreed with the Planning Authority. If there is no alternative use agreed for these roads and tracks, works shall be carried out to return the landcover to its original state.

Reparation works associated with a wind energy development may be extensive. Roads, hedgerows, ground disturbance are issues which can arise from development works associated with wind farms. Damage to existing public roads, hedgerows and land surfaces i.e. soil disturbance, as a result of development works on a wind energy site, shall be repaired to the satisfaction of the Local Authority at the developer's expense. Site road embankments and associated areas shall be contoured and seeded to the satisfaction of the Local Authority.

5.2.13 Water

The protection of all water-courses and aquifers is of paramount importance when assessing developments which may create an adverse impact on receiving waters and aquifers. Bog bursts and landslides can occur when significant works take place on sensitive lands and the result can often lead to a significant effect on receiving waters.

Hydrological impacts must be fully considered, in particular during construction activities.

5.2.14 Soil and Geology

Windfarm construction management plans should consider issues relating to soil and geology which may arise from windfarm development e.g. potentially unstable sloped lands, landslide susceptibility and soil excavation.

5.2.15 Ancillary Structures and Equipment

The ancillary structures normally associated with a wind farm development include:

- Sub-stations
- Transformers
- Service buildings

In the initial stage of the development a wind monitoring mast may be erected, but this is normally on a temporary basis i.e. 1-2 years.

It is recommended that all details relating to the ancillary elements of a proposed wind farm development are clearly set out during the application stage. Landscaping proposals to minimise the visual impact of the sub-stations should also be addressed during the application process.

5.2.16 Grid Connection

It is the responsibility of the developer to contact the relevant electricity transmission or distribution grid operators who are responsible for access to the local grid system.

It is recognised that due to circumstances beyond the control of the developer, it may not be possible to provide precise information about grid connection at a pre-planning or planning stage. However it is recommended that the applicant provide indicative grid connection information and/or feasible connections for the assessment of the Planning Authority. It may be necessary to apply separately for planning permission works to facilitate connection to a grid.

5.2.17 Electromagnetic interference

Development proposals shall demonstrate that potential electromagnetic interference has been assessed and where deemed necessary consultation with the relevant bodies and any necessary mitigation measures have been agreed.

Where it is difficult to identify and predict potential electromagnetic interference, measures to monitor the effects of the development on telecommunications and procedures to remedy any interference when the wind farm becomes operational will be required. A survey of field strengths before and after construction should be carried out.

5.2.18 Aeronautical safety

All wind turbine development proposals shall be referred to the Irish Aviation Authority for their assessment comments and recommendations as part of the planning application process. Windfarm developers are advised to consult with them at an early stage as it may assist in identifying potential issues at an early stage in the wind farm development process. Developments will not be permitted where it cannot be demonstrated beyond all reasonable doubt that a proposed development will not in any way compromise aeronautical safety.

5.2.19 Development Contributions

In accordance with Section 48 of the Planning and Development Act, 2000, developers shall pay Roscommon County Council the appropriate development contribution. If deemed necessary, the Local Authority shall attach a bond or deposit to ensure the satisfactory completion and decommissioning of a development in accordance with the conditions set.

5.2.20 Safety Considerations

There are a number of safety elements to be considered in the development and maintenance of a wind farm. In relation to all public roads and railways a minimum set back equal to the height of the turbine and the blade will be required.

Due consideration must be given to overhead power lines and the appropriate clearance distance must be provided by the developer. Developers are advised to consult directly with the electricity power line provider and the National Roads Authority (if necessary) to establish safe development parameters.

It shall be the responsibility of the developer to submit a program of safety procedures proposed for a wind energy development. A maintenance agreement to ensure the turbines and any ancillary equipment do not deteriorate to a degree where they may pose a hazard to the public, shall be agreed with the Local Authority.

5.2.21 Decommissioning

If a wind energy development ceases operations it is essential that the appropriate decommissioning of the development takes place in a timely manner. As with all other considerations of a development, decommissioning should form an integral element of the planning process i.e. decommissioning works and timeframes for removal of wind turbine components, sub-station etc. should be agreed during the planning application process.

If the Planning Authority is satisfied that a wind energy development may continue beyond a granted timeframe without creating any significant visual or environmental impact, its timeframe may be extended by the Planning Authority on receipt of a planning application.

5.3 INFORMATION FOR WIND ENERGY DEVELOPERS

Proposals submitted to the Planning Authority for wind energy developments will generally be assessed against the following criteria:

1. Potential impact of the proposed development on natural heritage i.e. direct and indirect impact upon:
    - Designated sites
    - Flora and Fauna
    - Sites of ecological significance

    Where it is considered that there may be potential impacts on any of the above, mitigation measures such as management plans to address a satisfactory co-existence of the wind energy development and the designated site or habitat on site.

2. Potential impact of the proposed development on built heritage i.e. archaeological sites, recorded monuments, protected sites and buildings.

    Archaeological fieldwork in advance of submitting an application may be required on sites of archaeological significance. Typically buffer zones will be required to protect the integrity of sites and buildings of archaeological significance.

3. Ground conditions i.e. soil, sub-soil stability and soil types. Areas which require significant consideration are peat areas in particular raised bogs and peat soils on steep slopes, where soil slippages may occur. Where it is considered that there may be risks of soil slippage or there is concern over ground conditions, the onus will be on the applicant to submit a report from a suitably qualified professional verifying the stability of the soil to facilitate a wind energy development.

4. The main emphasis in relation to protecting waters relates to the initial construction phase of the wind energy development. Management plans and mitigation measures to ensure there are no adverse impacts on hydrology and water courses. Where it is considered necessary, development sites may require ongoing environmental monitoring during the construction phase to ensure waters are protected.

5. Visual impact and landscape impact are generally perceived as the primary impact associated with wind farm developments. The assessment of the visual and landscape impact shall be carried out in accordance with the guidelines available at the time of submitting an application. This includes; the DoEHLG Wind Energy Development Guidelines (2006), EPA Advice notes of Current Practice in the Preparation of an EIS (2003) and DoEHLG Guidelines on Appropriate Assessment of Plans and Projects in Ireland (2009).

Visual and landscape assessment will include an evaluation of the landscape and its ability to assimilate wind turbines. The ancillary components of a wind energy development i.e. roads, structures, overhead wires shall also be assessed. Applications must be assessed against existing views and prospects identified within the relevant County Development Plan or Local Area Plan.

Cumulative effect i.e. the perceived effect on the landscape of a wind farm development with any other development or application (which may be another windfarm) shall be assessed. Where the impact on a landscape or visual impact is considered to be significant, mitigation measures must be undertaken i.e. altering the layout, spacing height or number of wind turbines proposed.

6. Local environment and telecommunication issues i.e. noise levels, shadow flicker, telecommunications interference, proximity to overhead power lines and aircraft safety.

   The assessment of potential noise impacts should have regard to the guidelines set out in Section 5.6 of the DEHLG Wind Energy Development Guidelines (2006). Where considered necessary, conditions may be applied to monitor noise levels during the initial construction phase.

   Monitoring of noise levels may also be required during the operational phase of the development. Where monitoring shows that noise levels exceed projections, mitigating measures shall have to be submitted to the Local Authority for agreement.

   All applications will be required to show an assessment of the theoretical shadow flicker for all dwellings within 500m of any turbine. A shadow flicker assessment based on anticipated meteorological constraints will also be required. Where it is not demonstrated beyond all reasonable doubt that shadow flicker will not create an adverse impact upon surrounding residencies, mitigating measures such as reduction in height of turbines or relocation of turbines must be submitted.

   Wind turbines may potentially interfere with broadcast communications and affect television and radio signals. Applicants should consult with the relevant national and local broadcasters as part of the pre-planning process to assess potential impacts and agree mitigation measures if necessary.

   In relation to adequate clearance from overhead power lines, proposals should have regard to Section 5.9 of the DEHLG Wind Energy Development Guidelines (2006). These Guidelines state that there is a statutory obligation to notify the electricity distributor of proposed developments within 23 metres of any transmission or distribution line.

   The Irish Aviation Authority's 'Obstacles to Aircraft in Flight Order (2002) as amended, defines obstacles to aircraft for the purpose of airspace protection in Ireland. Wind energy development shall have regard to this Order and consultation with the Irish Aviation Authority should be undertaken as part of the pre-planning process.

7. Access to the site and transportation of materials associated with a wind farm development is very important. Very large components are associated with wind turbine developments and their movement to the site may involve difficulties if the road network is not sufficient to facilitate ready access.

   Transportation routes should be assessed and agreed with the local area engineer and other relevant safety bodies at the early stages of a development proposal. Routes and hours of transportation may be conditioned as part of a granted application. Where there is a necessity to repair or reinstate public roads damaged as a result of transporting materials to and from a site, financial bonds will be applied.

8. The site entrance must be suitable to facilitate the initial construction works of the project and the operational phase. As such it will be necessary to provide the appropriate set back, sight lines and gradient as required.

9. Site facilities i.e. water provision and sanitary provision as well as appropriate disposal facilities will be required during the construction phase of the development.

5.4 HYDRO POWER

Proposals for hydro power schemes may pose some negative effects on the environment including; visual impacts upon the landscape; geological impacts; impacts on ground water; impacts on terrestrial and freshwater ecology, and impacts from noise generated during construction and at the operational stage.

Proposals for hydro power generation sites will be required to address issues such as fish movements and protection, retention of natural watercourse levels and water quality.

The River Basin Management Plans seeks to protect all waters (surface, ground and coastal) within its district and, where necessary, improve waters and achieve sustainable water use. Proposals for the development of hydro power will be required to demonstrate compliance with the relevant River Basin Management Plan.

Substantial works are normally involved in hydro power schemes. These include construction of structures for the abstraction and discharge of water and for the housing of turbines, etc. There will also generally be a requirement for provision of pipelines for conveying water to the point of power-generation and for cabling, etc.

The design and implementation of appropriate water quality management measures will be considered in detail at the planning stage. Applications for hydro power schemes shall be accompanied by an appropriate Environmental Management Plan developed to take account of this and other environmental issues. This information may be included as part of an Environmental Impact Assessment.

Having regard to the scale and nature of pumped storage developments such schemes will not be permitted in Natura 2000 sites or within designated and proposed Natural Heritage Areas. Furthermore, such schemes will not be considered ex situ of these recognised ecologically sensitive areas where it is considered that they will significantly affect the conservation objectives and qualifying interests of Natura 2000 sites, impact on the ecological integrity of NHA/pNHAs, protected habitats and/or species as designated under National and European legislation.

5.4.1 Small Scale Hydro-Electric Schemes

In 2007 the Central and Regional Fisheries Boards, published *Guidelines on the Planning, Design, Construction & Operation of Small-Scale Hydro-Electric Schemes and Fisheries.* These Guidelines provide information on the specific requirements for fisheries, water and habitat protection, and the requirements of the Fisheries Acts.

These guidelines address the possible impacts of small scale hydro developments and best practice in the development and assessment hydro schemes. In determining applications Roscommon County Council will have regard to the recommendations of this document.

Small scale hydro schemes may be considered acceptable in situ or ex situ of a Natura 2000 site and/or a designated or proposed Natural Heritage Area, provided it is demonstrated that proposals will not significantly affect the conservation objectives and qualifying interests of Natura 2000 sites, the ecological integrity of NHA/pNHAs or protected habitats and/or species as designated under National and European legislation.

Environmental Impact Assessment and Article 6 of the Habitats Directive
An application for the installation of a hydroelectric plant shall require an Environmental Impact Assessment (EIA) where it meets the thresholds specified in Schedule 5 Part 2(h) of the Planning and Development Regulations 2001.

An Environmental Impact Statement (EIS) shall also accompany an application for sub threshold developments where the Planning Authority considers that the potential environmental impact is such that an EIA is necessary.

Where an application for a hydroelectric scheme is proposed within or in the vicinity of a Natura 2000 site, an assessment under Article 6 of the Habitats Directive will be required.

Visual Impact
In many cases hydro power schemes are often located in scenic areas and the visual impact arising from hydro scheme infrastructure i.e. turbine houses, embankments, structures and paths have the potential to have a significant impact on the landscape. In certain instances the impact upon protected views and routes may be significant.

Good design and integration of a hydro scheme can mitigate potential adverse visual impacts. Hydro schemes should be designed to allow the landscaping of dam walls and ancillary infrastructure.

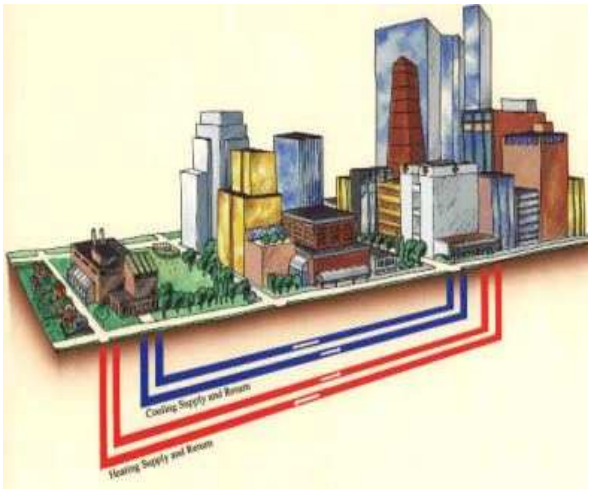
In cases where the visual impact in sensitive/protected landscapes can not be sufficiently ameliorated the planning authority will not view such proposals favourably.

The siting and routing of power lines within and outside a development site can have a significant visual impact. For this reason, in sensitive landscapes, the planning authority (subject to site specific considerations) may require power lines from the site connecting hydroelectric schemes to the national grid to be laid underground.

Underground piping of cables will not be considered where such infrastructure is deemed to potentially impact on the conservation objectives of Natura 2000 sites, Natural Heritage Areas and proposed Natural Heritage Areas.

Details of consultations with the electricity transmission operators (Eirgrid) regarding the nature and location of a proposed grid connection may be required as part of the planning application process.
In many hydro power installations are located in remote upland areas, proposed access routes for construction, operation and potential decommissioning require consideration. Proposals must demonstrate that the design and implementation proposals provide an effective water quality management system. This system must ensure that waters discharged from the site do not give rise to environmental pollution.

5.5 BIO ENERGY



The generation of fuel from biomass and anaerobic digestion on a commercial scale is generally regarded as an industrial process usually involving large structures and proposals for grid connections. As such bio energy plants are suited to brownfield sites, within or immediately adjacent to industrial areas or co-located with other wood processing industries. Proposals for bio energy schemes will be considered on lands which are zoned for industrial uses in any development plan.

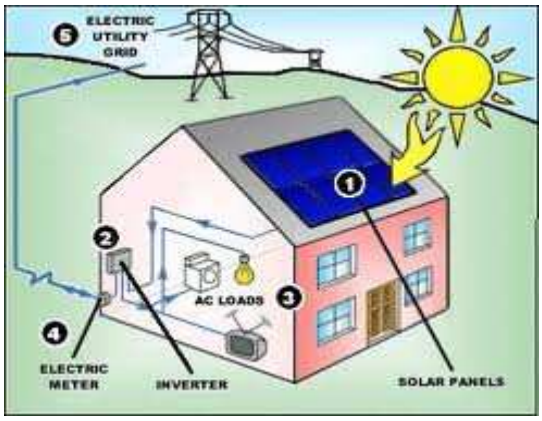
Given the scale of traffic movement associated with developments of this nature, locations for bio energy developments should be close to the point of demand and served by public roads with sufficient capacity to absorb increased traffic flows and adjacent to main transport corridors.

District heating is increasing as an ancillary development of bio energy schemes. District heating schemes will be encouraged subject to normal planning considerations including appropriate land use, scale and where it can be demonstrated that the scheme will not adversely affect residential or environmental amenity.

Amenity issues arise with developments of this nature. Noise generation from machinery, boilers, and traffic movement may in some cases be loud enough to affect the amenity of adjacent premises, particularly in residential areas. Biomass plants may also have an adverse impact on visual amenity.

Particular types of biomass schemes may also generate odours and emissions to air. Schemes of this nature will be required to demonstrate that any emissions and odours generated from the development will not rise to adverse impacts upon the receiving environment.

5.6 SOLAR ENERGY



In certain circumstances solar technologies can have an undesirable impact on the appearance of rural and urban areas.

The siting of solar technology may be of particular importance in sensitive urban areas where designated protected structures and/or architectural conservation areas exist. The installation of solar panels on a building, whether they are for solar water heating (SWH) or photovoltaic (PV) systems, can impact upon the character of a building.

Planning permission is required to install solar technology on a Protected Structure. Appropriate design considerations are important to ensure that proposals to not diminish the overall character of the building. Thus an application to install solar technology on a protected structure, or within its curtilage, will be assessed having regard to the impact of the proposed development on the character of the building and its curtilage.

5.7 GEOTHERMAL ENERGY & HEAT PUMPS

Large scale geothermal and heat pump energy technology can give rise to a number of potential impacts. These primarily relate to the fact that open loop heat pumps can affect the temperature of the groundwater. This can impact on the structure and ecology of the aquifer and any dependent surface waters.

The installation of a heat pump and its associated elements should be facilitated within the curtilage of the site. For domestic dwellings with on-site wastewater treatment systems consideration must be given to avoid adverse impacts on these systems, such as effluent area damage.

Boreholes/drilling for geothermal energy must consider potential contamination impacts to surface or ground waters. For developments of this nature the Planning Authority will require a detailed geotechnical and hydrological assessment of any potential impacts as a result of deep well boring.

As the installation of geothermal components requires the excavation of trenches or deep boreholes it is important to assess in advance, whether the site is within or adjacent to a site of archaeological significance what the implications of the development might be on the archaeological significance of the area.

5.8 EXEMPTED DEVELOPMENT - MICRO RENEWABLES

Micro renewable generation for domestic, agricultural and light industrial activities are now exempted development subject to criteria detailed in Statutory Instrument No. 83 of 2007**,** No.235 of 2008 and No.256 of 2008.The following information provides a summary of the current exemptions for micro-renewable developments. It should be noted that future amendments to Planning Regulations may supersede the exemptions set out below and as such the Planning and Development Regulations should always be consulted when assessing whether or not a renewable energy proposal constitutes exempted development.

Heat Pump in an Industrial Setting

The level of the ground must not be altered by more than 1m above or below the level of the adjoining ground.
The total area of any air source HP must not exceed 15 sq. m.
An air source heat pump must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
Noise levels at the nearest party boundary must not exceed 43 db (A).
Heat Pump in a Light Industrial or Business Setting
The level of the ground must not be altered by more than 1m above or below the level of the adjoining ground.
The total area of any air source HP must not exceed 10 sq. m.
No structure must be placed to the front of a building.
An air source heat pump must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
Noise levels at the nearest party boundary must not exceed 43 db(A).

Heat Pump in an Agricultural Setting

Exemptions apply to ground source or air source heat pumps.
The level of the ground must not be altered by more than 1m above or below the level of the adjoining ground.
The total area of any air source HP must not exceed 10 sq. m.
An air source heat pump must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
Noise levels at the nearest party boundary must not exceed 43 db(A).

Heat Pump in a Domestic Setting

The level of the ground must not be altered by more than 1m above or below the level of the adjoining ground.

The total area of any air source HP or combination of two heat pumps must not exceed 2.5 sq. m.
The heat pump must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
Noise levels at the nearest party boundary must not exceed 43 db(A).
No structure must be placed to the front of a building.

Wind Turbine in a Domestic Setting

Turbine must not be attached to a building.
One turbine per house and it can not be sited in front of the building.
Total height must not exceed 13m.
Rotor diameter must not exceed 6m.
3m minimum clearance between ground and lowest point of blades.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus one metre from the nearest party boundary.
Noise levels must not exceed 43db(A) or 5 db(A) above background noise at the nearest inhabited neighbouring dwelling.
No advertising can be placed on the turbine and the turbine must be matt finished.
The blades must not interfere with telecoms signals.

Wind Turbine in an Agricultural Setting

Turbine must not be attached to a building.
One only turbine per site.
Total height must not exceed 20m.
Rotor diameter must not exceed 8m.
3m minimum clearance required between ground and lowest point of blades.
Turbine mast must be one and a half times the total maximum height of the assembly (including turbine and blades) plus 1m from the nearest party boundary or non-electrical overhead lines.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus 20m from the nearest 38kV electricity distribution line.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus 30m from the centreline of the nearest transmission line i.e. 110kV plus.
The turbine must not be within 100m of an existing turbine.
Noise levels must not exceed 43db(A) at the nearest inhabited dwelling.
No advertising can be placed on the turbine and the turbine must be matt finished.
The blades must not interfere with telecoms signals.
Consent must be sought from the Irish Aviation Authority if the turbine is to be within 5km of an airport.

Wind Turbine in an Industrial or Business Setting

Turbine must not be attached to a building.
One only turbine per site.
Total height must not exceed 20m.
Rotor diameter must not exceed 8m.
3m minimum clearance required between ground and lowest point of blades.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus 5m from the nearest party boundary or non-electrical overhead lines.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus 20m from the nearest 38kV electricity distribution line.
Turbine mast must be the total maximum height of the assembly including turbine and blades plus 30m from the centreline of the nearest transmission line i.e. 110kV plus.
Noise levels must not exceed 43db(A) or 5 db(A) above background noise at the nearest inhabited neighbouring dwelling.

No advertising can be placed on the turbine and the turbine must be matt finished.
The blades must not interfere with telecoms signals.
Consent must be sought from the Irish Aviation Authority if the turbine is to be within 5km of an airport.
The area must not be within an Architectural Conservation Area.

Solar Thermal or PV panel in a Domestic Setting

Total panel area must not exceed 12 sq. m or 50% of the total roof area including existing panels.
The distance between the plane of the wall or pitched roof and the panel must not be more than 15cm.
The distance between the plane of a flat roof and the panel must not exceed 50cm.
The panel must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
A free standing array's height must not exceed 2m above ground level.
The erection of a free standing array must not reduce the area of private space to the rear or side of the house to less than 25 sq. m.

Solar Thermal within a Light Industrial or Business Setting

Can not be erected on a wall.
Total panel area must not exceed 50 sq. m or 50% of the total roof area including existing panels.
The distance between the plane of the pitched roof and the panel must not exceed 50cm in a light industrial building and 15cm in a business premises.
The distance between the plane of a flat roof and a panel must not exceed 2m in a light industrial setting and 1m in a business premises.
The panel must be a minimum of 50cm from the edge of the roof on which it is mounted or 2m on a flat roof.
Any associated equipment or storage must be within the roof space of the building.
A free standing array's height must not exceed 2m above ground level.
The total aperture area of a free standing array must not exceed 25 sq. m.
No advertising can be placed on the panel and a free standing panel must not be placed to the front of the premises.

Solar Thermal or PV within an Industrial Setting

Distance between the plane of the wall or pitched roof and the panel must not exceed 1m.
The distance between the plane of a flat roof and the panel must not exceed 2m.
The panel must be a minimum of 50cm from the edge of the wall or roof on which it is mounted.
The total aperture area must not exceed 50 sq. m.
Any associated equipment or storage must be within the roof space of the building.
A free standing array's height must not exceed 2m above ground level.
No advertising can be placed on the panel.

Solar Thermal or PV within an Agricultural Setting

Total panel area must not exceed 50 sq. m or 50% of the total roof area including existing panels.
Distance between the plane of the wall and the panel must not exceed 15cm.
The distance between the plane of a pitched roof and the panel must not exceed 50cm.
The distance between the plane of a flat roof and the panel must not exceed 2m.
The panel must be a minimum of 50cm from the edge of the wall or roof on which it is mounted or 2m if on a flat roof.
The total aperture area of a free standing array must not exceed 25 sq. m.
Any associated equipment or storage must be within the roof space of the building.
A free standing array's height must not exceed 2m above ground level.
No advertising can be placed on the panel.

PV within a Light Industrial or Business Setting

Total panel area must not exceed 50 sq. m or 50% of the total roof area including existing panels.
The distance between the plane of the wall and the panel must not exceed 15cm.
The distance between the plane of a pitched roof and the panel must not exceed 50cm in the case of a light industrial building and 15cm in a business setting.
The distance between the plane of a flat roof and the panel must not exceed 2m in the case of a light industrial building and 1m in the case of a business premises.
The panel must be a minimum of 50cm from the edge of the roof or pitched roof on which it is mounted or 2m on a flat roof.
Any associated equipment or storage must be within the roof space of the building.
A free standing array's height must not exceed 2m above ground level.
The total aperture area of a free standing array must not exceed 25 sq. m.
No advertising can be placed on the panel and a free standing panel must not be placed to the front of the premises.

CHP Enclosing Structure in Industrial Setting

Gross floor area not to exceed 500 sq. m and height and length must not exceed 10m and 50m respectively.
Must not be within 10m of public road or 200 metres of the nearest inhabited dwelling e.g. house, school, church, hospital unless written consent is available.
Structure must not exceed 8m if within 100m of a public road.
Maximum of 2 flues which must be below 20m in height and a maximum of 1m in diameter.
Noise levels must not exceed 43 db(A) at the nearest party boundary.
One only such structure exempt per premises and the structure can not enclose anything else.

CHP Enclosing Structure in Light Industrial or Commercial Setting

Gross floor area not to exceed 300 sq. m and height and length must not exceed 8m and 40m respectively.
Must not be within 10m of public road or 200 metres of the nearest inhabited dwelling e.g. house, school, church, hospital unless written consent is available.
Structure must not exceed 8m if within 100m of a public road.
Maximum of 2 flues which must be below 16m in height and a maximum of 1m in diameter.
Noise levels must not exceed 43 db(A) at the nearest party boundary.
One only such structure exempt per premises and the structure can not enclose anything else.

CHP Enclosing Structure in Agricultural Setting

Gross floor area not to exceed 300 sq. m and height and length must not exceed 8m and 40m respectively.
Must not be within 10m of public road or 100 metres of the nearest inhabited dwelling e.g. house, school, church, hospital unless written consent is available.
Structure must not exceed 8m if within 100m of a public road.
Maximum of 2 flues which must be below 16m in height and a maximum of 1m in diameter.
Noise levels must not exceed 43 db(A) at the nearest party boundary.
One only such structure exempt per premises and the structure can not enclose anything else

Biomass Boiler in Industrial, Light Industrial or Business Setting

Exemptions apply to boiler house, flues and storage of fuel.
The gross floor area of the boiler house must not exceed 20 sq. m.
The maximum allowable storage capacity for fuel store must not exceed 75 cubic metres.
The maximum exempt height for the storage is 3m.

The maximum exempt height for any flue, (2 are allowable), is 16m above ground level and the maximum diameter of same is 1m.
Only one such structure is allowable per premises.
The boiler house must not be within 10m of a public road or 100 metres from the nearest inhabited building such as a school, church, hospital etc. unless the written consent of the occupant is given.
Noise levels must not exceed 43 db(A) at the nearest party boundary.
The fuel must not be derived from animal waste or from wood containing dangerous substances.

Biomass Boiler in an Agricultural Setting

Exemptions apply to boiler house, flues and storage of fuel.
The gross floor area of the boiler house must not exceed 20 sq. m.
The maximum allowable storage capacity for fuel store must not exceed 75 cubic metres.
The maximum exempt height for the storage is 3m.
The maximum exempt height for any flue, 2 are allowable, is 20m above ground level and the maximum diameter of same is 1m.
Only one such structure is allowable per premises.
The boiler house must not be within 10m of a public road or 100 metres from the nearest inhabited building such as a school, church, hospital etc. unless the written consent of the occupant is given.
Noise levels must not exceed 43 db (A) at the nearest party boundary.
The fuel must not be derived from wood containing dangerous substances.

Issues that De-Exempt Micro-Renewable Development

Article 9. (1) of the Planning and Development Regulations sets out conditions where the exemptions detailed above do not apply. The Planning Authority will not consider a development exempt if it would:
Interfere with the character of a landscape, or a view or prospect of special amenity value or special interest, the preservation of which is an objective of a development plan for the area in which the development is proposed;
Consist of or comprise the excavation, alteration or demolition of places, caves, sites, features or other objects of archaeological, geological, historical, scientific or ecological interest, the preservation of which is an objective of a development plan for the area in which the development is proposed;
Be in an area to which a special amenity area order relates.

Information in relation to exempted development is available by downloading the above statutory instruments from the Department of the Environment, Community and Local Government's web site, or by contacting Roscommon County Council's Planning Department.

Developers who propose to install a micro-renewable technology are advised to obtain a written declaration from the local authority which will provide clarity on whether or not their particular development is covered by the exemptions.

5.9 RENEWABLE ENERGY DEVELOPMENT AND NATURA 2000 SITES

The following table summarises the minimum requirements of assessment work in relation to key species, either as part of a Habitats Directive Assessment or standard Environmental Impact Assessment. Current best practice guidelines and methodologies from elsewhere in Ireland and the UK are described. The table identifies the minimum requirements only and more stringent assessments may be required for some proposals. However the Table will provide some guidance on the level of information required for proposals which may affect key species and habitats.

Table 2 – Minimum survey requirements for proposals potentially affecting important features using best practice approaches.

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
Wintering and migratory waterfowl eg • **Greenland White-fronted Goose** • **Whooper Swan** • **Golden Plover**	For proposals within 5km of any Natura 2000 site designated for waterfowl or known feeding / roosting sites outside Natura 2000, or proposals located between such sites - Identify feeding and roosting areas Identify flight lines between feeding and roosting sites Assess collision risk (especially geese and swans)	Lough Ree SPA Middle Shannon Callows SPA Lough Gara SPA Bellanagare Bog SPA River Suck Callows SPA Lough Croan Turlough Ballykenny - Fisherstown Bog Four Roads Turlough SPA	• Detailed desk study of existing data • Field survey – for wintering birds at least twice per month, with additional visits to cover times of peak use if known • More frequent counts for migratory birds – at least weekly • Where birds not found using wind farm site on any visit, search for and record any evidence such as droppings and search for flocks away from site. • Carry out Vantage Point (VP) watches of the site. Ensure VPs cover the whole site plus a buffer zone of 500 metres around it. • At least 36 hours of observations from **each** VP over the relevant season. For migratory bird this could mean 36 hours at each VP in both autumn and spring • Ensure some watches undertaken in conditions of low cloud or mist • For potential roost sites ensure watches are undertaken an hour either side of dawn and dusk • Prepare collision risk assessment based on data collected	Oct – March for wintering birds Sept – November and March – May for migratory birds Complete work over at least 1 winter or migration period as standard. At least 2 winters needed if flocks are known to shift feeding or roosting sites between winters	*Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities – SNH 2006*
Common Tern (breeding)	For proposals within 1km of Natura 2000 sites designated for this species - Identify flight lines between breeding colonies and feeding areas.	Lough Ree SPA	• Detailed desk study of existing data especially to establish breeding colony locations • Select VPs to cover breeding areas so that incoming and outgoing flights can be recorded • Minimum of 36 hours observations at **each** VP • Attempt to "track" bird foraging flights if possible using a team of observers	May to July At least one year's data	*Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities – SNH 2006*
Common Scoter (breeding)	For proposals within 1km of Natura 2000 sites designated for this species -	Lough Ree SPA	• Detailed desk study of existing data Breeding Survey • Survey any possible breeding areas within 1km of wind	April to June (breeding survey) June to August (flight	*Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird*

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
	Identify breeding areas Identify any flight lines particularly during post-breeding dispersal Assess collision risk		farm site. • Three visits to each area between late April and start of June • Count unit = max number of females • Use boat or shore-based Vantage Points to assess presence of breeding birds Flight line survey • Select VPs to cover breeding areas so that incoming and outgoing flights can be recorded • Minimum of 36 hours observations at **each** VP	line work) At least one year's data	*Communities – SNH 2006* *Bird Monitoring Methods – a manual of techniques for key IUK species – RSPB1998* *Map of bird sensitivities to wind farms in Scotland: a tool to aid planning and conservation – RSPB/SNH 2008*
Corncrake	For proposals in known corncrake areas (within and outside Natura 2000) – Identify breeding locations	Middle Shannon Callows SPA	• Detailed desk study of existing data • Survey all suitable habitat within 1km of proposed sites • At least two visits required between 0000 and 0300am	May and June At least one year's data	*Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities – SNH 2006* *Bird Monitoring Methods – a manual of techniques for key UK species – RSPB1998*
Raptors on Annex I of EU Birds Directive - eg Peregrine	For proposals in upland areas or lowland sites such as quarries where peregrines known or suspected – Establish breeding status	n/a	• Detailed desk study of existing data Breeding Survey (Peregrine) • Map suitable breeding habitat within 2km of wind farm site and survey for evidence of nesting • Visit suitable sites in late March. Two further visits in June to assess breeding success. Flight Behaviour Survey • Carry out Vantage Point (VP) watches of the site. Ensure VPs cover the whole site plus a buffer zone of	March – June (breeding) March – August (VPs) At least one year or two where birds use different nest sites in same area	*Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities – SNH 2006* *Bird Monitoring Methods – a manual*

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
	Establish flight behaviour within site		500 metres around it. • At least 72 hours of observations from **each** VP over the season. • Prepare collision risk assessment		*of techniques for key UK species – RSPB1998*
Bird species afforded general protection under Article 5 of EU Birds Directive	For all proposed wind farms – Obtain information on breeding and wintering bird populations and distribution Target key species such as those known to be potentially vulnerable to wind turbines and/or Red-Listed species. Key species may include breeding waders such as curlew and lapwing. Flight activity data (eg VPs) may be required for these species	n/a	• Detailed desk study of existing data Breeding waders (lowlands) • O'Brien and Smith method • Three early morning visits (mid April to mid June) • Walk on field-by-field basis • Record all wader activity using BTO codes Breeding waders (uplands) • Brown and Shepherd method • At least 2 visits early April to late June • Timed constant search effort recording within 500x500m quadrats General bird surveys • For uplands use modified Brown and Shepherd – eg not timed • In lowlands use scaled-down Common Bird Census (CBC) – eg 3 visits April – June. Record all birds and map territories. • Supplement with point counts in woodland habitats • Winter visits – use same methodologies Flight Behaviour Survey • Carry out Vantage Point (VP) watches of the site. Ensure VPs cover the whole site plus a buffer zone of 500 metres around it. • At least 36hours of observations from **each** VP over **each** relevant season.	April - July (breeding and flight activity) October – early March (winter)	*Percival, S.M. 2003- Birds and Wind Farms in Ireland: A review of potential issues and impact assessment.* *Lynas. P, Newton, S.F.,& Robinson, J.A.(2007). The status of birds in Ireland: an analysis of conservation concern 2008-2013. Irish Birds Volume 8 number 2 (149-166)* *Bird Monitoring Methods – a manual of techniques for key IUK species – RSPB1998*
Otter	For proposals with watercourses or with hydrological connection	Lough Ree SPA River Shannon	• Detailed desk study of existing data	Multiple visits ideally Any time of year, but	*Chanin, P. 2003 - Monitoring the Otter – Conserving Natura*

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
	to watercourses within or outside Natura 2000 sites – Identify presence of otter activity Identify presence of holts used by breeding otters and other sensitive features including potential shelters	Callows SPA River Moy SAC Lough Corrib SAC	• Survey both linear watercourses and areas around infrastructure to identify any key features • Cover at least 250m radius around each turbine/access road • Avoid periods of high water, heavy rain, dense foliage and leaf fall.	best to avoid summer and autumn in wooded areas due to dense cover and leaf fall obscuring evidence	*2000 Rivers Monitoring Series No 10 – English Nature Peterborough* *Bailey, M. and Rochford, J. (2006) – Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals No 23. NPWS* *National Roads Authority – Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes.*
Bats	For all proposed wind farms – Obtain information on bat roosts, commuting routes and foraging areas	n/a	• Detailed desk study of existing data including consultation with NPWS and Bat Conservation Ireland Suggested methodology pending new guidelines from Bat Conservation Ireland • Monthly visits between April and September • Mixture of dawn and dusk surveys • Daytime roost site assessment • Emergence /Return surveys at suspected roost sites • Cover entire site and buffer of 200m to include features beyond site boundary • Use appropriate bat detecting and recording equipment • Record all activity on large scale maps	April to September Usually one full season	*Eurobats Publication No 3 – Guidelines for consideration of bats in wind farm projects (2008)* *Bat Conservation Trust (2007) Bat Surveys - Good Practice Guidelines, Bat Conservation Trust, London* *NIEA 2009 – Bat Survey: Specific Requirements for Wind Farm Proposals*

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
					NB – New guidance currently being drafted by Bat Conservation Ireland
Marsh Fritillary	For proposals with potential hydrological connectivity with Natura 2000 sites designated for this species and at any other site known or suspected to support this species – Assess habitat suitability for the species Establish population and distribution of larval webs	Callow Bog SAC Carrowbehy/Caher Bog SAC Cloonchambers Bog SAC Bellanagare Bog SAC	• Detailed desk study of existing data and consultation with NPWS • Habitat Suitability Survey and mapping of *Succisa pratensis* (devil's-bit scabious) within site. Key factors are percentage of *Succisa,* sward height, scrub cover and presence of tussocks • Optional search for adult butterflies in late May/June • Larval web searches of suitable habitat – transects across area	One year, but note that marsh fritillary colonies can shift each year so habitat suitability assessment is essential to safeguard possible breeding areas. Late May/June – adult butterfly search June – November for habitat assessment Late August to early October for larval web searches	*NIEA 2010 – Marsh Fritillary Survey: Specific Requirements* *NIEA 2010 – Devil's Bit Scabious Survey: Specific Requirements* *National Roads Authority – Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. NRA* *Irish Butterfly Monitoring Scheme Survey Forms (NBDC Website)*
Salmon	For proposals with hydrological connectivity with Natura 2000 sites designated for this species – Assess population and	Lough Corrib SAC River Moy SAC	• Detailed desk study of existing data and consultation with Inland Fisheries • Where little or no data exist, and after consultation with Inland Fisheries/NPWS/EPA etc, investigate use of watercourse by salmon • Use temporary fish traps or counters to monitor fish activity • Electro-fishing can be used to monitor parr or smolt	Employ fish traps October - February for adults or any time of year for parr. Avoid electro-fishing when spawning adults are present (eg Oct-Feb)	*National Roads Authority – Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. NRA*

Species	Key species objectives	Natura 2000 sites	Principal Methodology	Timing and Duration	References
	distribution of species within relevant watercourses		numbers, but not when spawning adults are present.		
Lamprey species	For proposals with hydrological connectivity with Natura 2000 sites designated for this species – Assess population and distribution of species within relevant watercourses	Lough Corrib SAC River Moy SAC	• Detailed desk study of existing data and consultation with Inland Fisheries • Use temporary fish traps or counters to monitor fish activity for adults • Electro-fishing can be used to monitor ammocoete numbers, but only in consultation with Inland Fisheries Ireland.	Ammocoete surveys are best undertaken between August and October	*National Roads Authority – Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. NRA*
White-clawed Crayfish	For proposals with hydrological connectivity with Natura 2000 sites designated for this species – Assess population and distribution of species within relevant watercourses	Lough Corrib SAC River Moy SAC	• Detailed desk study of existing data and consultation with NPWS and Inland Fisheries • Use combination of manual searches, trapping and nocturnal torchlight survey depending on nature of watercourse. Seek appropriate consents. • Always work in upstream direction • Manual searching can be done in clear water <60cm deep. Select 5 suitable areas within a 1-200m section of river. Search 10 most suitable potential refuges for crayfish. • Trapping can be done in turbid water and in water >60cm. Use at least 10-20 baited fine mesh traps in each 1-200m section at 2-4km intervals along the watercourse. Set traps overnight and check following morning. • Torchlight surveys can be done in clear, shallow water. Survey a 100m section when fully dark. Look for crayfish up to 2m from the bank. • Biosecurity measures are essential to prevent spread of crayfish “plague” between watercourses.	August/September	*National Roads Authority – Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. NRA*

Early mitigation of potential impacts by appropriate siting and layout of renewable energy proposals, particularly wind farm proposals is always preferable to having to change operational aspects of the development to avoid impacts at a later stage both for developers and wildlife. Understanding areas of high risk and applying an appropriate level of survey is fundamental in devising early mitigation.

The following table below summarises the recommendations for the Natura 2000 site species and habitat selection features.

Table 3 Summary Recommendations for Natura 2000 Site Features

Feature	Recommendation	Relevant Natura 2000 site
Greenland white-fronted goose	• Exclude areas up to 600 metres outside SPAs designated for the species from *most favoured* category for wind energy development. • Require minimum survey requirements as laid out in **Table 2** where any proposal falls within areas identified as sensitive for the species. • Require minimum survey requirements as laid out in **Table 2** if presence at a site is suspected or initial site surveys find the species present or if the site is within a potential flightline for the species moving to and from sites.	• Lough Gara SPA • Bellanagare Bog SPA • River Suck Callows SPA • Lough Croan Turlough • Ballykenny - Fisherstown Bog • Four Roads Turlough SPA
Whooper swan	• Exclude areas up to 600 metres outside SPAs designated for the species from *most favoured* category for wind energy development. • Require minimum survey requirements as laid out in **Table 2** where any proposal falls within areas identified as sensitive for the species. • Require minimum survey requirements as laid out in **Table 2** if presence at a site is suspected or initial site surveys find the species present or if the site is within a potential flightline for the species moving to and from sites.	• Lough Ree SPA • Middle Shannon Callows SPA • Lough Gara SPA • River Suck Callows SPA
Golden plover	• Exclude areas up to 1 km outside SPAs designated for the species from *most favoured* category for wind energy development. • Require minimum survey requirements as laid out in **Table 2** if presence at a site is suspected or initial site surveys find the species present or if the site is within a potential flightline for the species moving to and from sites.	• Lough Ree SPA • Middle Shannon Callows SPA • River Suck Callows SPA • Lough Croan Turlough • Four Roads Turlough SPA
Other winter waterfowl populations	• Require minimum survey requirements as laid out in **Table 2** if presence at a site is suspected or initial site surveys find the species present or if the site is within a potential flightline for the species moving to and from sites.	• Lough Ree SPA • Middle Shannon Callows SPA • River Suck Callows SPA • Lough Croan Turlough
Marsh fritillary	• Require devil's bit scabious survey as part of habitat survey for all projects. Require minimum survey requirements as laid out in **Table 2** if: • presence at a site is suspected or; • initial site surveys find the species present, or; • If habitat survey highlights devil's bit scabious as present at the site.	• Callow Bog SAC • Carrowbehy/Caher Bog SAC • Cloonchambers Bog SAC • Bellanagare Bog SAC

Otter	• Require minimum survey requirements as laid out in **Table 2** if the proposal site holds any watercourses. • Require a Habitats Directive Article 6 screening assessment for all projects that may have a direct impact on watercourses within SACs designated for otter.	• Lough Ree SPA • River Shannon Callows SPA • River Moy SAC • Lough Corrib SAC • All Proposals
All bat species	• Require minimum survey requirements as laid out in **Table 2** in all cases.	• All Proposals
Lamprey species	• Require a Habitats Directive Article 6 screening assessment for all projects within River Moy or Lough Corrib catchments that may have a direct connection to watercourses. • Require minimum survey requirements as laid out in **Table 2** if the screening assessment identifies potential significant effect with respect to the feature.	• Lough Corrib SAC • River Moy SAC
Salmon	• Require a Habitats Directive Article 6 screening assessment for all projects within River Moy or Lough Corrib catchments that may have a direct connection to watercourses. • Require minimum survey requirements as laid out in **Table 2** if the screening assessment identifies potential significant effect with respect to the feature.	• Lough Corrib SAC • River Moy SAC
Freshwater crayfish	• Require a Habitats Directive Article 6 screening assessment for all projects within River Moy or Lough Corrib catchments that may have a direct connection to watercourses. • Require minimum survey requirements as laid out in **Table 2** if the screening assessment identifies potential significant effect with respect to the feature.	• Lough Corrib SAC • River Moy SAC
Wetland habitats	• Require a Habitats Directive Article 6 screening assessment for all projects that have the potential to affect hydrology or water quality of water dependent sites as a result of watercourse connectivity or existence within a single hydrological unit.	• Callow Bog SAC • Tullaghanrock Bog SAC • River Moy SAC • Derrinea Bog SAC • Errit Lough SAC • Carrowbehy / Caher Bog SAC • Drumalough Bog SAC • Cloonchambers Bog SAC • Lough Corrib SAC • Coolcam Turlough SAC • Corliskea / Trien / Cloonfelliv Bog SAC • Cloonshanville Bog SAC • Bellanagare Bog SAC • Four Roads Turlough SAC

		• Castlesampson Esker SAC • River Shannon Callows SAC • Lough Ree SAC • Croan Turlough SAC • Lough Funshinagh SAC • Corbo Bog SAC • Lough Forbes Complex SAC