



ENVIRONMENTAL REPORT



STRATEGIC ENVIRONMENTAL ASSESSMENT
OF THE
DRAFT RENEWABLE ENERGY STRATEGY FOR COUNTY MAYO

MAYO COUNTY COUNCIL
COMHAIRLE CONTAE MHAIGH EO

DECEMBER 2010

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**SEA CARRIED OUT BY MAYO COUNTY COUNCIL SEA TEAM
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BY
FORWARD PLANNING SECTION**

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Table of Contents

Non Technical Summary	i
Section 1 SEA Introduction & Context	1
1.1 Introduction	1
1.2 Strategic Environmental Assessment (SEA)	1
1.3 Legislative Context.....	1
1.4 Content of the Environmental Report.....	2
1.5 Implications for Mayo County Council and the Elected Members	2
Section 2 SEA Methodology	3
2.1 Introduction	3
2.2 Screening.....	3
2.3 Scoping and Consultation	3
2.4 Establishing the Environmental Baseline	5
2.5 Consideration of Alternatives.....	6
2.6 The Environmental Report.....	7
2.7 The SEA Statement.....	7
2.8 Difficulties Encountered in Compiling the Required Information.....	7
2.9 Undertaking the SEA Process	8
Section 3 Context of the Draft Renewable Energy Strategy	9
3.1 Content and Main Objectives of the Draft Renewable Energy Strategy	9
3.2 Relationship of Draft RES with other relevant Plans and Programmes.....	11
Section 4 The Baseline Environment.....	16
4.1 Introduction	16
4.2 Biodiversity and Flora and Fauna	17
4.3 Population and Human Health	29
4.4 Soils and Geology.....	33
4.5 Water	42
4.6 Air Quality and Climatic Factors.....	62
4.7 Material Assets	77
4.8 Cultural Heritage.....	92
4.9 Landscape	100
4.10 Interrelationships between Environmental Factors	104
4.11 Overlay Mapping of Environmental Sensitivities and Outcomes.....	104
4.12 Consideration of Impacts of the RES on Adjoining Authorities	104
Section 5 Environmental Protection Objectives	108
5.1 Introduction	108

Environmental Report
Draft Renewable Energy Strategy for County Mayo

5.2	Biodiversity, Flora and Fauna: EPOs, Targets and Indicators	108
5.3	Population and Human Health: EPOs, Targets and Indicators	110
5.4	Soils and Geology: EPOs, Targets and Indicators	110
5.5	Water: EPOs, Targets and Indicators.....	111
5.6	Air and Climatic Factors: EPOs, Targets and Indicators	114
5.7	Material Assets: EPOs, Targets and Indicators.....	115
5.8	Cultural Heritage: EPOs, Targets and Indicators	117
5.9	Landscape: EPOs, Targets and Indicators.....	119
Section 6	Alternative Scenarios.....	120
6.1	Introduction	120
6.2	Advantages and Disadvantages of Renewable Energy Production	120
6.3	Environmental Considerations relating to RE Developments.....	122
6.4	The Alternatives.....	126
6.5	Evaluation of Scenarios	127
6.6	Evaluation of Alternative Scenarios against EPOs	144
Section 7	Evaluation of the Draft RES Policies and Objectives	149
7.1	Outline of Renewable Energy Strategy	149
7.2	Evaluation of Policies and Objectives – Methodology.....	150
Section 8	Mitigation Measures	156
8.1	Introduction	156
8.2	SEA Recommendation	156
8.3	Mitigation Measures	156
8.5	Incorporation of Mitigation Measures into the Renewable Energy Strategy	164
Section 9	Monitoring Measures.....	168
9.1	Introduction	168
9.2	Indicators and Targets	168
9.3	Sources	168
9.4	Reporting and Monitoring	168
Appendices	177	
Glossary	187	
List of Abbreviations	189	
References.....	190	
Flood Risk Report	1	
Maps 1 and 2 of Draft Renewable Energy Strategy	9	

Non Technical Summary

Section 1 SEA Introduction & Context

Mayo County Council has prepared a draft Renewable Energy Strategy for the County (RES). Following approval by the Council it is intended that the Strategy will be incorporated as a Variation into the Mayo County Development Plan 2008-2014 and will remain in place until 2020. The aim of this draft Strategy is to develop the plan-led approach to the location of renewable energy development at a more detailed level than that outlined in the Wind Energy Strategy (2008) and renewable energy policies and objectives in the Mayo County Development Plan 2008-2014. The draft Strategy also revises and replaces the Mayo Wind Energy Strategy 2008 and the Renewable Energy policies and objectives of the Mayo County Development Plan 2008-2014.

Strategic Environmental Assessment (SEA) is a formal process that is being carried out in parallel with the preparation of the Renewable Energy Strategy. SEA is the systematic, ongoing process of evaluation of the likely significant environmental effects of implementing a plan or programme (including a strategy such as the RES) in order to ensure that these effects are appropriately addressed before a decision is made to adopt it. It also gives the public and other interested parties an opportunity to comment and to be kept informed on decisions that may impact on the environment and how they were made. This Report records the process and findings of the SEA and its preparation is part of the SEA process.

The SEA is being carried out in order to comply with EU SEA Directive 2001/42/EC which was transposed into Irish law through the SEA Regulations. In order to ensure that the proposed RES does not have any adverse impacts on Mayo's designated conservation sites, the Natura 2000 network, a separate assessment called a Habitat Directive Assessment was also carried out.

Section 2 Methodology

The methodology used in the SEA and in the preparation of the Environmental Report complies with statutory requirements of the EU Directive 2001/42/EC. As part of the SEA process it is necessary to engage in consultation with the public and various agencies to ascertain the environmental issues of relevance to the RES. In this regard, prior to preparing the draft RES, the Council published a Discussion Paper in February 2010 titled "The Potential for Renewable Energy in Co. Mayo" and invited submissions. A 'scoping' exercise was also carried out to determine the range of environmental issues and level of detail to be contained in the Environmental Report. This involved consultation with the relevant Environmental Authorities i.e. the Environmental Protection Agency; the Department of the Environment, Heritage and Local Government; and the Department of Communications, Marine and Natural Resources.

An inter-departmental multi-disciplinary SEA Team was established within Mayo County Council to carry out the SEA process which provided advice and expertise in establishing the baseline, determining environmental impacts of the RES, establishing environmental protection objectives and mitigation and monitoring measures. The Forward Planning Section co-ordinated the SEA process and compiled the Environmental Report.

The main output of the SEA process is this Environmental Report which sets out the findings and results of the SEA process on the likely significant effects of implementing the Draft RES. It also sets out mitigation measures to prevent or reduce significant adverse effects likely to arise from implementation of the Strategy, together with the alternatives considered; and measures relating to monitoring following its adoption.

The Environmental Report is an important tool that provides the decision makers, the elected members of Mayo County Council, who decide what type of Strategy to adopt, as well as the public, with a clear understanding of the likely environmental consequences of decisions taken in order to harness the energy and economic potential presented by renewable technologies in Mayo.

This report should be read in conjunction with the draft RES.

Section 3 Context of the Draft Renewable Energy Strategy

In June 2008, Mayo County Council adopted a Wind Energy Strategy (WES) for County Mayo as part of the Mayo County Development Plan 2008-2014 (MCDP). Objective O/TI-RE 1 of the Plan undertook to review the WES for Co. Mayo within one year of the adoption of the Plan. However, Mayo County Council decided to broaden the scope of the review of the WES and to prepare a RES for the County to include other sources of renewable energy (including Wind); in recognition of Mayo's other extensive renewable energy sources such as wave, tidal and biomass – the development of which it is an objective of the Council to facilitate as a priority (Objective O/TI-RE 8).

The aim of the draft RES is to develop the plan-led approach to the location of renewable energy development at a more detailed level than that outlined in the Wind Energy Strategy (2008) and the renewable energy policies and objectives in the Mayo County Development Plan 2008-2014. The draft Strategy also revises and replaces the Mayo Wind Energy Strategy 2008 and the Renewable Energy policies and objectives of the Mayo County Development Plan 2008-2014.

The Council's vision in relation to RE development in the County as expressed in the draft RES is:

“To harness the energy and economic potential of County Mayo presented by renewable technologies in order to provide benefit for both the local communities and global environment. In doing so, the elements of the natural, cultural and landscape heritage that define Mayo for local people and visitors alike will be protected. It is recognised, however, that change is an integral part of cultural heritage and that in order for communities and businesses to thrive Mayo needs new developments. Renewable energy projects will, therefore, be developed in ways that protect the integrity of particularly valued areas and sites, maximise local and regional benefits and minimise or avoid negative consequences.”

The draft RES is set within (and has been guided by) a hierarchy of policies, strategies and plans relating to environmental protection and spatial planning at the EU, national, regional and local levels. At the national level the RES is at the lower level of a hierarchy of land use and spatial plans which include the National Spatial Strategy 2000-2020; the Regional Planning Guidelines 2010-2016 for the West Region; and Mayo County Development Plan 2008-2014 of which the Strategy will become a part when it is adopted.

In addition, there is an overarching legislative framework which provides the statutory basis for the preparation of plans and strategies and for the protection of the environment at the international, EU and national levels. The policies and objectives of the draft RES comply with the environmental protection objectives of the above policy and legislative strategic actions.

Section 4 The Baseline Environment

Before future environmental impacts can be predicted, it is necessary to achieve an understanding of the current state of the environment. Therefore, a baseline description of the current physical environment must be established, with particular reference to those aspects of the environment which are experiencing existing environmental problems, or are likely to be significantly affected by implementation of the Strategy. Such baseline data is required to;

- Allow environmental problems to be identified
- Provide a baseline against which future monitoring can be carried out and
- Provide a basis for impact prediction.

The baseline information outlines the environmental context within which the RES will operate and the opportunities, constraints and targets that this context puts on the Strategy. Current environmental issues, likely to be significantly affected by the implementation of the RES, are identified at this stage of the process in order to more accurately assess potential future impacts.

The area of the County is 5560 sq. km (including the off-shore islands) and the entire County will be considered for the provision of renewable energy. Extensive areas of the County are designated as conservation areas for wildlife, geological or landscape reasons. For this reason, the baseline covers all areas of the County rather than focusing on particular geographical areas.

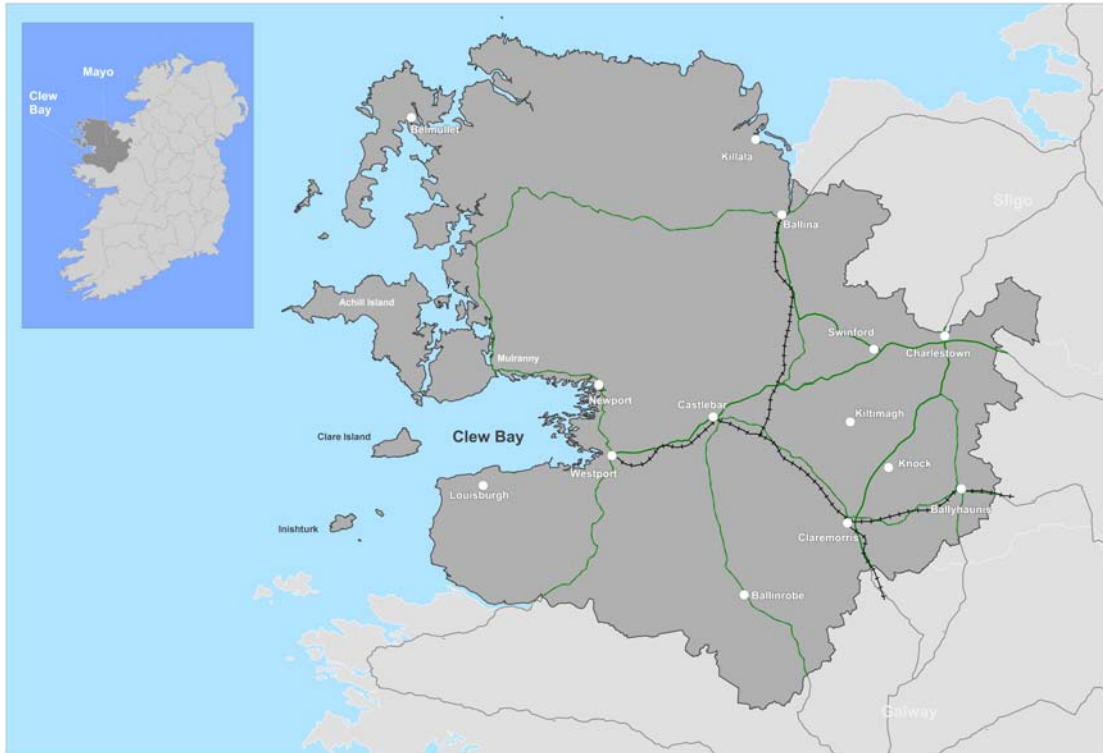


Fig 1 County Mayo

Biodiversity and Flora and Fauna

County Mayo has a particularly rich and diverse natural heritage. Mountains and upland areas are concentrated in the north and west of the County, which is characterised by a mosaic of peatland, heath and forestry plantations. More fertile farmland is found in the low-lying and undulating landscapes of east Mayo. There are several large lakes in the County and numerous medium to small lakes. Lough Conn and Mask are among the largest lakes in the country. Mayo is drained by an extensive network of rivers and streams. The main rivers of the County include the Moy, Deel, Owenmore, Owenduff, Newport, Bunowen, and the Erriff. The long and varied Mayo coastline contains a wide range of coastal habitats from cliffs to estuaries, mudflats, machair, sandy beaches and offshore islands. The richness and diversity of Mayo's habitats and species contribute to the character of the landscape. Biodiversity can be defined as the variability among living organisms and the interactions between them. It can include diversity within species, between species and of ecosystems. Almost a third of County Mayo's land area is designated for the protection and conservation of flora and fauna. This high percentage reflects the international and national significance of Mayo's wealth of natural heritage.

The various categories of protected sites/areas in Mayo include Ramsar Sites, Candidate Special Areas of Conservation; proposed Special Protection Areas, Natural Heritage Areas (existing and proposed), Statutory Nature Reserves and Ballycroy National Park; Geological Sites; Local Biodiversity Areas & Ecological Networks.

In addition to EU and National designations, there are 13 non SAC/NHA designated bogs, fens & turloughs of conservation interest protected under the MCDP 2008-2014. Along with sites designated for nature conservation, Mayo has many other areas of local ecological importance including broadleaved woodlands, scrub, hedgerows, tree lines, cutover bog and wet grassland.

The baseline study identified a number of environmental problems relating to Biodiversity, flora and fauna including; threats to biodiversity from habitat destruction and fragmentation, land clearance and development pressure, poorly-managed commercial forestry, drainage, pollution, invasive alien plant and animal species and climate change.

Habitat Directive Assessment

This draft RES has undergone Habitats Directive Assessment (HDA). This assessment has indicated that although the draft Strategy avoids Natura 2000 sites (Map 1 –Wind Energy) and ensures protection of Natura 2000 sites for all other renewable energy developments arising from this draft Strategy, mitigation measures have been outlined to preclude indirect effects on these sites from proposed renewable energy developments outside designated areas. Notwithstanding a HDA being carried out on this draft Strategy, individual renewable development proposals may be subject to a HDA at the project stage.

Population and Human Health

The population of Mayo in 2006 was 123,839 persons representing an increase of 5.3% since 2002, the most significant population increase since 1926. The pattern of change in urban and rural areas within the County since 2002 has seen a greater dispersal of growth with Ballina, Castlebar and Westport declining in terms of the volume of absolute growth, but other areas increasing.

According to the 2006 census, 63% of Mayo's population lives in rural areas and 37% live in urban areas. Rural EDs contributed 21% of County growth between 2002 and 2006. This, together with the trend towards greater spread of urban growth between towns, points to a more dispersed pattern of population and housing growth.

Population and human health can potentially be impacted upon by several environmental factors including water, soil and air and the interrelationships between them.

Soils and Geology

The soils of West Mayo largely consist of blanket peats which support rare varieties of flora and fauna protected under the EU Habitats Directive. Peaty gleys and peaty podzols, are found on low lying land and these mainly support agriculture in these areas. Towards the coasts of the west and north, areas of extensive agriculture are supported by acid brown earths. A greater diversity of soil types including grey brown podzolics, shallow brown earths and podzols occur in the east of the County and support the majority of the County's agriculture. There are significant areas of peat bogs around the north Castlebar region.

Mayo has had a long and complex geological history, the oldest rocks in Ireland, Pre-Cambrian gneiss, are found in the plains of Erris. In contrast, younger Carboniferous limestones make up much of the low-lying lands of the south east of the County. Quaternary sediments form a discontinuous blanket covering most of the bedrock, with moraines, drumlins and eskers all visible. The GSI has identified 122 sites in Mayo as Irish Geological Heritage (IGH) Sites and these are afforded protection under the County Development Plan.

The main pressures on soil resources in Ireland arise from intensive agriculture and organic waste disposal; forestry; industry; peat extraction; urbanisation and infrastructural development. Minimal protection of soils and geology, apart from that afforded by other environmental designations, means that sensitive areas such as peatlands are open to exploitation and degradation. Altering peatlands may result in contamination of soils and water courses. In addition, soil erosion due to development and forestry related operations, has a major impact on water quality and can also lead to landslide events. Recently the GSI have established a landslide database; to date there has been a total of 15 recorded landslide events in the County.

Water

The Water Framework Directive (WFD) (2000/60/EC) sets the framework for the comprehensive management of water resources in the European Community. The fundamental objective of the Directive aims at maintaining "high status" of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least "good status" in relation to all waters by 2015.

Freshwater Quality and Ecology

County Mayo contains a large quantity of river and stream channel lengths and lake areas in comparison with other counties in Ireland. These surface waters are an integral part of the County's landscape and resource base; they support diverse ecosystems across the County – a number are subject to ecological designations; and they are important in the supply of drinking water through direct abstraction and through their role in groundwater recharge.

The statutory Characterisation Report for the Western River Basin District (WRBD) was undertaken to, *inter alia*, identify RBD characteristics, in particular the water bodies which are *at risk* or *not at risk* and further *probably at risk* and *probably not at risk* of achieving the objectives of the WFD, namely, to achieve good status or maintain high status by 2015. The surface water bodies in Mayo have been designated as *high*, *good*, *moderate*, *poor* and *bad*.

Rivers and Lakes

Initial observation would indicate that, broadly-speaking, the eastern sector of the County is dominated by river bodies which are 'at risk' and 'probably at risk' of **not** achieving good status within the five-year target, while, with notable exceptions, the western region contains more 'not at risk' and 'probably not at risk' categories. In line with the risk status, the greater majority of moderate and poor water bodies are located in the more populated, developed part of Mayo, whereas the good and high water bodies are in the western, sparsely-populated, less-developed catchments.

The larger lakes; Conn, Cullin, Carra and Carrowmore are described at moderate status and many smaller lakes at high status. Lakes which have been described as good include Mask, Beltra, Feeagh and Furnace. No lakes have been described as bad.

Freshwater Ecology

The terms 'high status' and 'good status' are synonymous with 'high' and 'good' chemical status, but also, more notably, with 'high' and 'good' ecological status. Risk scores of each individual water body in Mayo have been assigned almost solely with regard to the abundance and diversity of aquatic macroinvertebrates. Hence, a *not at risk* allocation will essentially indicate a diverse and rich macroinvertebrate community, in addition to a well-oxygenated water body with little to no siltation and the absence of filamentous algae and which, on the balance of probabilities, will achieve the key objective of the WFD by 2015.

Under the EU (Water Policy) Regulations, the EPA established and maintain a register of Protected Areas. Essentially, this list contains data on *inter alia*, Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Species listed include those of lake habitats including slender niaid, and Arctic char. Otters, White-clawed crayfish and Freshwater Pearl mussel are just some river water-dependant taxa from river channels. In Mayo there are currently 56 candidate SACs designated and protected under the Habitats Directive 1992 due to their conservation value for habitats and species. While not formally adopted as yet, the majority of these designations are proposed for freshwater species and habitats, of which there are a total of 30.

Approximately 93% of the current County SPA designations (relating to protection of bird species) are designated in consideration of freshwater species and habitats.

Designated Salmonid waters in County Mayo include the River Moy and its network of tributaries. No Mayo lakes have been designated.

The protection of the conservation status of the freshwater pearl mussel is the primary objective under the EC Environmental Objectives (Freshwater Pearl Mussel) Regulations, 2009. Under this legislation, the freshwater pearl mussel sub-basins are designated catchments which are afforded high protection and in Mayo two such sub-basins currently exist; in Bundorragha and the Newport River catchments.

Currently, wastewater treatment plants (WWTP) in Mayo are being assessed for their potential impact on the species and habitats of Natura 2000 Sites. To date, six WWTPs have been granted licences by the EPA.

Marine Water Ecology

Mayo has a coastline approximately 1,235km long, representing approximately 13.5% of the entire Irish coastline. Marine and coastal waters are important for tourism, for use as bathing locations, fisheries and supporting marine wildlife. There are a number of key marine ecological and water quality characteristics of the Mayo coastline which highlight its importance and sensitivity to marine species and habitats. These include a total of 18 SACs which incorporate marine habitats or species, representing an area of approximately 870km². Within these SACs, there are four Annex 1 marine habitat and a further 14 Annex 1 coastal habitats, four of which are considered 'priority' habitats under the Habitats Directive. Within the SACs, there are also three Annex II species, two exclusively marine – grey seal and harbour seal.

In addition to the above, there are eight coastal SPAs in Mayo which are designated for a range of bird species. Cetaceans (whale, dolphin and seal species) which are protected under the 1976 Wildlife Act, occur widely outside protected areas. The Irish Whale and Dolphin Group recorded 16 sightings of cetaceans off the Mayo coast in 2009. Many of the coastal SACs are also designated as NHAs.

In Mayo, 11 bathing beaches were awarded the internationally recognised Blue Flag status in 2010 and an additional four beaches achieved the Green Coast Award in 2010.

Shellfish waters are designated and afforded protection under the Quality of Shellfish Waters Regulations 1994 (SI No. 200 of 1994) and the Shellfish Waters Directive 1979 (79/923/EEC). Both Regulations require that shellfish waters are protected from the effects of the functions of planning authorities. There are six bays and estuaries which are designated as shellfish production areas in the County.

In-shore waters around the entire Mayo coastline provide valuable nursery and spawning areas for a number of commercial fish species including blue whiting, cod, haddock, hake, herring, horse mackerel, mackerel, megrim and whiting. There are extensive in-shore fisheries throughout the area for species including mussels, oysters, lobster, crab, salmon, whitefish and various open-water fish species.

Marine and Transitional Water Quality

Since 2006 the EPA monitors water quality and the ecological status of nine estuarine and coastal waters in County Mayo; Erriff Estuary, Killary Harbour, Inner Clew Bay, Westport Bay, Newport Bay, Tullaghan Bay, Sruwaddacon Bay, Moy Estuary and Killala Bay. The trophic (i.e. nutrient) status of these water bodies was classified as unpolluted in the most recent assessment (Lucey, 2009). However, under the biological status assessment of these water bodies, only two are classified as being of high status (Killary Harbour and Inner Clew Bay), with a further two of good status (Westport Bay and Sruwaddacon Bay) and the remaining four being of moderate status. Those water bodies not of high status, have lost this status due to the condition of their fish stocks, with the exception of the Moy Estuary and Killala Bay which are not of good status due to the high frequency of phytoplankton blooms and elevated abundance of opportunistic macroalgae (although actual nutrient levels have been determined as being of natural levels at all of these water bodies).

Groundwater

The Geological Survey of Ireland (GSI) has classified all aquifers in Ireland into three main categories based on potential yield and extent:

- Regionally Important,
- Locally Important, or
- Poor.

Much of the east of the County is classified 'LI- Locally important, generally moderately productive in local zones' with much of the south and west of the County classified 'Rck- Regionally important, conduit karst aquifer, good development potential'. There is a relatively smaller amount of area classified 'Pl-poor aquifer, generally unproductive except in local zones' while an area south of Killalla Bay is classified as 'Rk- Regionally important, karst aquifer, good development potential'.

The GSI uses a matrix comprising four groundwater vulnerability categories - extreme, high, moderate and low - for mapping purposes and in the assessment of risk to groundwater. The categories are based on the thickness of cover (overburden) which provides some attenuation for contaminants migrating toward the groundwater table from the surface or near subsurface. Aquifers of extreme vulnerability can be found to the east and south east of Lough Mask while aquifers of high vulnerability are mostly found in the east of the County.

Environmental Problems relating to Water

There are a number of challenges currently facing water quality and water-dependant ecological factors in Mayo. These include pressures from urban wastewater and water treatment plant discharges and various other discharges. A large number of new sewerage schemes are required throughout the County. Because of insufficient or no treatment, water bodies are at risk from elevated nutrient loadings. This has implications for water quality and ecology both of which are interrelated.

Risks from agricultural lands and farm holdings as well as runoff from forestry lands and peat bog also pose potential threats to aquatic species together with habitat and competition from invasive species. Abstraction for drinking water may place unrealistic demands on water bodies and can impact on water quality and ecology.

Key potential environmental issues in the marine environment include eutrophication, hazardous substances, fisheries, mariculture, tourism and recreation and off-shore wind farms.

Regarding groundwater, there are severe environmental problems in the County with regard to water quality which have the potential for significant adverse impact upon biodiversity and flora and fauna, drinking water supplies and human health. Most of the aquifers in County Mayo are assessed as being probably not at significant risk with some aquifers classified as being not at risk. Aquifers which underlie and surround the settlements of Castlebar, Killala, Bellacorrick, Ballinrobe, Claremorris and Ballyhaunis and a large portion of the south east of the County have been assessed as being probably at significant risk.

Air and Climatic Factors

No significant pollution emission sources are located within the County and existing air quality is considered to be within current air quality standards. The primary influences on the existing air quality in the County include emissions from the transport and domestic/commercial heating sectors. For the purpose of assessment and management of air quality, Ireland is divided into four zones. County Mayo is located in Zone D. To date air quality monitoring data for the region indicates very good air quality with concentrations of specific pollutants being well within the emission limits values.

The low level of industrialisation in Mayo, in comparison to more industrialised areas, has contributed to a good standard of air quality in the County; however it is important that future developments (including development associated with all stages of renewable energy development) are controlled to ensure that air emissions/odours do not have a negative impact.

The primary environmental issues with regard to air quality in the County arise from road traffic; a high reliance on fossil fuel for domestic and commercial space heating compounded by the lack of district heating networks as well as combined heat and power plants; uncontrolled burning due to the burning of gorse and forest fires; and odours primarily from the application of slurry and animal storage.

Climate Change

Climate Change is recognised as the most serious and threatening global environmental problem. While natural variation in climate over time is normal, it is recognised that the rate of climate change is increasing as the emission of greenhouse gases (GHGs) into the atmosphere increases. The primary GHG is carbon dioxide CO₂ generated by the burning of fossil fuels. It is generally accepted that in order to reduce GHG emissions it is necessary to increase the use of energy from renewable sources.

The current strategy for the reduction in the use of fossil fuels and an increase in renewable energies stems from the Kyoto Protocol which sets binding targets for 37 industrialized countries and the European

community for reducing GHG emissions. The targets amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

Under the European Union Directive 2009/28/EC on the promotion of the use of energy from renewable sources, each Member State has a binding renewable energy target, which will contribute to the achievement of the overall EU goal. Ireland's overall target is to achieve 20% of energy from renewable sources by 2020¹. The National Climate Change Strategy 2007-2012 sets out ways to achieve national targets for the period 2008-2012 which will be achieved through a number of means including harnessing more renewable energy and using energy more efficiently.

There are a number of existing and permitted renewable energy related developments in the County. The largest wind farm development in the County with planning consent is that proposed at Bellacorrick, in close proximity to the existing wind farm comprising of 180 turbines with a potential output of approximately 306MW. There are a number of micro renewable energy installations for wind, solar and hydro-power (2).

Flood Issues

Information in relation to flood issues is based on the Flood Risk Report which was prepared in connection with the Renewable Energy Strategy (attached to rear of the Environmental Report). The mapping of historical flood events in County Mayo (sourced from OPW Flood Hazard Mapping www.floodmaps.ie) gives a general indication, based on reported past floods, of where flood vulnerable locations are in County Mayo. On www.floodmaps.ie the number of flood point locations for County Mayo is 193. However, due to local improvement works carried out in recent years, this number is subject to change. The most recent flood events, together with the areas more prone to flooding and its effects, are recorded in the Flood Risk report.

The OPW are currently involved in preparing Preliminary Flood Risk Assessments (PFRA's) with the relevant Local Authorities, the EPA and other key agencies. These will identify Areas with Potentially Significant Flood Risk (APSR's) based on historic and predictive data and consultation with stakeholders. Catchment-based Flood Risk Assessment and Management (CFRAM) studies will be undertaken focusing on these areas. These CFRAM studies will produce flood maps and establish, within a Flood Risk Management Plan, a prioritised set of flood risk management measures for their relevant areas, including the use of physical and management responses.

Nationally, the PFRAs will be provisionally completed in 2010 with formal completion in 2011, and will identify areas of potentially significant flood risk. The PFRA plans are not yet available for County Mayo.

Material Assets

It is considered that the relevant material assets in the context of the RES are roads and transport infrastructure including (rail, piers and harbours), waste infrastructure, water and waste water infrastructure and commercial forests (Mayo Forest Estate).

Road and Transportation: Mayo is served by some 628.4km of Regional Roads and 5331km of Local Roads. There are 78 piers and harbours for which Mayo County Council has statutory responsibility. Other transport infrastructure includes Iarnród Éireann and Ireland West Airport Knock (IWAK).

Energy: Two 110kV lines traverse the County, from Bellacorrick to Sligo and Bellacorrick to Claremorris, with 110Kv stations at Bellacorrick, Moy (Ballina), Castlebar, Westport and Dalton (Claremorris). The existing grid network is almost at capacity and it will not be possible to utilise Mayo's natural resources for renewable energy without essential upgrades to the grid.

Waste Infrastructure: This includes a number of EPA licensed facilities and Local Authority authorised waste facilities including transfer stations, waste permit sites and ATFs (authorised treatment facilities to depollute end of life vehicles). There is an extensive network of bring banks for collection of glass and aluminium cans. There are two recycling centres Derrinumera, Newport and Rathreen Ballina). Mayo

County Council has two EPA licensed landfills (Derrinnumera, Newport and Rathroeen Ballina), one of which is operational at the present time. However not all of the infrastructure included in the Connaught Waste Management Plan has been developed to date.

Waste Water Infrastructure: Details of waste water infrastructure are outlined on Figure 4.28 in the main body of this report. There is a lack of waste water treatment infrastructure in many parts of the County.

Drinking Water Infrastructure: Mayo County Council is responsible for 25 Public Water Supplies serving a population of 78,021 (EPA, 2009); Lough Mask, Lough Conn, Carrowmore Lake and Moher Lake provide water to the greatest number of houses in the County. There are 94 Public Group Water Schemes, 86 Private Group Water Schemes and a number of Single Private Sources in the County (EPA, 2009). The quality of the Public Drinking Water supplies remains high. However, the poor microbiological quality of the private group water schemes continues to be a challenge.

Mayo Forest Estate: Approximately 10% of Mayo is covered with forestry. A little over 11% of the total forest estate in the County is classified as broadleaf, with oak and birch the main broadleaf species. The remainder is mainly conifer forests, mostly planted from the 1960s, in the north and west of the County. Private forestry, planted mainly in the 1990s is predominantly concentrated on enclosed or improved farmland in the east of the County. The uniform monoculture coniferous plantations favoured by past forestry policy can be of limited biodiversity, landscape and amenity value. In addition, the interaction of these plantations with certain pollutants in the atmosphere (e.g. sulphur dioxide) can lead to the acidification of surface waters. Forestry activities can also lead to nutrient enrichment and sedimentation in rivers and lakes, which has a negative impact on the aquatic ecology of these waterbodies. While on the one hand our forests are vulnerable to the effects of climate change, forestry provides a range of opportunities to mitigate rises in greenhouse gas levels.

Cultural Heritage

Archaeological Heritage

County Mayo has a rich archaeological heritage as reflected in the Record of Monuments and Places (RMP) which lists and protects monuments and places under Section 12 of the National Monuments (Amendment) Act, 1994. Nearly 6,000 areas of archaeological importance (representing almost 8,000 elements) are included in the RMP for County Mayo spanning over 7,000 years. There are 51 National Monuments in the County in the ownership or guardianship of the State and a further 11 National Monuments that are subject to Preservation Orders. The archaeological heritage is a non-renewable resource. Increased development pressure raises the potential for adverse impacts on the archaeological resource.

Architectural Heritage

County Mayo has a rich architectural heritage, of which 273 structures are included in the Record of Protected Structures (RPS). Whilst the RPS includes some of the architectural heritage of the County deemed worthy of preservation and conservation, it could not be described as a definitive list. There are many buildings and structures, not included in the RPS which are important in their own right as part of the built heritage of the County. Mayo's architectural heritage is an important record of the economic and social history of the County and encompasses a broad spectrum of architectural forms relating to: Maritime, Transport and Industry; Historic Gardens; Agriculture; and other Vernacular Architecture. Loss of this heritage arises due to some owners and occupiers being unaware of their legal responsibilities to maintain protected structures resulting in deterioration, loss or damage to the historic fabric. Loss may also result from unauthorised development, unavailability of skilled labour in traditional skills and prohibitive costs.

Landscape

Mayo presents a wide range of landscapes ranging from complex agricultural patterns in the lowlands with small roads and houses; to a deeply indented Atlantic coastline; to the great and often empty uplands and moorlands of the west and north of the County.

County Mayo's Landscape Appraisal (Mayo County Development Plan 2008-2014) subdivides the County into sixteen distinct landscape character units each containing an area of land with similar character-giving elements such as slope, vegetation and land use. With regard to both the character units and the vulnerable

features, the Appraisal groups together character units into Policy Areas which provide for the guidance of development across the County. There are four Landscape Policy Units in County Mayo;

Policy Area 1: Montaine Coastal
Policy Area 2: Lowland Coastal
Policy Area 3: Uplands, moors, heaths or bogs
Lakeland Sub-policy Area 3A
Policy Area 4: Drumlins and Lowlands
Lakeland Sub-policy Area 4A.

County Mayo's eastern landscapes (Policy Area 4) are the most robust in the County and are least sensitive to change. All other landscapes are highly sensitive to change.

Views and Prospects

Mayo County Development Plan 2008-2014 also identifies scenic landscape areas in the form of listed Highly Scenic Views, Scenic Viewing Points, Scenic Views and Scenic Routes. It is the policy of the Council to ensure that development does not adversely interfere with views and prospects and the amenities of places and features of natural beauty or interest when viewed from the public realm.

An environmental problem with regard to landscape is the visual impact which occurs in sensitive landscape areas, such as those near the coastline, as a result of one off housing and other developments. Such developments, which individually may not have significant adverse impacts, cumulatively have the potential to have significant adverse impacts upon these sensitive landscapes. Climate change is also attributing to landscape environmental problems such as coastal erosion resulting in loss of habitats and landscape features.

Interrelationships between Environmental Factors

As is evident from the baseline description of the various environmental components, there is a complicated set of interrelationships between these components. An obvious example is that of water; changes in water quality will have impacts on population and human health and biodiversity. These interrelationships are discussed throughout the report as they arise.

Having established the environmental baseline; the main environmental problems and the interrelationship between the different environmental components, in order to identify where the most sensitive areas within and adjacent to the County occur, environmental factors, as described in the baseline were mapped using Geographical Information Systems (GIS).

This overlay mapping was used to identify areas with the least environmental/planning constraints. This enabled the identification of areas suitable for different types of renewable energy development and with the least potential for conflict with environmental protection objectives.

Consideration of Impacts of the RES on Adjoining Authorities

Environmental impacts do not recognise administrative boundaries and therefore the potential impacts of the RES on adjoining authorities must also be taken into consideration. Having regard to Departmental guidance, a study area extending 15km from the County boundary was established in order to take into account the potential for in combination effects with other plans and projects inside and outside the plan area.

Section 5 Environmental Protection Objectives

Environmental Objectives are broad, overarching principles which specify a desired direction of environmental change. In the SEA process, Environmental Protection Objectives (EPOs) are the methodological measures against which the environmental effects of the RES can be tested. These have been developed from international, national and county policy.

The EPOs are linked to indicators which serve to assess/measure the success of the EPOs and facilitate monitoring the implementation of the RES. They are also linked to targets which the RES can help work towards. The EPOs established for the SEA process are as follows:

Environmental Protection Objectives

EPO Code	Environmental Protection Objectives
Biodiversity, Flora and Fauna	
B1	Conserve and enhance the diversity of protected habitats and species
B2	Protect, conserve and enhance habitats, species and areas of national or international importance and promote the sustainable management of ecological networks
Population and Human Health	
PH1	To protect human health from hazardous nuisances arising from exposure to incompatible land uses
Soils and Geology	
SG1	To protect the IGH sites as identified by the GSI in the MCDP 2008-2014
SG2:	To protect areas which are at risk of flooding, or areas which may be at risk of exacerbating flooding in another area
SG3	To identify and protect areas which may be deemed as at significant risk of landslides
SG4	To identify and protect areas which may be at risk of significant erosion
Water (Freshwater)	
W1	To prevent deterioration of surface water bodies of good or high status
W2	To restore surface water bodies of less than good (good ecological potential / chemical status) to at least good status by 2015
W3	To control and improve the quality of diffuse and point source discharges
W4:	To conserve, protect and enhance indigenous freshwater ecological elements and prevent disturbance from habitat destruction / modification, competition from invasive species and threats from listed flora
W5:	To treat all effluents to a quality consistent with the aim of preventing further deterioration of the receiving waters & with a view to achieving good status by 2015
Water (Marine)	
ME1	Conserve the diversity of habitats and protected species, including all sites of special biodiversity importance
ME2	Maintain range and distribution of cetaceans (whales & dolphins) and Seals
ME3	Maintain and improve where possible, water quality in marine and estuarine waters including quality of bathing and shellfish waters
ME4	Protect fish communities
Groundwater	
G1	To prevent pollution and contamination of ground water
Air & Climatic Factors	
Air	
AR1	Maintain and improve air quality status in line with appropriate policies and legislative requirements
AR2	To minimise increases in travel related air pollutants and greenhouse gas emissions.
AR3	To promote energy conservation initiatives
N1 (Noise)	To avoid, prevent or reduce on a prioritised basis exposure to the negative effects of environmental noise associated with renewable energy developments

Non Technical Summary of Environmental Report
Draft Renewable Energy Strategy for County Mayo

Climate	
CF1	To ensure that County Mayo maximises its contribution to the national decrease in greenhouse gas emissions
CF2	To ensure that projects designed to increase electricity production from renewable resources in County Mayo are carried out in an environmentally sensitive manner so as to protect the existing environment
Flooding	
F1	To prevent development on lands which pose – or are likely to pose in the future – a significant flood risk
Material Assets	
R1 (Roads & Transport)	To protect County Mayo’s Road Network
AP1 (IWAK)	To prevent any interference with the safety and efficiency of aircraft operations in the vicinity of Ireland West Airport Knock (IWAK)
P1 (Piers & Harbours)	To ensure the upgrading of the piers & harbours is carried out in an environmentally sensitive manner so as to protect the existing environment
WM1(Waste Infrastructure)	Reduce waste arisings through an integrated approach including education & awareness
WM2	Maximise recycling and recovery
WM3	Divert biowaste from landfill and reduce landfill emissions
WM4	Ensure that all waste activity is regulated and that waste is treated in accordance with the highest environmental standards without causing environmental pollution
E1 (Energy Infrastructure)	To ensure new energy infrastructure, including renewable energy infrastructure, is connected to the national grid in a sustainable manner
WW1 (Waste Water)	To ensure that renewable energy developments do not impact negatively on existing Waste Water Treatment Plants
DW1 (Drinking Water)	Prevent deterioration of the status of water bodies with regard to quality & quantity and improve water body status for rivers, lakes, and groundwaters to at least good status as appropriate to the WFD, providing good sources of abstraction for drinking water
MF1 Mayo Forest Estate)	To promote the potential of forestry to enhance Mayo’s biological and landscape diversity and to provide aesthetic and amenity benefits while at the same time protecting our heritage and environment and providing economic benefit to local communities
Cultural Heritage	
Archaeology	
CH1	To protect the archaeological heritage identified in the RMP; National Monuments in the ownership or guardianship of the State; and National Monuments that are subject of Preservation Orders; and to safeguard the integrity of the archaeological sites in their setting
CH2	To promote and support the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG
Architecture	
AH1	To ensure the protection of the architectural heritage of County Mayo with regard to Protected Structures, Architectural Conservation Areas, and other elements as described in Section 4.8.3 (Baseline) in accordance with statutory requirements and guidelines
AH2	To ensure the protection of heritage bridges where they may be vulnerable due to construction traffic as a result of any renewable energy development
Landscape	
L1	To protect County Mayo’s sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes
L2	To protect the visual amenity of all other landscapes of County Mayo

Section 6 Alternative Scenarios

The SEA legislation requires the Environmental Report to consider reasonable alternative strategies for the draft RES before deciding on the preferred option. Five alternative scenarios were drawn up taking account of national renewable energy targets, the current RPGs, MCDP 2008-2014, existing and consented renewable energy development in the County and the renewable energy resources available in the County.

Mayo currently has renewable energy related activity; both at macro and micro levels, but renewable energy production is mainly produced from wind energy in the form of wind farms. Mayo has a number of natural resources which could be harnessed to provide renewable energy. The County has been identified as one of the best located counties in Ireland in terms of on-shore and off-shore winds and ocean (wave) energy. There is also potential to develop renewable energy from biomass (wood) and biogas (using agricultural and municipal wastes) resources.

The Alternative Scenarios considered were:

Scenario 1 - Do nothing scenario: Retain Current Wind Energy Strategy 2008 and Renewable Energy Policies and Objectives in Mayo County Development Plan 2008-2014.

Scenario 2: Ad-hoc planning for renewable energy development without an overall strategic framework to guide renewable energy developments in the County.

Scenario 3: Offshore Renewable Energy Development Only.

Scenario 4: Strategically Planned Off-shore and On-shore Renewable Energy Development enabling priority areas for renewable development to be identified and considering all forms of renewable energy development.

Scenario 5: Renewable Energy Development along the Mayo Coastline Only.

The Scenarios were assessed against the EPOs and **Scenario 4** – ‘Strategically Planned Off-shore and On-shore Renewable Energy Development’ emerges as the most environmentally sustainable scenario. Although the assessment indicates that there is potential for conflict with the status of the EPOs under Scenario 4 in respect of population, freshwater, some material assets, landscape and archaeological heritage; measures may be put in place to mitigate such conflicts. Scenario 4 also emerges as the alternative most likely to improve the status of the EPOs, particularly those relating to biodiversity, flora and fauna, marine waters and ecology, soils and geology, material assets such as waste management infrastructure and the architectural heritage.

Having regard to planning considerations, Scenario 4 is also the option that emerges as the alternative that balances environmental protection with economic and social development. Therefore, Scenario 4 is the option that forms the basis of the draft Strategy.

Section 7 Evaluation of the Policies and Objectives in the draft RES

Having established the baseline and the identification of existing problems and constraints, areas were identified as suitable for particular renewable energy developments as outlined on Maps 1 and 2 at the rear of this report. In this Section, the detailed policies and objectives of the draft RES are evaluated in an Evaluation Matrix in order to identify potential areas of conflict between the Strategy and the EPOs. The process of evaluation enables the likely significant effects of implementing the draft RES to be identified; and also for mitigation measures to be incorporated into the Strategy where appropriate to address potential adverse impacts.

Section 8 Mitigation Measures

This section outlines mitigation measures designed to avoid/prevent, minimise/reduce or as fully as possible offset/compensate for any significant adverse effects on the environment as a result of implementing the RES.

Section 9 Monitoring Measures

The SEA Directive requires that the significant environmental effects of the implementation of plans and programmes are monitored. This environmental report puts forward proposals for monitoring implementation of the RES which are adopted along with the Strategy. Monitoring is based around the indicators which were chosen earlier in the process for the purpose of measuring changes to the various environmental components. They allow quantitative measures of trends and progress over time relating to the EPOs used in the evaluation process.

Section 1 SEA Introduction & Context

1.1 Introduction

Mayo County Council has prepared a draft Renewable Energy Strategy for the County (RES). Following approval by the Council it is intended that the Strategy will be incorporated as a Variation into the Mayo County Development Plan 2008-2014 and will remain in place until 2020.

The aim of the Strategy is to develop the plan-led approach to the location of renewable energy development at a more detailed level than that outlined in the Wind Energy Strategy (2008) and the renewable energy policies and objectives in the Mayo County Development Plan 2008-2014. The Strategy also revises and replaces the Mayo Wind Energy Strategy 2008 and the Renewable Energy policies and objectives of the Mayo County Development Plan 2008-2014.

This is the Environmental Report on the Strategic Environmental Assessment (SEA) of the draft RES. The purpose of the report is to identify, evaluate and describe the likely significant effects on the environment of implementing the RES. The preparation of the Environmental Report has been integrated into and informed the preparation of the draft Strategy. Accordingly, it should be read in conjunction with the draft Strategy.

1.2 Strategic Environmental Assessment (SEA)

SEA is the systematic, ongoing process of evaluation of the likely significant environmental effects of implementing a plan or programme (including a strategy such as the RES) in order to ensure that these effects are appropriately addressed before a decision is made to adopt it. The overall aim of SEA is to:

- Provide a high level of protection of the environment
- Integrate environmental considerations into the preparation of the Strategy from the outset
- Increase public participation in environmental decision making
- Improve the environmental sustainability of the Strategy and
- Raise awareness of the potential environmental consequences of its implementation so that these consequences may be mitigated or avoided altogether.

This Report records the process and findings of the SEA and its preparation is also part of the SEA process.

1.3 Legislative Context

SEA is being carried out in order to comply with European Union (EU) SEA Directive 2001/42/EC. This Directive was transposed into Irish law through the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations (S.I. No. 435 of 2004) and the Planning and Development (SEA) Regulations (S.I. No. 436 of 2004).

This SEA is being undertaken under Article 9(1)(a) of the EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. No. 435 of 2004) which requires that SEA is carried out for plans and programmes which are prepared for energy and which set the framework for future development consent of certain projects such as wind energy. The Habitats Directive Assessment (HDA) process has also informed the SEA.

1.4 Content of the Environmental Report

The Environmental Report is required to contain information as set out in Schedule 2 of the EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. No. 435 of 2004). Table 1.1 outlines the information that is required and the relevant sections of this Report in which the information is located.

Table 1.1. Information Required In Environmental Report	Relevant Section in this Report
Outline of the contents and main objectives of the plan, and of its relationship with other relevant plans and programmes	Section 3
Description of relevant aspects of the current state of the environment and the evolution of that environment without implementation of the plan	Section 4
Description of the environmental characteristics of areas likely to be significantly affected	Section 4
Identification of any existing environmental problems which are relevant to the plan, particularly those relating to European protected sites	Section 4
Environmental protection objectives, established at international, EU or national level, which are relevant to the plan and describe how those objectives and any environmental considerations have been taken into account when preparing the plan	Sections 1, 3, 4, 5, 6 and 7
Describe the likely significant effects on the environment (biodiversity, human health, fauna, etc.)	Sections 4, 6 and 7
Describe any measures envisaged to prevent, reduce and as fully as possible offset any significant adverse environmental effects of implementing the plan	Section 8
Give an outline of the reasons for selecting the alternatives considered, and a description of how the assessment was undertaken (including any difficulties)	Section 6
A description of proposed monitoring measures	Section 9
A non-technical summary of the above information	Included at front of this Report

1.5 Implications for Mayo County Council and the Elected Members

This Environmental Report will be submitted to the Elected Members with the draft RES. The Members must take account of the Environmental Report before the Strategy is adopted. When the Strategy is adopted a statement will be made public, summarising, *inter alia*: how environmental considerations have been integrated into the Strategy; and the reasons for choosing the Strategy as adopted over other alternatives described in the Environmental Report.

Section 2 SEA Methodology

2.1 Introduction

The methodology used in the SEA of the draft RES complies with the requirements of EU Directive 2001/42/EC as transposed into Irish law by the EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2005 (S.I. No. 435 of 2004) and the Planning and Development (SEA Regulations) 2004 (S.I. No. 436 of 2004). The methodology also reflects national guidance relating to SEA including the following documents:

- Implementation of SEA Directive (2001/42/EC) Assessment of the Effects of Certain Plans and Programmes on the Environment – Guidelines for Regional Authorities and Planning Authorities” Department of Environment, Heritage and Local Government 2004(DoEHLG)
- Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland – Synthesis Report, EPA 2003
- Strategic Environmental Assessment (SEA) and Climate Change: Guidance For Practitioners (EPA)
- SEA Pack and Scoping Guidance Document, EPA Updated Version 2010
- SEA Process Checklist EPA Consultation Draft Document January 2008

There are 4 main stages involved in the SEA process:

1. Screening
2. Scoping
3. **Identification, Prediction, Evaluation and Mitigation of Potential Impacts (Environmental Report on the SEA of the Draft RES – current stage)**
4. Consultation, Revision and Post Adoption Activities (Monitoring).

2.2 Screening

Pursuant to Article 9(1)(a) of the EC (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. No. 435 of 2004), Mayo County Council is required to carry out SEA of the draft Renewable Energy Strategy. Therefore, Screening was not necessary in this instance and the environmental assessment proceeded to the Scoping Stage.

2.3 Scoping and Consultation

Where it has been determined that SEA is required, the contents of the Environmental Report must be scoped to establish the scope and level of detail to be included in the Environmental Report and to identify environmental issues which may require further consideration during the SEA process. Mayo County Council carried out a scoping exercise in conjunction with the prescribed Environmental Authorities i.e. the Environmental Protection Agency; Department of Environment, Heritage and Local Government; and Department of Communications, Marine and Natural Resources.

In this regard, a Scoping Consultation document was submitted to the Environmental Authorities in September 2010. This document gave an outline of the geographic area involved; the nature of the proposed Strategy and its intended lifespan; the likely scale, nature and location of development within the area during the lifetime of the Strategy; an outline of the types of renewable energy sources considered appropriate for County Mayo; and predicted significant environmental impacts.

The Scoping Consultation document expressed the view that the draft RES has the **potential** to impact on a broad range of environmental components. Submissions were received from the Environmental Authorities which are summarised in Table 2.1 below.

Table 2.1 Summary of Submissions from Environmental Authorities

<p>Environmental Protection Agency (EPA)</p> <p>A SEA Pack & SEA Guidance Document were submitted to assist in undertaking SEA. The SEA team are referred to the EPA's web based Environmental Mapping / GIS ENVision and maps, data and additional information associated with the WRBD and Protected Areas. Matters requested to be taken into consideration in preparing the RES and SEA include:</p> <ol style="list-style-type: none"> 1. Other relevant ongoing national/regional Plans / Programmes / Strategies and related SEAs 2. The full range of environmental effects as per the SEA and Habitats Directives; proximity to and potential impacts on designated nature conservation sites and the need for AA. 3. Reasonable & realistic spatial, density, intensity & technological alternatives for renewable energy development 4. Incorporation of national guidelines; Appropriate Assessment, Environmental Assessment and visual assessments of renewable energy proposals; Consideration of Landscape and scenic views 5. County Biodiversity Action Plan and available mapping. 6. Potential for impact on aircraft flight paths to/from regional airports.
<p>Department of Environment, Heritage and Local Government</p> <ol style="list-style-type: none"> 1. The submission requests that the draft Offshore Renewable Energy Development Plan & Eirgrid's Grid25 strategy & Implementation Programme should be noted; it is important that there is cohesion between separate but interrelated plans/programmes and their environmental assessments. 2. Also that the review of the WES and objective O/TI-RE 7 should be assessed & revised to ensure compliance with Articles 6(3) & 6(4) of the Habitat Directive. 3. The potential for micro-renewables to have adverse effects on protected species & habitats is highlighted. 4. It is advised that all sites with nature conservation designations should be excluded from the 'acceptable in principle' category for wind farm development if such categories are used. 5. The RES should take account of long-term Carbon losses associated with locating renewable energy developments on peatlands/peat soils; note that Bord na Móna's cutover/cutaway peatlands in Co. Mayo are subject of a 'Cutaway Bog Rehabilitation Plan' in compliance with their IPPC licence. 6. Guidance is submitted regarding issues that should be addressed in the AA and RES including that: <ol style="list-style-type: none"> a) All aspects of potential projects should be taken into account and any risks of significant effects on Natura 2000 sites removed by omitting/revising policies, targets etc in the RES or including plan-level mitigation. b) Potential impacts on designated sites such as land take; impacts on water quality; habitat alteration, loss & fragmentation; displacement of species etc should be taken into consideration. c) The need for special attention regarding Natura 2000 sites selected for conservation of the Freshwater Pearl Mussel; guidance is also included in relation to SPAs and bird surveys. d) No areas should be identified for renewable energy development without information on ecological sensitivities; Strategic Environmental Objectives should be included for nature conservation sites & protected species. 7. Guidance is included in relation to evaluations & assessments undertaken at lower plan/project level, where such are required by conditions having regard to Article 6 (3); it is pointed out that AA and relevant parts of the SEA should be undertaken by/in conjunction with suitably qualified ecologists.
<p>Inland Fisheries Ireland-Ballina</p> <p>The importance of Mayo's Salmonid Fisheries is highlighted; Mayo contains some of the most important fisheries in Ireland; the Moy is one of the most productive salmon fisheries in Western Europe. The NW region also has several other important fisheries (salmon & sea trout). The IFI submit that it is imperative that future development takes full cognisance of the importance of good water quality to the region. The potential environmental impacts on waters of various types of renewable energy developments are outlined as follows:</p> <ol style="list-style-type: none"> 1. Regarding wind farm development, potential impacts are highlighted including impacts arising during construction work; hazards associated with locating in upland peatland areas; changes in natural hydrology; and environmental impacts of associated/ancillary works. 2. Regarding ocean energy, it is submitted that sites should be selected on the basis of minimal impact to shellfish areas, fish migration routes and access to fishing grounds. 3. Regarding hydro electricity, it is submitted that issues such as fish passage, fish protection/grating and retention of natural watercourse levels all need to be addressed; and that the potential impacts on wildlife habitat including fisheries needs to be considered in relation to pumped storage hydroelectricity using seawater. 4. Regarding biofuel, Department of Agriculture Guidelines & Regulations should be taken into account.
<p>Department of Communications, Energy and Natural Resources: No observations.</p>

The Planning Authority also engaged in public consultation prior to preparing the draft RES. In order to facilitate debate, a Discussion Paper was published in February 2010 titled ‘The Potential for Renewable Energy in County Mayo’ and submissions were invited. Over twenty submissions were received relating to a broad range of topics including the identification of suitable sites for renewable energy developments; infrastructural deficiencies of the grid; Mayo’s potential as a leader in renewable energy development; education and incentives; research and development; environmental protection and monitoring; targets; co-operation between agencies; and community, environmental and economic benefits of renewable energy.

2.4 Establishing the Environmental Baseline

Before future environmental impacts can be predicted, it is necessary to achieve an understanding of the current state of the environment. Therefore, a baseline description of the current physical environment must be established, with particular reference to those aspects of the environment which are experiencing existing environmental problems, or are likely to be significantly affected by implementation of the Strategy. Such baseline data is required in order to;

- Allow environmental problems to be identified
- Provide a baseline against which future monitoring can be carried out and
- Provide a basis for impact prediction.

Baseline data relating to the environmental parameters identified in the SEA Regulations was collected from a variety of existing known environmental and other relevant data sources, including from within the Council, in order to establish the current state of the environment.

2.4.1 GIS and the preparation of the Renewable Energy Strategy

A Geological Information System (GIS) was established to map and analyse data for the draft RES and accompanying SEA Environmental Report. An environmental constraints map of the County (both land based and marine) was created as a base map. Environmental constraints included;

Candidate Special Areas of Conservation	Groundwater Sources
Special Protection Areas	Walkways and Cycleways
Natural Heritage Areas	Sensitive Landscapes such as Ridges
Proposed Natural Heritage Areas	Recorded Monuments
Ballycroy National Park	Listed Buildings
IGH Sites	Shell Fish Production Areas
Local Biodiversity Areas	Designated Bathing Waters (Blue Flag and Green Coast)
Tree Preservation Orders	Mayo Coastal Waters At Risk
Recorded Landslide Events	Mayo Transitional Waters At Risk
Pearl Mussel Catchments Areas	Harbour Seal Sightings
Salmonoid Rivers	Grey Seal Sightings
Water Sources	Scenic Views

Human settlement patterns using the residential buildings database, road and rail networks and marine infrastructure were plotted on the base map, together with the existing ESB Network of 38kV and 110kV lines. This information was then used to prepare the following maps for the purpose of the Strategy;

1. A Wind Energy Map depicting existing and consented wind energy developments of 1MW or greater, together with sites considered suitable for wind energy having regard to the environmental constraints encountered, with the exception of listed scenic views and scenic routes and sensitive or vulnerable landscapes.
2. A Marine Map depicting existing marine infrastructure along the County shoreline and the proposed Marine Test Sites and Landing point. It should be noted that Mayo County Council only have jurisdiction over the high water mark.
3. A map depicting existing forestry in Ireland and Mayo along with parts of the adjoining counties.
4. A map depicting the Wind Speeds in the County at heights of 75m and 100m above ground level, utilising the SEAI and OSI wind atlas.
5. A map depicting energy infrastructure in the County.

In order to create the baseline maps, the GIS section used Mayo County Council datasets. In addition, a number of agencies listed below were contacted for data;

- National Parks and Wildlife
- National Inventory of Architectural Heritage
- ESB Networks
- Dept of Environment, Heritage and Local Government
- Dept of Agriculture, Fisheries and Food
- Geological Survey of Ireland
- An Post - GeoDirectory
- Environmental Protection Agency
- Teagasc
- Water Framework Directive – Western River Basin District
- Office of Public Works
- SEAI.

2.5 Consideration of Alternatives

Article 5 of the SEA Directive requires the Environmental Report to assess the likely significant environmental effects of implementing a plan and “*reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme*”. Such alternatives are required to be realistic and capable of implementation and should therefore represent a range of different possible approaches within the statutory and operational requirements of the County Development Plan. Five number alternatives were considered having regard to the objectives of the Strategy, its geographical scope and its location within the hierarchy of plans. The alternatives – described and evaluated in Section 6 of this Report are:

Scenario 1: Do nothing scenario: Retain Current Wind Energy Strategy 2008 and Mayo County Development Plan 2008-2014 Renewable Energy Policies and Objectives

Scenario 2: Ad-hoc planning for Renewable Energy Development without an overall strategic framework to guide renewable energy developments in the County

Scenario 3: Offshore Renewable Energy Development Only

Scenario 4: Strategically Planned Off-shore and On-shore Renewable Energy Development; enabling priority areas for renewable development to be identified; and considering all forms of renewable energy development.

Scenario 5: Renewable Energy Development along the Mayo Coastline Only.

2.6 The Environmental Report

The Environmental Report sets out the findings and results of the SEA process on the likely significant effects of implementing the Draft RES. It also sets out mitigation measures to prevent or reduce significant adverse effects likely to arise from implementation of the Strategy, together with the alternatives considered and measures relating to monitoring following its adoption.

The Environmental Report is an important tool that provides the decision makers, the elected members of Mayo County Council, who decide what type of Strategy to adopt, as well as the public, with a clear understanding of the likely environmental consequences of decisions taken in order to harness the energy and economic potential presented by renewable technologies in Mayo.

2.7 The SEA Statement

After the RES is adopted the Planning Authority will prepare and make available for inspection an Environmental Statement which will include;

- A summary of how environmental considerations have been integrated into the Strategy
- How the Environmental Report, submissions & consultations have been taken into account
- The reasons for choosing the Strategy as adopted over other alternatives dealt with and
- Measures to monitor the significant environmental effects of implementation of the Strategy or amended Strategy.

2.8 Difficulties Encountered in Compiling the Required Information

There were a number of areas for which insufficient data was available or where the level of detail was inadequate for the purpose of establishing baseline data. Details of difficulties encountered in respect of the various environmental components set out below:

Biodiversity, Flora & Fauna: The principal problems in relation to baseline data include the lack of detailed information on designated sites and lack of Conservation Management plans for these sites. Conservation Management Plans are only available for the following sites: Owenduff/Nephin Complex SAC (Site Code: 000534); Owenduff/Nephin Complex SPA, Site Code: 004098 and Flughany Bog NHA (Site Code 00497).

There is also a need to identify and collect information on all areas of local biodiversity value and ecological corridors in the County. Baseline information on the location and condition of habitats is fundamentally important for habitat management and conservation. This information is necessary to inform future planning policy and conservation policies, and for creating public awareness. Habitats of high conservation value can be avoided when planning for developments and can be targeted for biodiversity conservation or enhancement measures.

Population & Human Health: Population figures are extracted from the Census of Population 2006; the next Census is due in 2011. Given the drastic change in the economy since 2006, the figures in this report may not accurately reflect the current population and population distribution. The Regional forecasts carried out in 2008 are not provided at a County level.

Water: No maps are available for the location of finfish farms (currently under development from DCMNR). WFD datasets are not yet finalised for Mayo, therefore the water body status data used in this report is only draft and may be subject to change.

Air & Climatic Factors: There is a lack of data/information relating to compliance with noise conditions.

2.9 Undertaking the SEA Process

An inter-departmental multi-disciplinary SEA Team was established within the Council incorporating a broad range of expertise to input into the SEA process, and to ensure relevant environmental issues were considered and addressed. This group consisted of representatives from the planning, environment, water services, roads, architecture and GIS sections; and other areas within the Council with expertise relating to the natural, built and cultural heritage and renewable energy. Meetings were held at key stages of the process and the SEA team was responsible for establishing the baseline; identifying significant environmental issues; drafting the environmental protection objectives; assessing the policies and objectives; considering alternatives; and identifying targets and indicators for the purpose of subsequent monitoring. The Forward Planning Section co-ordinated the SEA process and compiled the Environmental Report.

Section 3 Context of the Draft Renewable Energy Strategy

3.1 Content and Main Objectives of the Draft Renewable Energy Strategy

In June 2008, Mayo County Council adopted a Wind Energy Strategy for County Mayo as part of the Mayo County Development Plan 2008-2014. Objective O/TI-RE 1 of the Plan undertook to review the Wind Energy Strategy for Co. Mayo within one year of adoption of the Plan. The aim of this draft Strategy is to develop the plan-led approach to the location of renewable energy development at a more detailed level than that outlined in the Wind Energy Strategy (2008) and renewable energy policies and objectives in the Mayo County Development Plan 2008-2014. The draft Strategy also revises and replaces the Mayo Wind Energy Strategy 2008 and the Renewable Energy policies and objectives in the County Development Plan.

In accordance with the requirements of the SEA Directive, an outline of the contents (by section) of the draft RES and the main objectives of the Strategy are set out below.

Outline of Contents of the Draft RES for County Mayo

Introduction: Sets the context for the preparation of the RES explaining that there is a global focus on the departure from fossil fuel reliance for energy needs to renewable options and that Mayo has extensive renewable energy resources. It outlines the background to the preparation of the Strategy in the context of what initially was intended as a review of the existing WES; however MCC decided to broaden the scope of the review to include other renewables. This section also outlines how the draft RES has been prepared in the context of EU and national RE targets for 2020 and sets the framework to enable County Mayo to contribute to meeting these targets whilst also recognising that different areas of the County require different strategic approaches to ensure that the provision of energy requirements through renewables takes place in a sustainable manner.

Section 1 Renewable Energy Overview: Sets out an overview of renewable energy in terms of why it is needed in the context of Ireland's obligations on climate change under the Kyoto Protocol and the National Climate Change Strategy 2007-2012. It also outlines some of the positive and negative effects of renewable energy production.

Section 2 Legislative Context: Sets out the legislative and policy framework at EU, National, Regional and Local levels which set the context for and informed the preparation of the RES.

Section 3 Renewable Energy in County Mayo: Outlines the current situation in relation to renewable energy production in Mayo and also current Council policy (as per MCDP 2008-2014) regarding renewable energy development. The types, characteristics, positives and negatives of each renewable energy source considered appropriate for County Mayo, are described. It is considered that the most likely long term sustainable solution to Ireland's energy needs will be the contribution of a number of renewable energies such as on-shore and off-shore wind, bio-energy and to a lesser extent solar and geothermal. The existing and theoretical potential amount of renewable energy in Mayo is also outlined.

Section 4 The National Grid: Gives an outline of the National Grid, Gate 3 ITC Programme and future strategy for the National Grid (Grid 25) and future development of the National Grid in Mayo.

Section 5 Integrating Environmental Consideration: Describes how the preparation of the draft RES was integrated with the parallel processes of SEA, HDA and flood risk assessment.

Section 6 Draft Renewable Energy Strategy for Co Mayo: Sets out the Strategy for the County including the Councils Vision Statement for renewable energy development in Mayo. It explains the aim of the draft RES and sets out the detailed policies and objectives which underpin the Strategy. Policies are grouped under the following headings: Climate Change, The Natural Environment, Strategic Infrastructure, Community Benefit and Research and Development.

Section 6 also outlines the methodology used in the preparation of the Strategy to identify potential areas for different types of renewable energy development. Potential areas deemed suitable (subject to certain requirements being met) for On-Shore Wind Energy and Ocean Energy research are described and outlined in Maps included in the Appendices. The requirements of the Planning Authority, relating to these and other technologies (Hydropower; Bio-energy, Solar and Solar Thermal Energy, Geothermal and Micro Energy) are also specified in this section.

Appendices

This includes a list of the legislation which informed the draft RES; Mitigation Measures put forward from the SEA process; and a series of Maps relating to wind energy and ocean energy, forestry, wind speeds and infrastructure in the County.

Main Objectives of Renewable Energy Strategy for County Mayo

The main objectives of the draft RES are expressed through the Council's Vision statement and Aim as set out in the Strategy, together with five major policies relating to Climate Change; the Natural Environment; Strategic Infrastructure; Community Benefit; and Research and Development.

The Council's vision in relation to renewable energy development in the County is:

"To harness the energy and economic potential of County Mayo presented by renewable technologies in order to provide benefit for both local communities and the global environment. In doing so, the elements of the natural, cultural and landscape heritage that define Mayo for local people and visitors alike will be protected. It is recognised, however, that change is an integral part of cultural heritage and that in order for communities and businesses to thrive, Mayo needs new developments. Renewable energy projects will, therefore, be developed in ways that protect the integrity of particularly valued areas and sites, maximise local and regional benefits and minimise or avoid negative consequences."

Aim of the Strategy:

To harness the energy and economic potential presented by renewable technologies in Mayo, to provide benefit for both local communities and the global environment whilst ensuring the protection of the natural and built heritage of the County.

The main objectives as expressed through the following policies are:

Policy 1 Climate Change: To support the National Climate Change Strategy 2007-2012.

Policy 1 is underpinned by 5 supporting objectives relating to achievement of national targets for reducing greenhouse gas emissions; encouragement of renewable energy production from various renewable energy sources at locations identified in the RES; renewable energy targets for the County for 2020; encouragement of energy efficiency and low energy design in new and existing developments; and integration of renewable energy techniques into the Council's own operations etc.

Policy 2 The Natural Environment: To ensure that a balance between the provision of renewable energy developments and the preservation and conservation of the natural environment is maintained.

Policy 2 is supported by four objectives to ensure protection of the natural environment including compliance with European and National legislation; supporting a sustainable plan-led approach to renewable energy development, in particular guiding such development to preferred locations; and ensuring that they do not interfere with, impinge or damage the natural or built environment and associated amenities, sensitive landscapes, scenic routes or views; and to ensure that all proposed renewable energy developments will be assessed on the principles of proper planning and sustainable development ensuring minimal adverse environmental impacts to biodiversity, flora and fauna; population and human health; soil; water; air and climatic factors; material assets; cultural heritage; and landscape.

Policy 3 Strategic Infrastructure: To encourage and assist in the provision of strategic infrastructure at appropriate locations to facilitate the provision and exporting of renewable energy.

The two supporting objectives for Policy 3 relate to the upgrading of the national grid; the provision of a 400kV line in Mayo and encouraging any new 400kV line to follow along the existing 110kV and 38kV lines in the County.

Policy 4 Community Benefit: To ensure that renewable energy developments are carried out in a manner that promotes economic and social benefits for the community of Mayo as a whole.

Policy 4 is supported by four objectives relating to the assessment of renewable energy development proposals in terms of community benefit arising from renewable energy development; encouraging sustainable community based renewable energy developments; supporting the concept of community benefit; and reducing fuel poverty in the County.

Policy 5 Research & Development: To facilitate renewable energy research and development within the County.

Policy 5 is underpinned by two supporting objectives to facilitate the development of a Sustainable Energy Park in Mayo for research and development, training and creation of public awareness in relation to renewable energy and marine renewable energy research.

3.2 Relationship of Draft RES with other relevant Plans and Programmes

The draft RES is set within (and has been guided by) a hierarchy of policies, strategies and plans relating to environmental protection and spatial planning at the EU, national, regional and local levels. At the national level the RES is at the lower level of a hierarchy of land use and spatial plans which include the National Spatial Strategy 2000-2020; the Regional Planning Guidelines 2010-2016 for the West Region; and Mayo County Development Plan 2008-2014, which the Strategy will become a part of when it is adopted. The hierarchy of land-use plans means that certain strategic issues in the Strategy may already have been determined at national and regional level.

In accordance with SEA legislation, the environmental report includes the information that may reasonably be required taking into account a number of factors, one of which is the extent to which certain matters are more appropriately assessed at different levels in the decision making process in order to avoid duplication of environmental assessment.

3.2.1 EU Context

The **Kyoto Protocol** is an international agreement linked to the United Nations Framework Convention on Climate Change. The Kyoto Protocol sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas emissions. The targets amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. In 2007, the European Union (EU) agreed new climate and energy targets: 20-20-20 by 2020 – 20% reduction in greenhouse gas emissions by 2020; 20% energy efficiency by 2020; and 20% of the EU's energy consumption to be from renewable sources by 2020.

Directive 2009/28/EC on the promotion of the use of energy from renewable sources establishes the basis for the achievement of the EU's 20% renewable energy target by 2020. Under the terms of the Directive, each Member State is set an individually binding renewable energy target, which will contribute to the achievement of the overall EU goal. Member states are to achieve their individual target across the heat, transport and electricity sectors. Apart from a sub-target of a minimum of 10% in the transport sector that applies to all Member States, there is flexibility for each country to choose how to achieve their individual target across the sectors. Ireland's overall target is to achieve 20% of energy from renewable sources by 2020¹.

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¹ Draft National Renewable Energy Action Plan 2010 DCENR

3.2.2 National Context

Sustainable Development- A Strategy for Ireland, 1997 sets out the national policy framework for delivering sustainable development nationally for the first time. It is underlined by the commitments made by Ireland at the Earth Summit (Rio) in 1992 and applies principles of sustainability to policy and decision making. The Strategy sets out policies relating to the sustainable development of energy, including policies which seek to ensure security of energy supply in order to support economic and social development while protecting the environment; maximize efficiency of generation and emphasize the use of renewable resources; promote energy conservation; and minimise emissions of greenhouse gases (GHG); maintain local air quality and limit/reduce the Irish contribution to regional and global environmental problems.

The RES supports the above policies and objectives.

Making Ireland Sustainable: Sustainable Development 2002 reviews progress in sustainable development in Ireland since the Earth Summit in Rio. It outlines priorities for sustainable development action over the following decade. The Government will aim at improving the quality of life now and for future generations by:

- Promoting and securing a high quality environment
- Keeping the economy competitive in a rapidly changing world
- Providing a strong basis for further economic prosperity
- Bringing about a fairer and more inclusive Ireland
- Contributing to sustainable development at the global level.

The RES is underpinned with sustainable principles which conform with the above aims.

3.2.3 Spatial Development

National Development Plan, 2007-2013: Transforming Ireland-A Better Quality of Life for All sets out a programme of investments aimed to ensure Ireland grows in a sustainable manner. The €184 billion Plan is characterised by sustainable economic growth, greater social inclusion and balanced regional development. In relation to renewable energy, the Plan promotes the use of renewable energy resources and increased energy efficiency. Emphasis is placed on an increase in renewable energy production in rural areas, especially projects that create environmentally sustainable enterprise and generate employment; and improvements to the national grid to accommodate this. The Sustainable Energy Sub-Programme allocates €276 million to fund the large scale development of wind energy capacity and the development of alternative sources of energy such as bio-mass and bio-fuels, ocean energy and solar and geothermal technologies.

The draft RES has taken the National Development Plan into consideration in its preparation.

The National Spatial Strategy 2002-2020 provides a planning framework for delivering more balanced social, economic and physical development between the regions. It proposes a more balanced pattern of spatial development throughout Ireland, with continued growth in Dublin but with significant improvement in the rate of development in nine ‘Gateway’ locations and nine ‘Hub’ towns which are considered critical to achieving balanced regional development. The NSS also states that rural areas have a vital contribution to make towards the achievement of balanced regional development by utilising and developing their rural based economic resources including *renewable energy*. The NSS also supports the economic growth and revitalisation of areas in the west region, previously centred on agriculture, to diversify into alternative economies based on the sustainable use of natural resources such as scenic landscapes for tourism, the sea for fisheries and marine-based aquaculture, the land for agriculture, forestry, inland aquaculture (in rivers and lakes) and *renewable energy*.

Policies and objectives in the draft RES support and encourage renewable energy developments at appropriate locations in the County and ensures that renewable energy developments are carried out in a manner that promotes economic and social benefits for the community of Mayo as a whole.

3.2.4 Climate Change

The National Climate Strategy 2007-2012 builds on Ireland's first Climate Change Strategy (2000). Its purpose is to limit the growth in greenhouse gas emissions which are causing the earth to warm up and changing our climate; resulting in wetter winters, flooding and summer droughts. Targets for the reduction of GHGs were set out in the Kyoto Protocol, and the National Climate Change Strategy 2007-2012 sets out ways to achieve these targets for the period 2008-2012 and to identify the areas in which further measures are being researched and developed to meet our 2020 commitment. Achieving the targets will be done through a number of means including harnessing more renewable energy and using energy more efficiently. The Draft RES supports the National Climate Change Strategy 2007-2012.

The Government's commitment to accelerating the development of renewable energy is set out in the Government's Energy Policy '**Delivering a sustainable energy future for Ireland – The Energy Policy Framework 2007-2020**'; the **Programme for Government**; the Government's strategy '**Building Ireland's Smart Economy - A Framework for Sustainable Economic Renewal**'; and the **National Renewable Energy Action Plan (NREAP)** which sets out the Government's strategic approach and measures to deliver on Ireland's 20% target under Directive 2009/28/EC.

Policies and objectives of the draft RES encourage and promote reduction in energy consumption, and encourage renewable energy development which will assist in achieving national renewable energy targets and assist in building Ireland's Smart Economy and sustainable renewable energy development.

Ocean Energy in Ireland 2005 and the draft Offshore Renewable Energy Development Plan 2010 'Ocean Energy in Ireland 2005' is a document prepared by Sustainable Energy Ireland (SEI) and the Marine Institute. It outlines a strategy to advance Ireland's research and development capabilities so that ocean energy can contribute to meeting Ireland's growing demand for renewable energy from 2005 through to 2016 and beyond. A four phase strategy to capitalise on Ireland's ocean energy resource is proposed.

In 2010 the Department of Communications, Energy and Natural Resources, with input from SEAI, prepared a draft Offshore Renewable Energy Development Plan (OREDPA) which describes the policy context for development of offshore wind, wave and tidal stream energy in Irish waters for the period to 2030. Mayo has potential to harness 18,500-19,500MW of renewable energy from fixed wind, floating wind and wave resources. However it is considered that less than half of this (4,900 to 7,900MW) may be exploited in an environmentally sensitive manner. Tidal resources have not been considered for the west coast.

The draft RES encourages renewable energy production from wave energy (and tidal energy as technology improves) and encourages marine renewable energy research and development at suitable locations along the Mayo coastline.

Grid 25 is a strategy for the development of Ireland's Electricity Grid for a Sustainable and Competitive Future and represents a total investment of €4 billion between now and 2025. Mayo forms part of the North West Region in Grid25 – an area which has been identified as having the largest (35%) expected regional distribution of the renewable generation capacity, as the area is particularly rich in wind and ocean renewable energy resources. Upgrading the grid system in the west is considered imperative.

The draft RES dedicates a section to the national grid, and policies and objectives in the draft RES encourage and support renewable energy infrastructure, including upgrading the national grid in a sustainable manner.

3.2.5 National Planning Guidelines

A number of national planning guidelines have also been taken into consideration in the preparation of the draft RES including;

- Wind Energy Development Guidelines (2006)

- Implementation of SEA Directive Assessment of the Effects of Certain Plans and Programmes on the Environment (2004)
- Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (2009)
- The Planning System and Flood Risk Management (2009)
- Architectural Heritage Protection Guidelines – Guidelines for Planning Authorities
- Landscape and Landscape Assessment (2000)
- Implementing Regional Planning Guidelines – Best Practice Guidance (2005)

3.2.6 Regional Context

The Regional Planning Guidelines for the West Region 2010-2022 (RPGs) set out a framework for the long-term strategic development of counties Mayo, Galway and Roscommon. In relation to energy provision, upgrading the energy supply and energy network infrastructure and support of renewable energy are identified as two of the key investment priorities required to support the sustainable development of the West Region. The RPG's also identify the Region's natural assets for renewable energy production as one of its strengths and lists the opportunities this strength presents i.e. to promote sustainable renewable energy developments in appropriate locations; develop associated 'green enterprise', pilot other forms of renewable energy production; become a leader in sustainable renewable energy and spin-off green industries and green economy. The RPG's indicate that there is potential to produce renewable energy from wind and wood sources in the short term, and wave energy in the long term. This is supported by a number of policies and objectives. The policies and objectives of the draft RES support the provision of renewable energy in all forms at appropriate locations in the County and the upgrading of the energy network, and ensures that renewable energy developments are carried out in a manner that promotes economic and social benefits for the community as a whole.

The Western River Basin Management Plan 2009-2015 (WRBMP) and Associated Programme of Measures aims to protect all waters (surface, ground and coastal) within the district and, where necessary, improve waters and achieve sustainable water use. Information on status, objectives and measures in the Western RBD has been compiled for smaller, more manageable geographical areas than river basin districts, termed water management unit action plans. The details of measures for the Western RBD are contained in the Water Management action plans for the district.

The policies and objectives in the draft RES support the provision of renewable energy development in a sustainable manner; having regard to the natural environment including all water bodies.

The Replacement Waste Management Plan for the Connaught Region 2006-2011 was adopted by the six local Authorities in the region i.e. Galway City and County, Counties Leitrim, Mayo, Roscommon, and Sligo. It adopts a regional approach to integrated waste management based on the waste hierarchy established in the EU framework Directive on Waste. The Plan sets out targets to be achieved by 2013 in relation to recycling (48%), energy recovery (33%) and residual waste disposal (19%). It recommends a number of measures in order to promote the prevention and reduction of waste arisings and the expansion of the region's waste infrastructure. Policies and objectives in the draft RES take into consideration the objectives and targets established in the regional waste management plan.

Development Plans and Wind Energy Strategies of local authorities adjoining Mayo County Council

There are a number of policies and objectives in Development Plans and Wind Energy Strategies of Local Authorities adjoining Mayo which promote the development of renewable energy at appropriate locations in their jurisdictions. Adjoining local authorities and town councils include Galway County Council, Sligo County Council and Roscommon County Council, Castlebar Town Council, Ballina Town Council and Westport Town Council.

The draft RES has taken into consideration landscape and natural designations of adjoining local authorities. Tuam Town Council lies within 15km of the County boundary and was therefore also considered.

3.2.7 Local Context

Mayo County Development Plan 2008-2014 sets out a framework for the sustainable development of the County. This document is the 'parent' plan for all other land use plans in the Mayo County Council area and must be taken into consideration in the preparation of other land use plans and strategies. The MCDP recognises the County's role in fulfilling the renewable energy commitments made at national level and has included a number of policies and objectives for renewable energy production.

The draft RES will supersede all policies and objectives in relation to renewable energy in the County Development Plan and will be incorporated into MCDP as a Variation following its adoption by Mayo County Council. The draft RES has taken all relevant policies and objectives of the MCDP into consideration in its preparation.

The preparation and adoption of MCDP 2008-2014 itself is subject to a number of higher level national and international environmental protection policies, objectives and legislation. The RES must be consistent with the overarching policies and objectives of the County Development Plan. In turn, following adoption of the RES, future proposals for renewable energy related developments must be consistent with the Strategy and the provisions of MCDP.

County Mayo Heritage Plan 2006-2011. The aim of the plan is to identify, raise awareness of and promote the conservation of the built, natural and cultural heritage of the County.

The Mayo Biodiversity Action Plan 2010-2016 provides a framework for the conservation of biodiversity and natural heritage at a local level. It is designed to ensure that national and international targets for the conservation of biodiversity can be achieved, while at the same time addressing local priorities.

The draft RES supports the provision of renewable energy development in a sustainable manner; having regard to the natural environment and biodiversity.

Flood Risk Plans

The OPW are currently involved in preparing Preliminary Flood Risk Assessments (PFRA's) with the relevant Local Authorities, the Environmental Protection Agency and other key agencies. This will identify Areas with Potentially Significant Flood Risk (APSR's) based on historic and predictive data and consultation with relevant stakeholders. Nationally, the PFRAs will be provisionally completed in 2010 with formal completion in 2011, and will identify areas of potentially significant flood risk. This is a screening exercise based on available and readily-derivable data. Detailed flood mapping will then be prepared for areas deemed to be potentially at significant risk by 2013. The PFRA plans are not yet available for County Mayo. In the absence of a Flood Risk Assessment for the County, the draft RES has taken into consideration flood risk sites (reported past floods or flood vulnerable locations) as identified on flood risk maps prepared by the OPW and has guided development away from areas at risk of flooding.

Irish National Forest Standard 2000 was published by the Forest Services and provides the framework for the future of Irish forestry including the need for protection of biodiversity, landscape, archaeology and enhanced community involvement to ensure sustainable forest management.

Legislative Context

In addition to the above policy framework, there is an overarching legislative framework which sets the context for the preparation of plans and strategies and for the protection of the environment. These are listed in Appendix 1 of this report.

Section 4 The Baseline Environment

4.1 Introduction

In order to assess the environmental effects of the RES it is necessary to understand the current state of the environment (the baseline environment) of the County. This baseline information outlines the environmental context within which the RES will operate and the opportunities, constraints and targets that this context puts on the Strategy. Current environmental issues likely to be significantly affected by the implementation of the RES, are identified at this stage of the process in order to more accurately assess potential future impacts. This section describes the environmental baseline in terms of the following environmental components – biodiversity, flora and fauna; population and human health; soils and geology; water; air and climatic factors; material assets; cultural heritage; landscape; and the interrelationship between these components. The likely evolution of each environmental component without the implementation of the Plan is also described.

County Mayo is located on the western shores of Ireland. The area of the County is 5560 sq. km (including the off-shore islands) and the entire County will be considered for the provision of renewable energy. Extensive areas of the County are designated as conservation areas for wildlife, geological or landscape reasons. For this reason, the baseline covers all areas of the County rather than focusing on particular geographical areas.

The population of Mayo is approximately 124,000 persons (2006). It is estimated that Mayo's current annual electricity demand is approximately 800GWh, with a winter peak load of approximately 160MW and summer peak load at approximately 100MW. The total energy consumption in Mayo in 2006 was approximately 4600GWh.¹

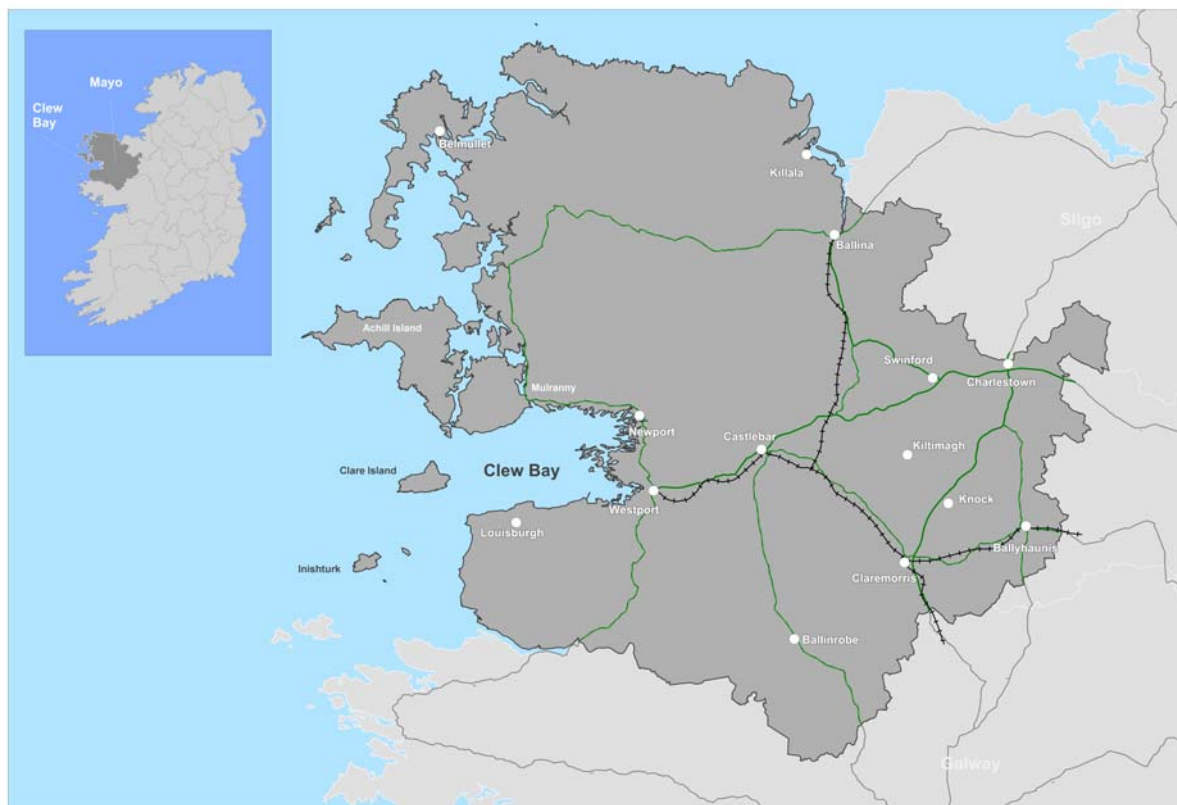


Fig 4.1 County Mayo

4.2 Biodiversity and Flora and Fauna

County Mayo has a particularly rich and diverse natural heritage. Mountains and upland areas are concentrated in the north and west of the County, which is characterised by a mosaic of peatland, heath and forestry plantations. More fertile farmland is found in the low-lying and undulating landscapes of east Mayo. There are several large lakes in the County and numerous medium to small lakes. Lough Conn and Mask are among the largest lakes in the country. Mayo is drained by an extensive network of rivers and streams. The main rivers of the County include the Moy, Deel, Owenmore, Owenduff, Newport, Bunowen, and the Erriff. The long and varied Mayo coastline contains a wide range of coastal habitats from cliffs to estuaries, mudflats, machair, sandy beaches and offshore islands. The richness and diversity of Mayo’s habitats and species contribute to the character of the landscape. Biodiversity can be defined as the variability among living organisms and the interactions between them. It can include diversity within species, between species and of ecosystems. Almost a third of County Mayo’s land area is designated for the protection and conservation of flora and fauna. This high percentage reflects the international and national significance of Mayo’s wealth of natural heritage.

Along with sites designated for nature conservation, Mayo has many other areas of local ecological importance including broadleaved woodlands, scrub, hedgerows, tree lines, cutover bog and wet grassland. Many of these areas are important, helping to form wildlife corridors and ecological networks across the landscape. These corridors and networks allow animal species to move freely from one habitat to another.

The various categories of protected sites/areas in Mayo are outlined in Figure 4.2 and described below:

4.2.1 Ramsar Sites

There are five wetland sites in County Mayo designated as Ramsar Sites under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971). These sites are of International importance with regard to their ecological value especially with regard to wetland waterfowl. The designated Ramsar sites are:

Ramsar Site	Brief Description
Blacksod Bay and Broadhaven (Ramsar Site No. 844; 683 ha):	A composite of diverse marine and coastal habitats that includes vast dune systems and extensive areas of dune grassland with saltmarshes occurring in sheltered bays and inlets.
Killala Bay/Moy Estuary (Ramsar site No. 843; 1,061 ha):	Includes a well-developed dune system, saltmarsh, sand and shingle beaches backed by sea-cliffs, and extensive sand and mudflats exposed at low tide.
Knockmoyle/Sheskin (Ramsar Site No. 372; 1,198 ha):	Part of an extensive area of lowland blanket bog with a remarkably dense network of pools and small acidic lakes.
Owenboy (Ramsar Site No. 371; 397 ha):	Part of an extensive area of undulating lowland blanket bog consisting of domes, pool complexes, flushes, spring-fed fens, swallowholes and subterranean and surface streams.
Owenduff Catchment (Ramsar Site No. 336; 1,382 ha):	Part of the most extensive remaining blanket bog complex in Ireland, the site includes lowland and mountain blanket bog, wet heath and cliffs in the surrounding lowlands.

Site Synopses for the Ramsar sites are given in Appendix 2a of this report.

4.2.2 Candidate Special Areas of Conservation and Special Protection Areas

There are 18 sites in County Mayo designated and protected under the Birds Directive (79/409/EEC) as Special Protection Areas (SPAs) due to their conservation value for birds of importance in the European Union (Table 4.1). SPAs presently encompass 9% of the County area. There are 52 candidate Special Areas of Conservation (cSACs) in the County (Table 4.2). SACs are designated and protected under the Habitats Directive (92/43/EEC) due to their conservation value for habitats and species of importance in the European Union (EU). SPAs and SACs (Figure 4.2) form Natura 2000, a network of protected areas throughout the EU. Site Synopses for all SPAs and candidate SACs are included in Appendix I of the Environmental Report of the SEA of MCDP 2008-2014.

Table 4.1 SPAs in Co. Mayo

Site Code	Site Name	Site Code	Site Name
004004	Inishkea Islands	004062	Lough Mask
004036	Killala Bay/Moy Estuary	004072	Stags of Broadhaven
004037	Blacksod/Broadhaven	004074	Illanmaster
004042	Lough Corrib	004084	Inishglora & Inishkeeragh
004051	Lough Carra	004093	Termoncarragh Lake & Annagh Machair
004052	Carrowmore Lake	004098	Owenduff/Nephin Complex
004053	Lough Conn	004111	Duvillaun Islands
004054	Lough Cullin	004136	Clare Island
004055	Cross Lough	004177	Bills Rock

Table 4.2 Candidate SACs in Co. Mayo

Site Code	Site Name	Site Code	Site Name
000297	Lough Corrib	000534	Owenduff/Nephin Complex
000458	Killala Bay/Moy Estuary	000541	Skealaghan Turlough
000461	Ardkill Turlough	000542	Slieve Fyagh Bog
000463	Balla Turlough	000633	Lough Hoe Bog
000466	Bellacorick Iron Flush	001482	Clew Bay Complex
000470	Mullet/Blacksod Bay Complex	001497	Doogort Machair/Lough Doo
000471	Brackloon Woods	001501	Erris Head
000472	Broadhaven Bay	001513	Keel Machair/Menaun Cliffs
000475	Carrowkeel Turlough	001529	Loughs Cahasy& Baun and Roonah
000476	Carrowmore Lake Complex	001536	Mocorha Lough
000479	Cloughmoyne	001571	Urlaur Lakes
000480	Clyard Kettle-Holes	001774	Lough Carra/Mask Complex
000484	Cross Lough (Killadoon)	001899	Cloonakillina Lough
000485	Corraun Plateau	001922	Bellacorick Bog Complex
000492	Doocastle Turlough	001932	Mweelrea/Sheeffry/Erriff Complex
000495	Duvillaun Islands	001955	Croaghaun/Slievemore
000497	Flughany Bog	002005	Bellacragher Saltmarsh
000500	Glenamoy Bog Complex	002006	Ox Mountains Bogs
000503	Greaghans Turlough	002081	Ballinafad
000504	Kilglassan/Cahervoostia Turlough Complex	002144	Newport River
000507	Inishkea Islands	002177	Lough Dahybaun
000516	Lackan Saltmarsh & Kilcummin Hd.	002179	Towerhill House
000522	Lough Gall Bog	002243	Clare Island Cliffs
000525	Shrule Turlough	002268	Achill Head
000527	Moore Hall (Lough Carra)	002298	River Moy
000532	Oldhead Wood	002320	Kildun Souterrain

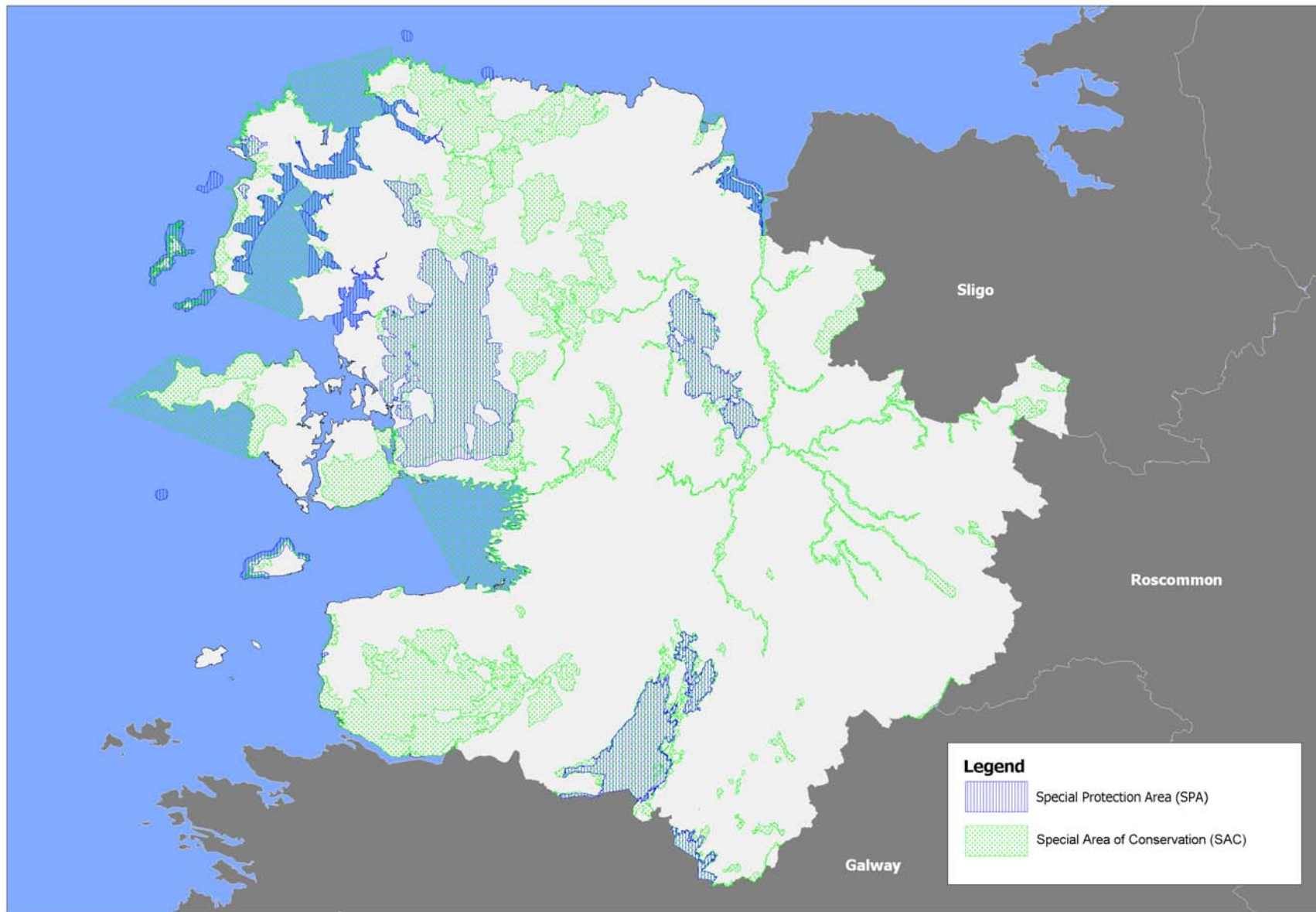


Fig 4.2 EU Designated Sites for Nature Conservation in County Mayo

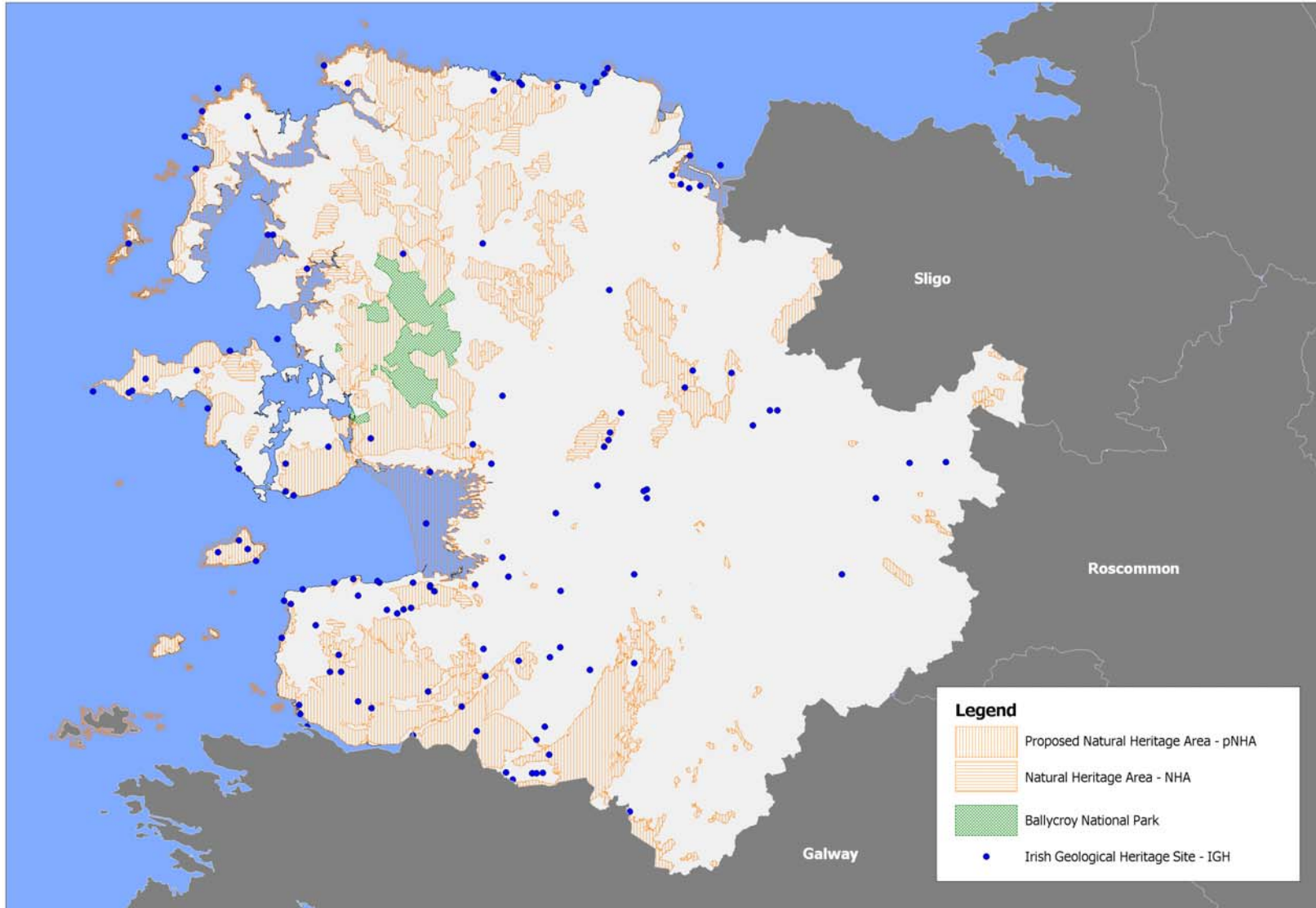


Fig 4.3 National Designations in County Mayo

4.2.3 Natural Heritage Areas

There are 15 Natural Heritage Areas (NHAs) and 48 proposed NHAs in County Mayo. These are listed in Table 4.3 and Table 4.4 respectively and shown, together with other National designations, on Figure 4.3. NHAs are designated and protected under the Wildlife (Amendment) Act 2000 due to their conservation value for ecological and/or geological/geomorphological heritage in a national context. Site Synopses are included in Appendix I of the Environmental Report of the SEA of MCDP 2008-2014.

Table 4.3: NHAs in Co. Mayo

Site Code	Site Name	Site Code	Site Name
000548	Tawnymackan Bog	002391	Inagh Bog
001473	Bangor Erris Bog	002403	Sraheens Bog
001548	Pollatomish Bog	002419	Glenturk More Bog
001566	Tristia Bog	002420	Cunnagher More Bog
001567	Tullaghan Bay and Bog	002432	Forrew Bog
001570	Ummerantarry Bog	002446	Ederglen Bog
002381	Doogort East Bog	002455	Lough Greney Bog
002383	Croaghmoyle Mountain		

Table 4.4: pNHAs in Co. Mayo

Site Code	Site Name	Site Code	Site Name
000215	Rathbaun Turlough	001483	Cloghmoyle Dunes
000385	Rostaff Turlough	001485	Cloonagh Lough (Mayo)
000459	Altaconey Bog	001486	Cloonboorhy Lough
000467	Benaderreen Cliffs	001488	Cooraun Point Machair/Dooreel Creek
000469	Bills Rocks	001491	Dambaduff Lough
000477	Clare Island	001492	Carrowmore Lough Shore
000481	Coolbarreen Lough	001499	Drumleen Lough
000482	Creevagh Head	001500	Eagle Island
000483	Croagh Patrick	001504	Frehill Island
000494	Downpatrick Head	001511	Inishdegil Islands
000502	Gowlaun Bog	001517	Killala Esker
000506	Inishglora and Inishkeeragh	001518	Kinlooey Lough
000509	Inishturk	001520	Knappagh Woods
000510	Kilgarriff Bog	001527	Lough Alick
000511	Killaturly Turlough	001528	Lough Beg, Carrowmore
000512	Kinrovar Machair	001533	Lough Manan
000519	Lough Conn and Lough Cullin	001559	Slisheen Turlough
000523	Lough Gower	001910	Mannin and Island Lakes
000546	Stags of Broadhaven	001967	Inishgalloon
000550	Towerhill Lake	001968	Mweelaun Island
000735	Maumtrasna Mountain Complex	001969	Caher Island
001278	Burren Rock	001970	Ballybeg Island
001470	Ardogommon Wood	001971	Inishdalla
001472	Mountpleasant School Turlough	002078	Moy Valley

4.2.4 Geological Sites

Geology is now recognised as an intrinsic component of natural heritage and regard should be given to the conservation of geological heritage features. The Geological Survey of Ireland (GSI) established the Irish Geological Heritage Programme (IGH) in 1998, the objective of which is to identify and select sites that best represent the geological heritage of Ireland for designation as NHAs. Currently there is no national designation of sites for geological interest anywhere in Ireland. The IGH has identified 122 Sites of Geological Interest in County Mayo (listed in Appendix VI of MCDP 2008-2014). These sites are currently protected by policies in the MCDP. Additional information is given in Section 4.4.2 Geology.

4.2.5 Statutory Nature Reserves

These are state-owned land, inland waters or foreshore areas forming the habitat of a species or community of flora and fauna of scientific interest or forming part of an ecosystem of scientific interest, which would benefit from protection measures, established under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Reserves are protected under Ministerial Order. There are three such reserves in Mayo. These are described in summary below. More detailed descriptions are set out in Appendix 2b.

Nature Reserve (NR)	Brief Description
Owenboy (NR No. 59; 397.1ha)	Situated 10 km west of Crossmolina & 10 km east of Bellacorrick at Eskeragh Bridge. An extensive bog of intermediate type utilised by the internationally protected Greenland Whitefronted Goose (also designated Ramsar Site (No. 371).
Knockmoyle Sheskin (NR No. 60; 1198ha)	Situated north of Bord na Móna works at Bellacorick. Made up of an extensive area of lowland blanket bog densely pool-studded and containing interesting flushes. Also designated Ramsar Site (No. 372).
Oldhead Wood (NR No. 61:17 ha)	Situated 3 km north-east of Louisburg. An example of semi-natural woodland, oak being the dominant species, with birch, rowan, willow and some introduced beech and sycamore.

4.2.6 Ballycroy National Park

National Parks are almost entirely state owned areas designated nationally with the aims of nature conservation and public recreation and appreciation. There is one designated National Park in the County, namely Ballycroy National Park which constitutes 11,779 ha of Atlantic blanket bog in the Owenduff/Nephin Beg area of north west Mayo. It contains some of the most important blanket bog habitat in Europe. Blanket bogs are included in Annex 1 of the Habitats Directive as a priority habitat type of Community interest, the conservation of which requires the designation of SACs. Ireland's western blanket bogs are the most important remaining in Western Europe and north west Mayo contains some of the most extensive examples of this habitat type. The Owenduff area in the Nephin Mountains in particular is a wild and remote area of blanket bog, cliffs and river habitats containing some rare species of plants. The area is also important as a roosting, feeding and breeding site for certain migratory species, including species such as the Greenland White-Fronted Goose, which are listed in Annex 1 of the Birds Directive. The Owenduff River is of international importance in conservation terms and it is the last river in Western Europe, which drains a relatively intact, extensive blanket bog system. The scenery and wilderness qualities of this area are outstanding. The area of the National Park is designated as a SPA (Site Code 004098) and as a cSAC (Site Code 000534).

4.2.7 Local Biodiversity Areas and Ecological Networks

Article 10 of the Habitats Directive recognises the importance of ecological networks as corridors and stepping stones for wildlife, including for migration, dispersal and genetic exchange of species of flora and fauna. Ecological networks are important in connecting areas of local biodiversity with each other and with nearby designated sites so as to prevent islands of habitat from being isolated entities. Ecological networks are composed of linear features, such as treelines, hedgerows and rivers/streams, which provide corridors or stepping stones for wildlife species moving within their normal range. They are particularly important for mammals, especially for bats and small birds.

The Habitats Directive requires that ecological connectivity and areas of ecological value outside the network of designated ecological sites are maintained and it recognises the need for the management of these areas through land use planning and development policies. Local natural and biodiversity designations are shown on Figure 4.4.

Habitat survey and mapping of the habitats of County Mayo began in 2008 and has been carried out within and around nine towns in the County - Killala, Kiltimagh, Ballyhaunis, Ballinrobe, Charlestown, Swinford, Belmullet, Westport and Castlebar. An area of 113.8 km² has been surveyed and mapped to date. Within this area, 36 habitat complexes of high local or greater conservation value were identified as Local Biodiversity Areas (LBAs). Many LBAs correspond to sites already designated by the DoEHLG as SACs, SPAs or pNHAs. Ecological corridors linking high biodiversity areas have also been identified. Table 4.5 lists the LBAs which are shown on Figure 4.4.

Table 4.5 Local Biodiversity Areas (LBAs) Identified in Co. Mayo

LBA	Site Name	LBA	Site Name
LBA 1	Knocklahard Turlough	LBA 19	Mullaghanoe River Central
LBA 2	Rathredmond Hazel Wood	LBA 20	Mullaghanoe River East
LBA 3	Lower Robe River	LBA 21	Treanacally Bog
LBA 4	Lough Carra Wetlands	LBA 22	Ross Dunes
LBA 5	Carrownalecka Hazel Wood	LBA 23	Meelick Esker
LBA 6	Island Lake, Ballyhaunis	LBA 24	Bartragh Island
LBA 7	Annagh Loughs, Ballyhaunis	LBA 25	North Killlala Coast
LBA 8	Tallagh Bog	LBA 26	Pollagh River Area
LBA 9	North Belmullet Twite Area	LBA 27	Cordarragh/Gowelboy Bog
LBA 10	Corclogh/Tonmore Bog	LBA 28	North Swinford Complex
LBA 11	South Belmullet Corncrake Areas	LBA 29	Carrowbeg Bog, Swinford
LBA 12	Southeast Castlebar Fens	LBA 30	Spaddagh River
LBA 13	Castlebar Lough	LBA 31	Killeen River Wet Grasslands
LBA 14	Lough Saleen	LBA 32	Colonel's Wood
LBA 15	Rathbaun Heath	LBA 33	Ballynacarrick Lough
LBA 16	Sonnagh Bog	LBA 34	Clerhaun Meadows
LBA 17	Sonnagh River	LBA 35	Westport House
LBA 18	Southeast Charlestown Wetland Complex	LBA 36	Corratowick Meadows

4.2.8 Protected Trees

In addition to being important wildlife habitat, trees also provide amenity value in the landscape. Nine groups of trees are protected under Tree Preservation Orders (TPOs) in the MCDP 2008-2014 (refer Figure 4.4.). Nationally, the Tree Register of Ireland (TROI) was established in 1999 to compile a comprehensive database of remarkable or champion trees throughout the country. The database now contains details of over 7,500 trees, many of which are national or County champions. Trees are remarkable for many reasons: their age, height, diameter, and for their historical and folklore associations, and can be critical in defining their local landscape. Appendix 2c lists trees protected by TPOs in the County.

4.2.9 Hedgerows

Hedgerows are an important feature of the Mayo landscape and an integral part of the rural environmental fabric, especially in the south and east of the County. The agricultural landscape contrasts with and compliments the large areas of upland and blanket bog. The County's hedgerow network is valuable not only in terms of agriculture, landscape and biodiversity—facilitating the movement of wild flora and fauna, acting as ecological corridors between habitat features, but functions to filter pollution, improve water quality and sequester carbon. They also act as a barrier to sound between traffic on busy roads and housing, and provide shelter in exposed areas. Roadside and townland boundary hedges generally contain a higher diversity of species than other hedges.

A survey of Mayo's hedgerows was undertaken in 2007, using a standard methodology in 63 sample 1 km squares distributed evenly around the County, covering approximately 1% of its total area (see Figure 4.4). This survey established the extent, composition, structure, condition and management of hedgerows in County Mayo.

4.2.10 Forestry

Approximately 10% of Mayo is covered with forestry, of which a little over 11% is broadleaved. Coillte manage 6% while the remainder is in private ownership. The main areas of afforestation, which were planted in the 1960s and 1970s, are in the north and west of the County in areas around Bellacorrick, Glenamoy and Ballycastle. These plantations are dominated by lodgepole pine. Private forestry, planted mainly in the 1990s is predominantly concentrated in the east of the County.

Under the National Forest Standard, 2000 all afforestation projects have to conform to a suite of environmental guidelines. Under these guidelines all features of biodiversity value; hedgerows, wetlands, stream banks and existing woodland have to be retained and protected. Up to 15% of plantation has to be set aside for open space and the retention of existing habitats; in plantations in Mayo however this would be as high as 25%. Coillte manages plantation areas in 32 Forest Management Units (FMUs). These FMUs have been surveyed to identify areas of biodiversity interest and potential. Sixteen Biodiversity Areas have been identified by Coillte in its Mayo FMUs which are described in Appendix 2d.

The National Survey of Native Woodland 2003–2008 identified two sites in Mayo - Knockbaun and Raheens Wood, in the top 19 undesignated sites ranked by conservation assessment score, out of 1217 woodland sites surveyed across the Republic.

Encroachment of scrub due to the reduction in agricultural activity in marginal areas has resulted in the development of new woodland habitats, supporting various levels of biodiversity. Scrub can be an important habitat for birds and invertebrates.

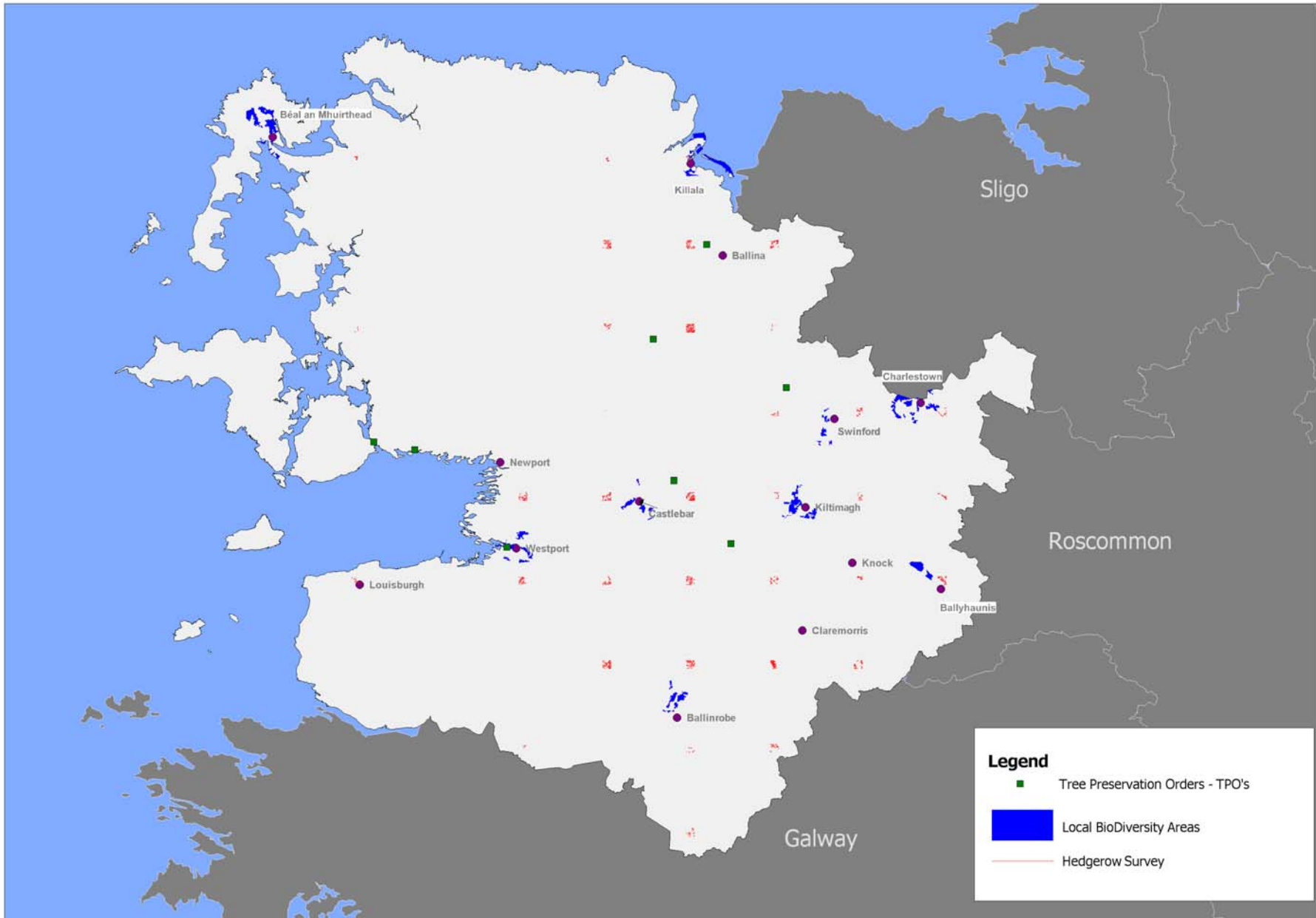


Fig 4.4 Location of Local Biodiversity Areas, Tree Preservation Orders and Surveyed Hedgerows in Co. Mayo

4.2.11 Non-Designated Bogs, Fens & Turloughs of Conservation Interest

In addition to EU and National designations, there are 13 non SAC/NHA designated bogs, fens and turloughs of conservation interest protected under the MCDP 2008-2014 as listed in Table 4.6.

Table 4.6 Non SAC/NHA Designated Bogs, Fens & Turloughs of Conservation Interest

Name of Bog/Fen/Turlough	Main Habitat Type
Derrykinlough	Raised Western
Lagduff West	Lowland Blanket
Ballycroy	Lowland Blanket
Lagduff East	Lowland Blanket
Mayfield Loughs	Fen
Robe River Bog	Fen & Raised Western
Ballymore Loughs	Fen
Carrick Lough	Fen
Lough Caheer	Fen
Knocklehard Lake	Fen
Lough Naskea	Fen
Houndswood Fen	Fen
Ballindereen Turlough	Turlough

4.2.12 Protected Species

County Mayo is home to several rare, protected and/or threatened plant and animal species. Protected plants are those that are legally protected under the Flora Protection Order within the Wildlife (Amendment) Act 2000 (e.g. drooping lady's tresses, bog orchid or yellow marsh saxifrage). The vulnerable status of other species is highlighted by their inclusion and classification in the Irish Red Data Book. Various animals are also afforded protection within the Wildlife Acts (e.g. all native mammals). Species listed on Annex II of the EU Habitats Directive (e.g. otter, salmon and freshwater pearl mussel) or Annex I of the EU Birds Directive (e.g. golden plover and kingfisher) are also protected. Details of these species are included in Appendix I of the Environmental Report of the SEA of the MCDP 2008-2014.

4.2.13 Likely evolution of Biodiversity, Flora and Fauna in the absence of the RES

The RES “will set out a path to allow Mayo County Council to contribute to meeting the national legally-binding targets set out by government and sets out opportunities for individuals, communities and businesses to harness renewable energy in a sustainable manner and to assist in combating climate change. The strategy will also clarify the approach Mayo Co. Council will take to renewable energy, and should assist direction and reduce uncertainty regarding issues associated with renewable energy developments in Mayo”. The types of renewable energy sources considered appropriate for County Mayo and to be addressed in the Strategy include: Wind energy, Ocean energy, Hydro electricity, Biomass, Biogas, Biofuel and micro generating renewable energy systems.

In the absence of the RES, the existing County Wind Energy Strategy and renewable energy policies and objectives in the MCDP 2008-2014 would guide the planning and development of renewable energy developments in the County. Accordingly, wind farm development would be open to consideration in parts of central Mayo and generally permitted in the east of the County. Wind farm developments would not be permitted in the west of the County, although encouraged in Belderrig, Ballycastle, Porturlin, Eskeragh, Bellacorrick, Sheskin, Doogary, and Louisburgh. This is an anomalous situation, which will pertain in the absence of the RES, and could have a negative impact on biodiversity, including ecological connectivity, in these areas. The RES should clarify this contradictory situation, which currently pertains in relation to wind developments.

Mayo has extensive areas of protected sites, which are designated for the protection of various habitats and species. However, the ecological resources of the County are at risk from the use of current traditional energy sources, from pollution and greenhouse gas (GHG) emissions, including the associated impacts of climate change on biodiversity. While the harnessing and provision of renewable energy has the potential to impact on these resources, the strategy if implemented in full, along with relevant national and international strategies, will contribute to the reduction of GHG emissions and to national targets for the reduction in CO₂.

In the absence of the RES, there will be no coordinated approach to renewable energy in the County and uncertainty with regard to renewable energy development applications, which will be dealt with on a reactive, case by case basis, without an overall strategic framework to guide them. Planning applications would continue to be assessed on an individual basis with flora and fauna, habitats and ecological connectivity protected under the policies of MCDP 2008-2014. Applications likely to impact on designated sites would be subject to Habitat Directive Assessment under Articles 6(3) and 6(4) of the Habitats Directive.

In the absence of the RES, there would be no framework directing renewable energy developments, including associated infrastructural requirements such as new roads, upgrading of the national grid, connections to the national grid etc. to appropriate, less ecologically-sensitive locations in the County. In a county context, identifying the appropriate locations for the various renewable energy technologies/sources will be of the utmost importance. Without strengthened policy in relation to all renewable energies, biodiversity may come under threat from developments in the future.

4.2.14 Habitat Directive Assessment

This draft Renewable Energy Strategy has undergone Habitats Directive Assessment and the assessment has indicated that although this draft Strategy avoids Natura 2000 sites (Map 1 –Wind Energy and ensures protection of Natura 2000 sites for all other renewable energy developments arising from this draft Strategy, mitigation measures have been outlined to preclude indirect effects on any Natura 2000 sites from proposed renewable energy developments outside designated areas. Notwithstanding a Habitats Directive Assessment being carried out on this draft Strategy, individual renewable development proposals may be subject to a Habitats Directive Assessment at the project stage.

4.2.15 Existing Environmental Problems relevant to Biodiversity, Flora & Fauna

While Mayo has a rich and diverse natural heritage, many of its habitats and species are, however, under threat. The main threats to biodiversity in the County are habitat destruction and fragmentation, land clearance and development pressure, poorly-managed commercial forestry, drainage, pollution, invasive alien plant and animal species and climate change.

Climate change and its effects are a major threat to biodiversity and the functions of ecosystems. Natural systems are especially vulnerable to the effects of climate change and can often sustain irreversible damage. Evidence from around the globe indicates that species are already shifting their ranges in response to on-going changes in regional climates (Parmesan and Yohe, 2003; Root *et al.*, 2005; Walther *et al.*, 2005; Lavergne *et al.*, 2006), that species are altering their phenology (Menzel and Fabian, 1999; Visser and Holleman, 2001; White *et al.*, 2003; Zavaleta *et al.*, 2003; Jones *et al.*, 2006; Donnelly *et al.*, 2007) and that some species are facing extinction, or have become extinct.

Predicted negative effects of climate change for Ireland's terrestrial (and marine) environments include changes in the distribution of species and the possible extinction of vulnerable species (EPA 2008). Designated sites and other semi-natural habitats will become important homes for new species and habitats. Invasive species may thrive due to a warmer climate and waters, and coastal habitats will come under threat from rising sea levels. Habitat degradation/fragmentation may occur due to prolonged periods of drought, and poor air quality will result in degradation of biodiversity.

However, biodiversity also has a role to play in ameliorating the impacts of climate change through the ecosystem services it provides. Carbon sequestration rates are influenced by different soil and forest types. Peatlands are considered as important carbon sinks, and carbon sequestration through land use changes and forestry has been the focus of much attention due to its potential as a cost-effective mitigation strategy. Similarly, wetland systems may be conserved or created to sequester carbon.

Also, the buffering role of peatlands and wetlands in retaining water during heavy rainfall events cannot be overstated. Conversely, land use changes can negatively affect the ability of the natural environment to absorb some of the primary impacts of climate change such as increased rainfall and flood events. Development on shorelines and floodplains and the infilling of wetlands is a problem.

Despite the advantages of wind energy when compared with more traditional energy sources based on the consumption of fossil fuels, wind energy can have negative impacts on biodiversity. Wind farm developments have the potential to impact significantly on habitats and species. Wind turbines can negatively affect the fauna in their surroundings, including birds. This is due not only to an increase in the number of turbines, but in the continuous improvement in turbine design (e.g. larger blades and increased rotating speeds). Other associated negative impacts do not affect birds directly, (including visual and sound impact and habitat loss), but could have a greater impact than direct mortality.

Wind farms also have a detrimental impact on bats, through collision with turbine blades, loss of foraging/commuting habitats and disorientation due to ultrasound emissions by wind turbines. The cumulative effect of wind farms on the landscape and habitats needs to be considered, with a need to protect sensitive landscapes and habitats. Ecological networks have been adversely impacted upon by the development of infrastructure, such as roads which result in habitat fragmentation or by development which results in the removal of hedgerows or which occur along coastal edges or on the edges of inland surface waters.

Alien invasive plant and animal species are considered one of the greatest threats to biodiversity. Invasive alien species negatively impact biodiversity through competition, herbivory, predation, habitat alteration and introduction of parasites or pathogens and pose a risk to the genetic integrity of our native species. In Mayo, a number of terrestrial plant species are a major cause for concern including rhododendron (*Rhododendron ponticum*), Giant rhubarb (*Gunnera tinctoria*) and Japanese knotweed (*Fallopia japonica*).

Biofuel crops, particularly using non-native species, must be introduced with an understanding of possible risks to the environment. Introducing some plant species as biofuel sources may be safe, but ecological risks must be assessed before introducing biofuel crops.

4.3 Population and Human Health

4.3.1 Population

The population of Mayo in 2006 was 123,839 persons, compared with 117,446 persons in 2002. This represented an increase of 5.3% in four years, the most significant population increase since 1926. The average annual rate of population increase in this four-year period was 1.3 per cent, which was higher than the rate of increase experienced during the 1996-2002 period (0.8%). The MCDP 2008-2014 estimates a population increase of 13,526 persons in the period 2006 to 2013, representing an increase of 10.9% over this period.

Despite the population growth recorded in the County between 2002 and 2006, Mayo's share of the West Region population continued to decline — from 31% in 2002 to 30% in 2006. The CSO Regional Population Projections 2006-2026, as released in 2008, suggests an annual growth for the West region of 1.6%, which is slightly above average growth forecast across all regions (1.5%). The Regional Population Projections 2006-2026 do not specify population forecasts for individual counties.

The pattern of change in urban and rural areas within the County since 2002 has seen a greater dispersal of growth, with Ballina, Castlebar and Westport declining in terms of the volume of absolute growth, but other areas increasing. Most notable is the population decline experienced in the urban areas of these three main towns, -6.1% in Castlebar Urban, -7.5% in Ballina Urban and -2.8% in Westport Urban, with significant increases in the environs of these towns (Environs of Castlebar 14%, Environs of Ballina 108.9%), with the exception of the Environs of Westport which declined by -2.5%.

Between 2002 and 2006 the County's urban population increased by 7.77%, while the rural population increased by 4.09%. Ballina and Castlebar together accounted for a large portion of the population change in all urban areas (as defined by the Census). Large population increases occurred in towns having populations between 1000 and 5000 persons namely Ballinrobe, Claremorris, Ballyhaunis and Foxford. A number of smaller towns (i.e. 100 to 1000 persons) also experienced substantial population increases such as Knock, Balla, Shrule, Kilkelly and Louisburgh. However a number of other smaller towns experienced substantial population losses such as Kilmaine and Cong.

According to the 2006 census, 63% of Mayo's population lives in rural areas and 37% lives in urban areas. Rural EDs contributed 21% of County growth between 2002 and 2006. This, together with the trend towards greater spread of urban growth between towns, points to a more dispersed pattern of population and housing growth.

4.3.2 Human Health

Human health protection is a fundamental aspect of environmental protection as human health has the potential to be impacted upon by several environmental factors including water, soil and air and the interrelationships between them. Human health/well-being is also closely related to quality of life which can be affected by such factors as commuting patterns and the provision of recreation and amenity facilities and the quality of the built and natural environment. Hazards or nuisances to human health can arise as a result of exposure to the above factors and incompatible land uses. These factors are examined in appropriate detail under the relevant environmental topic headings in this Report.

Seveso II Sites: these are premises which are subject of the EC (Control of Major Accident Hazards Involving Dangerous Substances) Regulations which gives effect to Council Directives 96/82/EC and 2003/105/EC on the control of major hazards involving dangerous substances. Currently, there are five Seveso II sites in the County as shown on Figure 4.5. The regulations apply to companies where dangerous substances are present in quantities equal to or above specified thresholds. These sites are Ballina Beverages, Ballina; Brooklands Gas Co Ltd, Ballina; Calor Gas Teo, Claremorris; Flogas Ltd, Ballyhaunis, ESB Power Generator, Killala. The Gas Terminal at Bellanaboy Bridge, to be operated by Shell E&P Ireland Ltd will also constitute a Seveso II site. The Health and Safety Authority must be consulted in relation to any new development at or within specified distances of these premises.

4.3.3 Existing Environmental Problems relating to Population & Human Health

The continued dispersal of population into rural areas, as reflected in Figure 4.6, may have adverse impacts on human health as it gives rise to increased dependency on the car and can impact on drinking water quality arising from un-maintained wastewater treatment systems. Dispersed populations also result in substantial loss of greenfield agricultural land which reduces the amount of lands available for renewable energy developments. Renewable energy developments can require substantial tracts of land, preferably located away from residences in the interests of residential amenity and to avoid turbulence and interference with communication signals etc. In addition large tracts of land may be required for fuel growth associated with biomass and bio fuel developments.

4.3.4 Evolution of Population & Human Health in the Absence of the RES

It is not envisaged that population location trends would substantially change in the absence of the RES. However in the absence of the Strategy, it is likely that the rate of renewable energy development would be slow, or may never become established in the County. Renewable energy development is considered necessary to assist in reducing carbon emissions, reducing our reliability on non renewable fossil fuels which are mainly imported and to assist in reducing fuel poverty – all which would assist in impacting positively on human health. Therefore in the absence of the RES it is likely that human health could deteriorate.



Fig. 4.5 Seveso II Sites in County Mayo

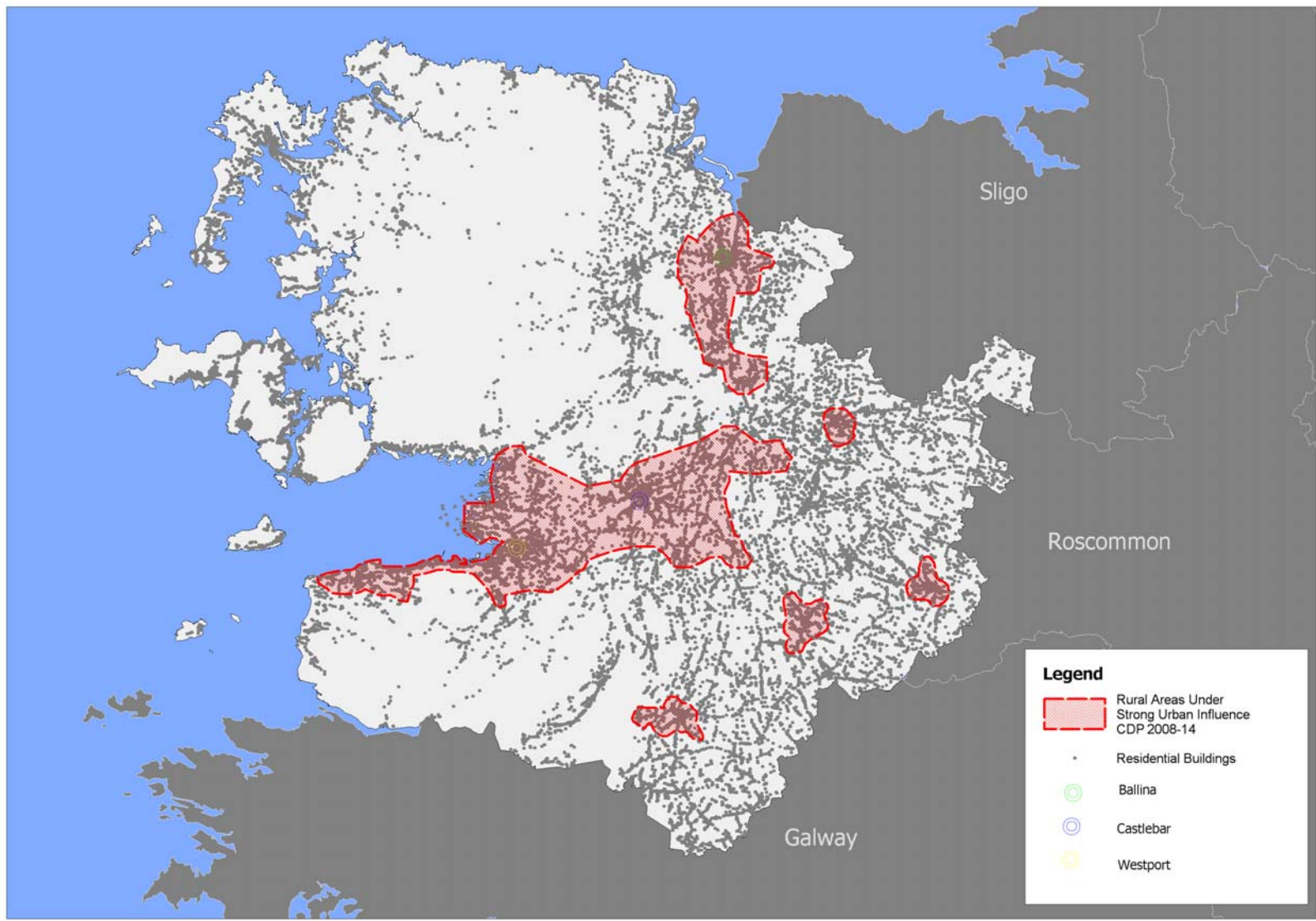


Fig 4.6 Dispersed Rural Settlement Patterns in Co Mayo and Areas of Urban Pressure

4.4 Soils and Geology

4.4.1 Soils

Soil is the top layer of the earth's crust, formed of mineral particles, organic matter, water, air and living organisms. It is considered a non renewable natural resource, as it is formed by a complex series of processes which occur over long timescales. Soil is an extremely variable and living medium and performs many vital functions including food and other biomass production, storage, filtration and transformation of many substances including water, carbon and nitrogen. Damage to soil structure has repercussions for other environmental media and ecosystems.

Although soil is not yet protected, provisions in favour of soil protection are spread across many policy areas and are usually designed to safeguard other environmental media. Under the EU Habitats Directive, areas of peat – raised bogs and blanket bogs – are included in SAC area designations (see Figure 4.9). In 2006, the European Commission adopted a soil thematic strategy, which is designed to halt and reverse the process of soil degradation, ensure healthy soils for future generations and remain capable of supporting the ecosystems on which our economic activities and well-being depend¹. Figures 4.7 and 4.8 show the soil types which occur in County Mayo and the CORINE 2000 Land Use Classes respectively.

The soil of West Mayo largely consists of blanket peats in the uplands and bog, which support rare varieties of flora and fauna and are protected under the EU Habitats Directive as shown in Figures 4.9 and 4.10. Peaty gleys and peaty podzols, are found on low lying land and these mainly support agriculture in these areas. To the coasts of the west and north, areas of extensive agriculture are supported by acid brown earths. The east of the County demonstrates a greater diversity of soils, including grey brown podzolics, shallow brown earths and podzols, which supports the majority of the County's agriculture. There are significant areas of peat bogs around the north Castlebar region.

4.4.2 Geology

North Mayo has had a long and complex geological history. The oldest rocks in Ireland, PreCambrian gneiss, can be found in the plains of Erris. In contrast younger Carboniferous limestones make up much of the low-lying lands of the south east of the County. The underlying geology of the County is outlined in Figure 4. 11.

Quaternary geology is the study of soils deposited or formed during the last 2 million years. Quaternary sediments form a discontinuous blanket covering most of the bedrock, with moraines, drumlins and eskers all visible. The eskers constitute most of the quarrying activities including granite and sand and gravel quarrying. Quarries and Mineral deposits in the County are shown in Figure 4.24, Section 4.6.

The GSI have identified 122 sites in Mayo as Irish Geological Heritage Sites (IGH). Mayo County Development Plan 2008-2014 lists these sites as Sites of Geological Interest (Appendix VI of MCDP) and it is a policy of the Council (P/EH-NH1 (d)) to protect, enhance and conserve features of geological interest including these sites. IGH sites (designated as Sites of Geological Interest in MCDP) are shown on Figure 4.12.

4.4.3 Existing Environmental Problems relating to Soils & Geology

The main pressures on soil resources in Ireland arise from intensive agriculture and organic waste disposal; forestry; industry; peat extraction; urbanisation and infrastructure development. These activities can lead to soil degradation including loss of organic matter, decline in soil fertility, acidification, loss of soil stability, increasing soil erosion, soil compaction, contamination, loss of biodiversity and loss of soil to buildings and infrastructure. Many of the above activities also have a detrimental effect on air and water environments. (Brogan et al, 2002, EPA).

Minimal protection of Soils and Geology, apart from that afforded by other environmental designations, means that sensitive areas such as those of peat are open for exploitation and degradation, although it should be noted that IGH sites are protected under the MCDP 2008-2014.

Peat is a natural filter, carbon sink and water storage facility. Altering the peat areas may result in contamination of soils and water courses. In addition soil erosion due to development and forestry related operations, has a major impact on water quality and can also lead to landslide events. Recently the GSI have established a landslide database, to date there has been a total of 15 recorded landslide events in the County. The location of these landslide events is shown on Fig 4.13.

4.4.4 Evolution of Soils and Geology in the Absence of the RES

Climate change is a natural phenomenon and the geological record shows there have been many cycles of glaciation and interglaciation. Climate change may be accelerated by human influence and increased emissions of green house gases may result in changing weather patterns and greater frequency of storms and weather events which will lead to flooding and escalate erosion – both on land and in coastal areas.

Measures have been taken to reduce the level of GHG emissions, particularly from the use of fossil fuels, being released to the atmosphere by use of renewable energy resources. It would be wrong to suggest that the RES would prevent erosion or flooding, as these are natural occurrences. However, it is likely that in the absence of the RES, areas which may be susceptible to erosion, landslides or flooding may be adversely affected by the location of renewable energy developments in such areas.

Renewable energy developments by their nature will have a large initial impact on both soil and geology, as the associated infrastructure requirements can involve road building, clearing and planting of land for biofuel crops or forestry for biomass, drilling of rock for geothermal and hydro energy infrastructure. Therefore a Renewable Energy Strategy is vitally important to guide developments and their locations so that the impacts on the soils and geology of the County may be gauged accurately.

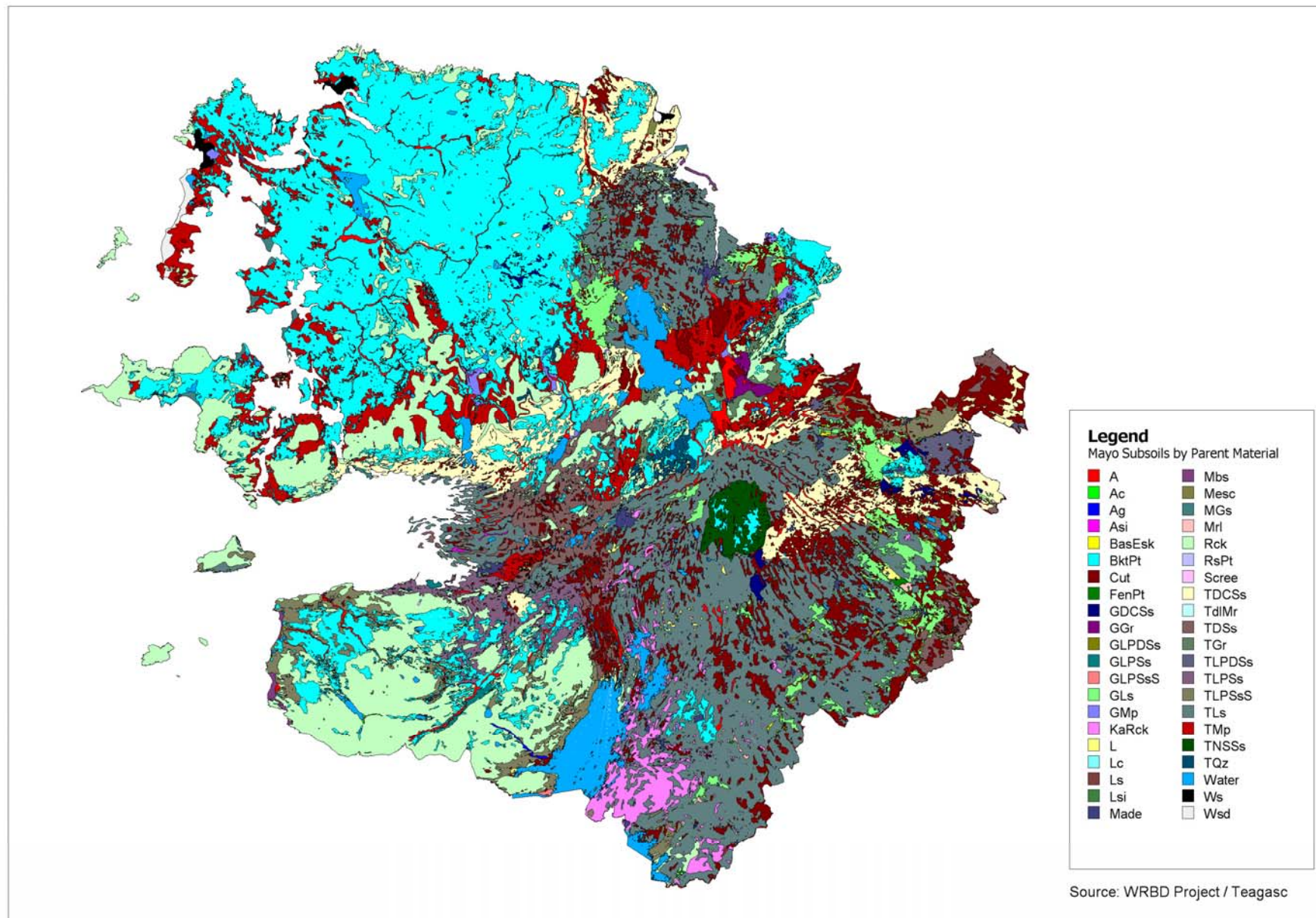


Fig 4.7 Soil Map of Mayo: Source WRBD: Teagasc and EPA

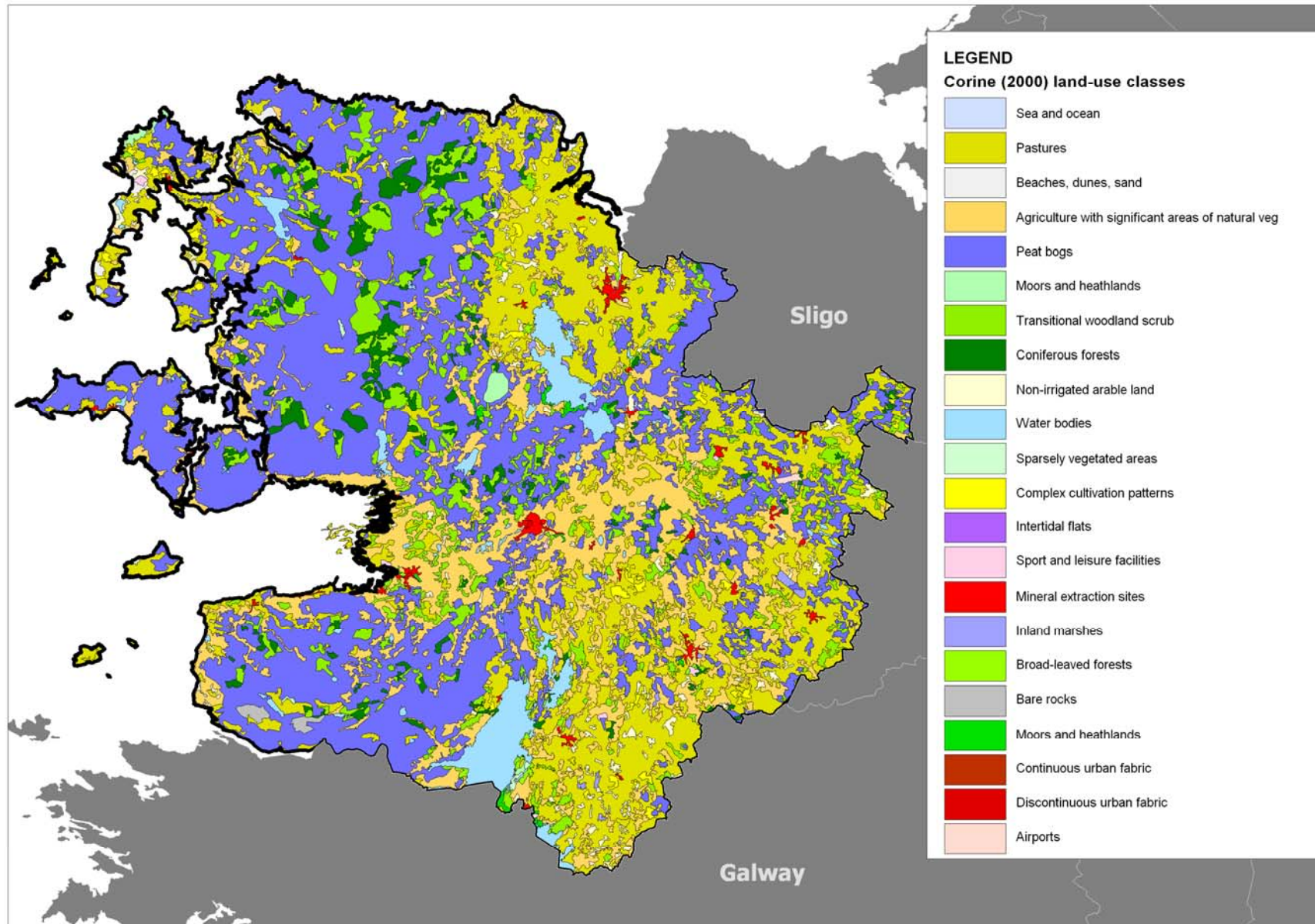


Fig 4.8 CORINE 2000 Land Use Classes

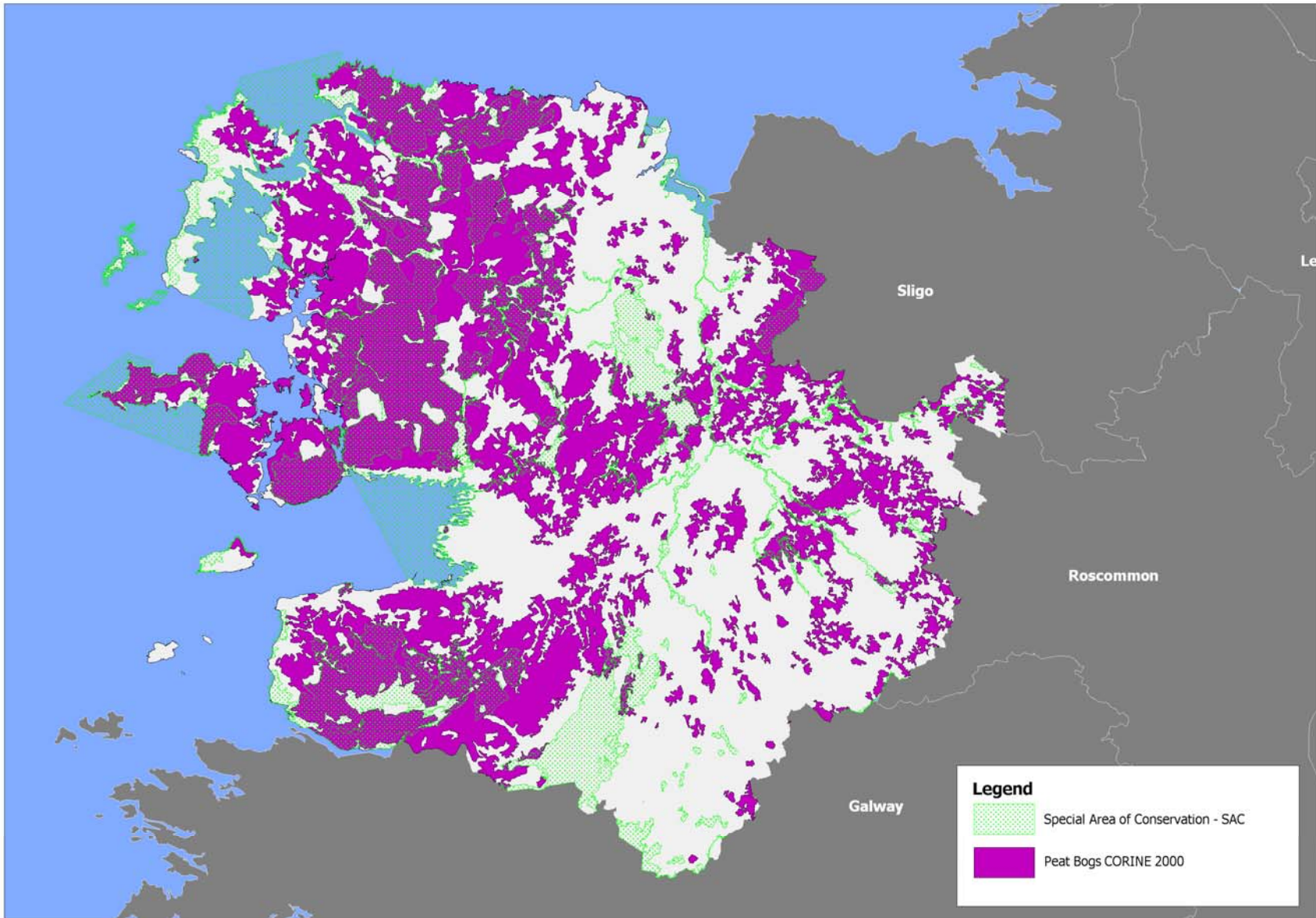


Fig 4.9 SAC's in Mayo shown in conjunction with Corine 2000 Peat Bog Land-Use Class

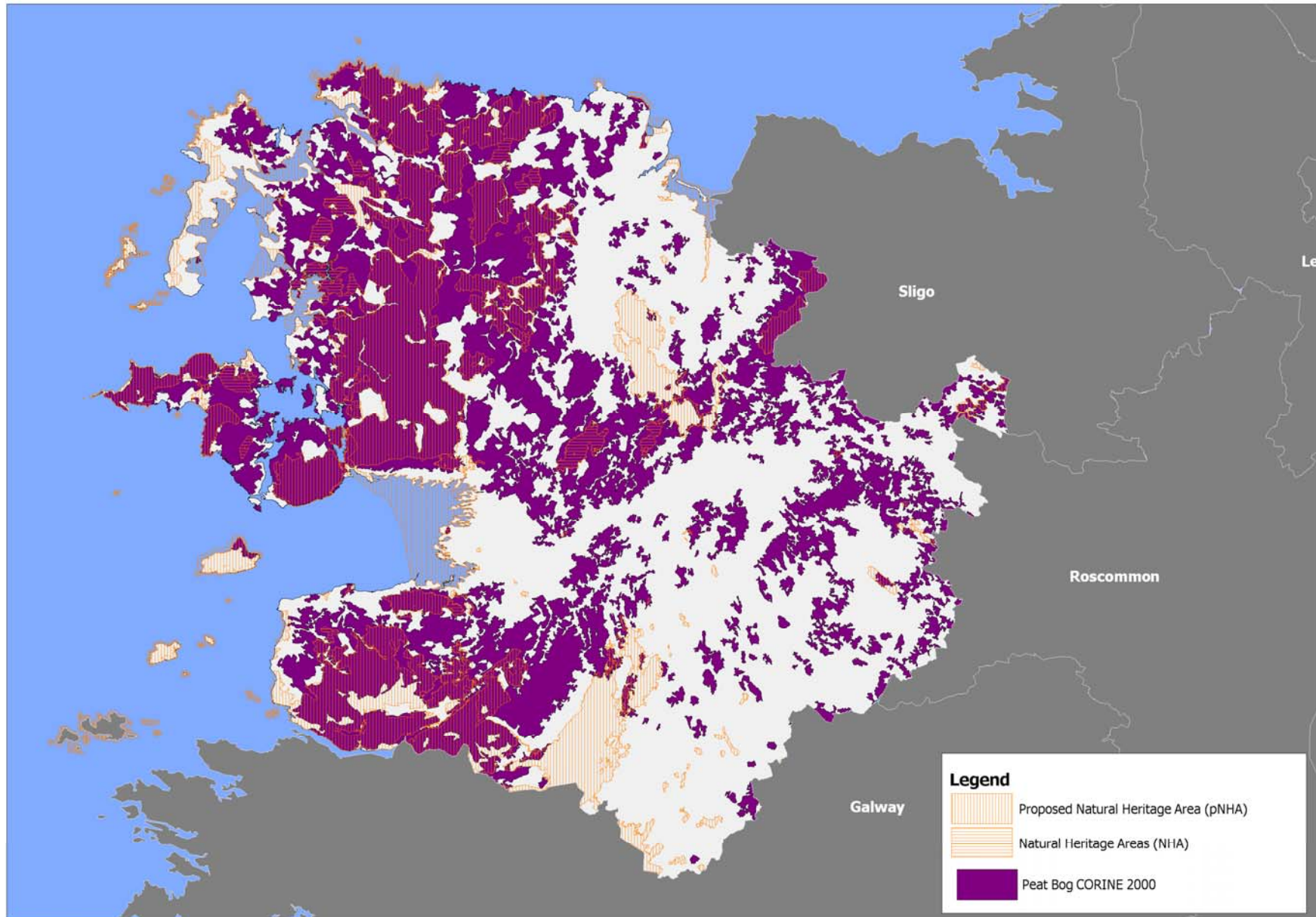


Fig 4.10 Proposed (pNHA) and Existing Natural Heritage Areas (NHA's) in Mayo in conjunction with Corine 2000 Peat Bog Land-Use Class

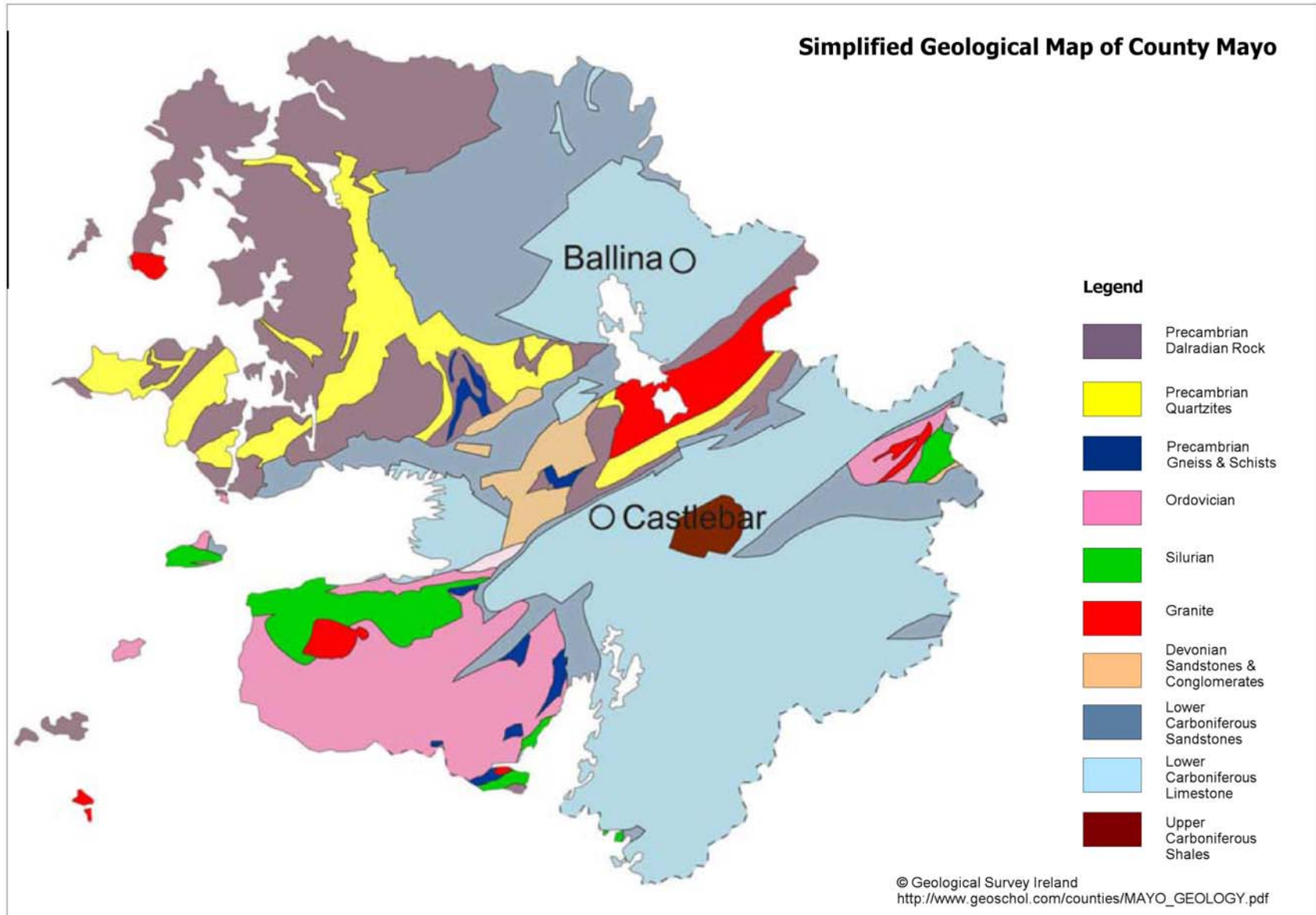


Fig 4.11 Geology of County Mayo



Fig 4.12 Irish Geological Heritage sites in relation to SAC & NHA/pNHA's

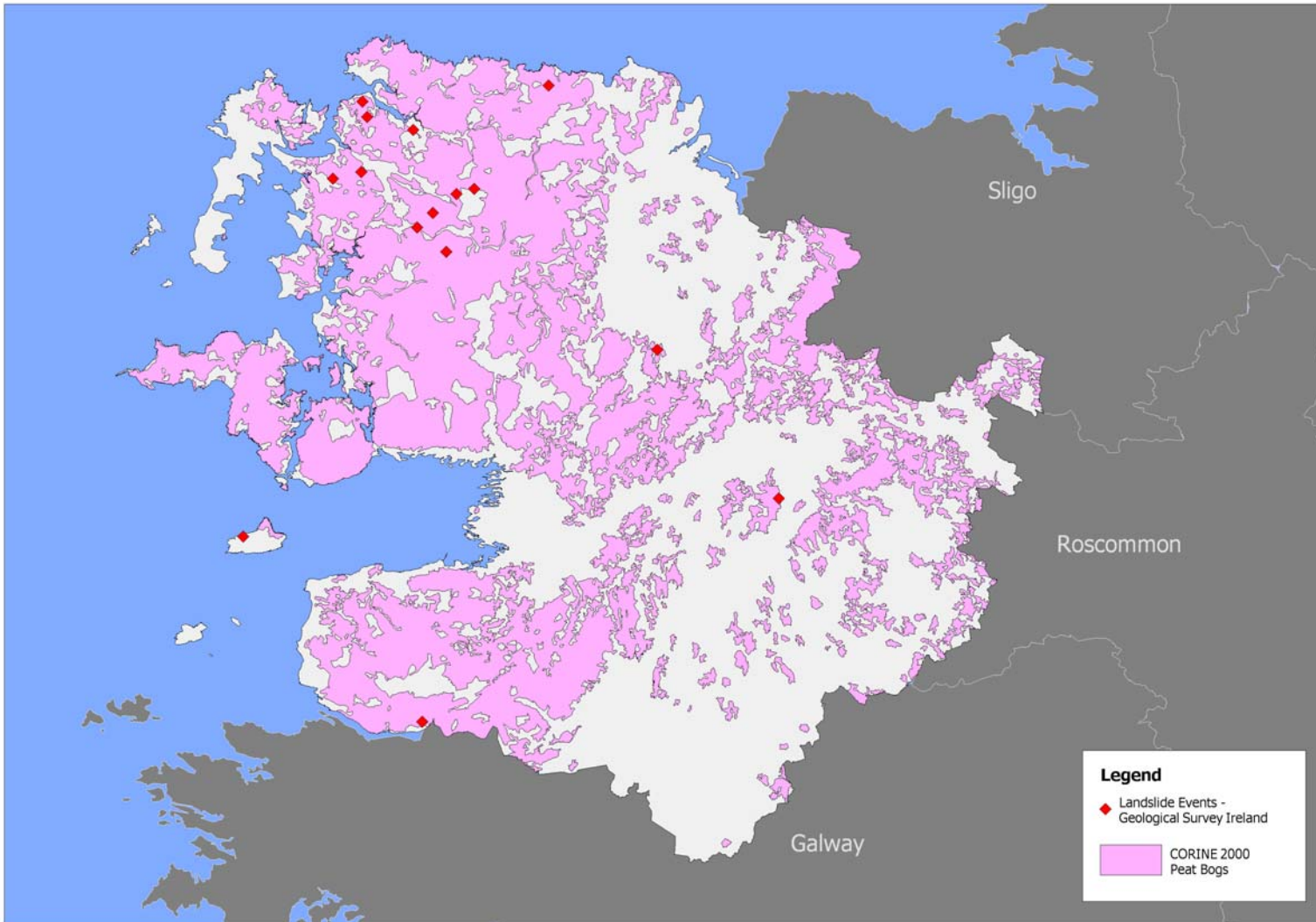


Fig 4.13 Location of Landslide Events in Co Mayo

4.5 Water

4.5.1 Introduction

The Water Framework Directive (WFD 2000/60/EC) was adopted in 2000 and subsequently transposed into Irish legislation by the EU (Water Policy) Regulations, 2003 (S.I. 722 of 2003). The WFD, which encompasses a number of earlier Directives, sets a framework for the comprehensive management of water resources in the European Community. The fundamental objective of the Directive is to maintain “high status” of waters where it exists, prevent any deterioration in the existing status of waters and achieve at least “good status” in relation to all waters by 2015. Good quality or status refers to the biological and/or chemical characteristics which demonstrate only minor differences compared to the natural or “reference” state. The essence of the WFD was to adopt a new approach to water quality management which focuses on both quality and quantitative status consistent with a healthy ecosystem, contrary to previous legislation, the focus of which was on standards and emission limits for physical and chemical parameters only.

The WFD rationalises and updates existing water legislation and provides for water management on the basis of River Basin Districts (RBDs). Ireland is divided into eight RBDs. Mayo is within the Western RBD (WRBD) which is co-ordinated by Galway County Council and includes County Sligo, the Galway City Council area, significant portions of counties Galway and Leitrim and smaller portions of counties Roscommon and Clare.

Besides protecting and enhancing water quality and aquatic ecosystems, the Directive also is intended to promote the sustainable use of high quality water resources.

4.5.2 Freshwater Quality and Ecology

County Mayo contains a large quantity of river and stream channel lengths and lake areas in comparison with other counties across Ireland. These surface waters are an integral part of the County’s landscape and resource base; they support diverse ecosystems across the County – a number are subject to ecological designations; and they are important in the supply of drinking water through direct abstraction and through their role in groundwater recharge.

The statutory Characterisation Report for the Western RBD was undertaken to, *inter alia*, identify RBD characteristics, in particular the water bodies which are *at risk* or *not at risk* and further *probably at risk* and *probably not at risk* of **not** achieving the objectives of the WFD, namely, to achieve good status or maintain high status by 2015 (Fig 4.14). From a study of high quality freshwater sites which formed a core group of stations for the reference network of rivers and lakes with high ecological status, the surface water bodies in Mayo have been designated as *high, good, moderate, poor* and *bad*.

4.5.3 Rivers and Lakes

Currently, under the auspices of the WRBD, Mayo river catchments have been assigned risk designations. Initial observation would indicate that, broadly-speaking, the eastern sector of the County is dominated by river bodies which are ‘at risk’ and ‘probably at risk’ of **not** achieving good status within the five-year target, while, with notable exceptions, the western region contains more ‘not at risk’ and ‘probably not at risk’ categories.

All water catchments in the WRBD and consequently in Mayo, have been subdivided into unique water bodies which are clearly defined geographic areas distinguished by type. These classifications, as described previously, include *high, good, moderate, poor* and *bad*. Figure 4.15 illustrates the current status and it is noteworthy that, in line with the risk status the greater majority of moderate and poor water bodies are located in the more populated, developed areas of Mayo, whereas the good and high water bodies are in the western, sparsely-populated, less-developed catchments. The one water body of bad status is the Robe catchment, the principal tributary of Lough Mask, which accounts for approximately 2% of the area

Environmental Report
Draft Renewable Energy Strategy for County Mayo

of the County. Unfortunately, high status accounts for only 1% of the total area of the County, while good, moderate and poor account for 41%, 28% and 28% of the total area respectively.

Regarding the sensitive waters identified under the Urban Waste Water Treatment Regulations, 2001 (S.I 254 of 2001), currently one river has been afforded protection under this legislation, namely, the Castlebar River (the stretch downstream of Castlebar Waste Water Treatment Plant at Knockthomas to entry into Lough Cullin).

Lake classifications under the WFD are designated as *high, good, moderate, poor* and *bad*. The situation regarding lake status in the County is undeniably mediocre, with the larger lakes Conn, Cullin, Carra and Carrowmore described as being at moderate status and many smaller lakes at high status. Lakes which have been described as good include Mask, Beltra, Feeagh and Furnace. No lakes have been described as bad, but being mindful that the recovery of lakes (following measures to *inter alia*, reduce eutrophication-promoting nutrients) may take more than 20 years, this situation makes the objective of the WFD increasingly difficult. The current status of Mayo lakes is illustrated in Figure 4.16.

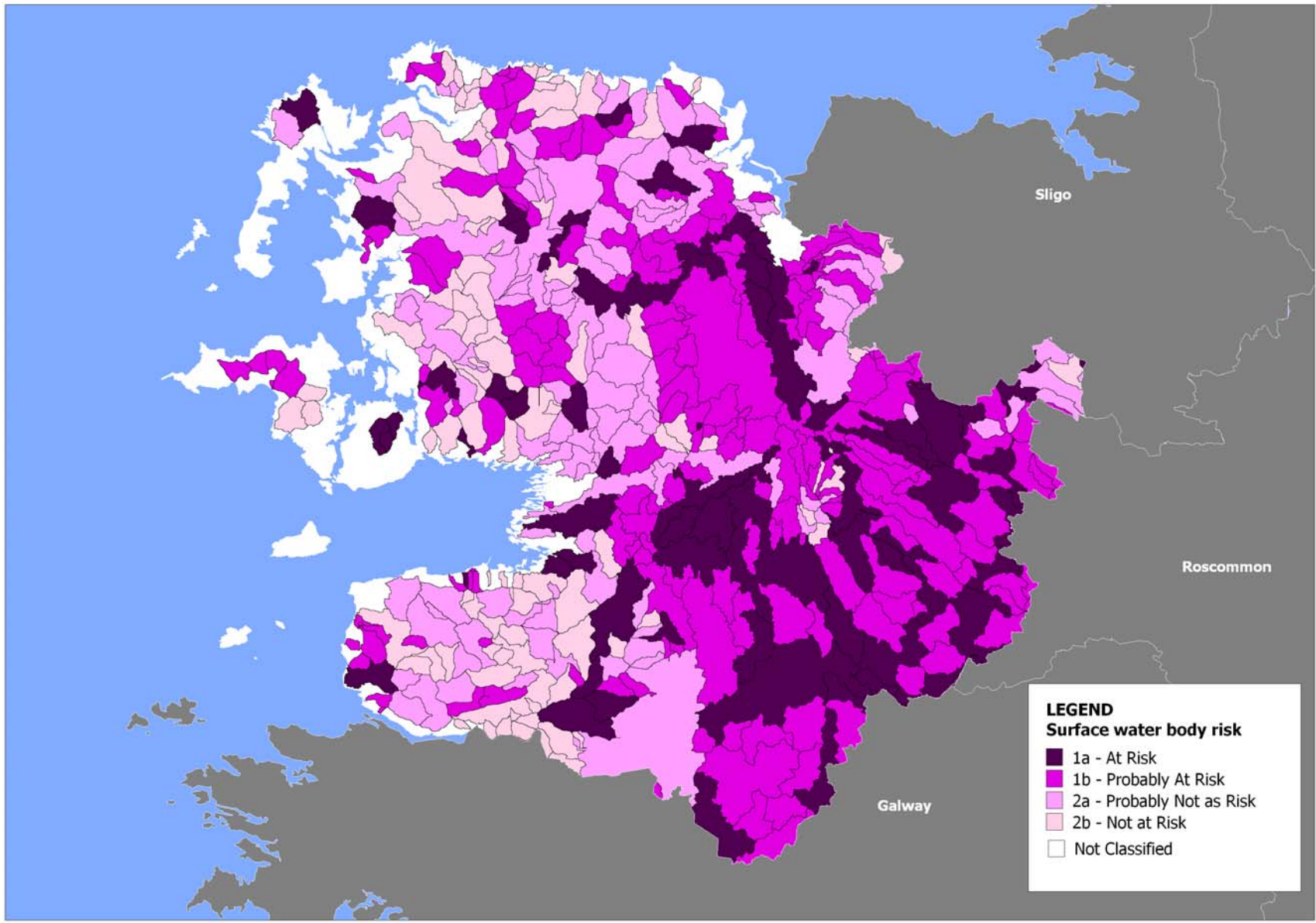


Figure 4.14 Current Risk Status of Water Bodies in Mayo (WRBMP)

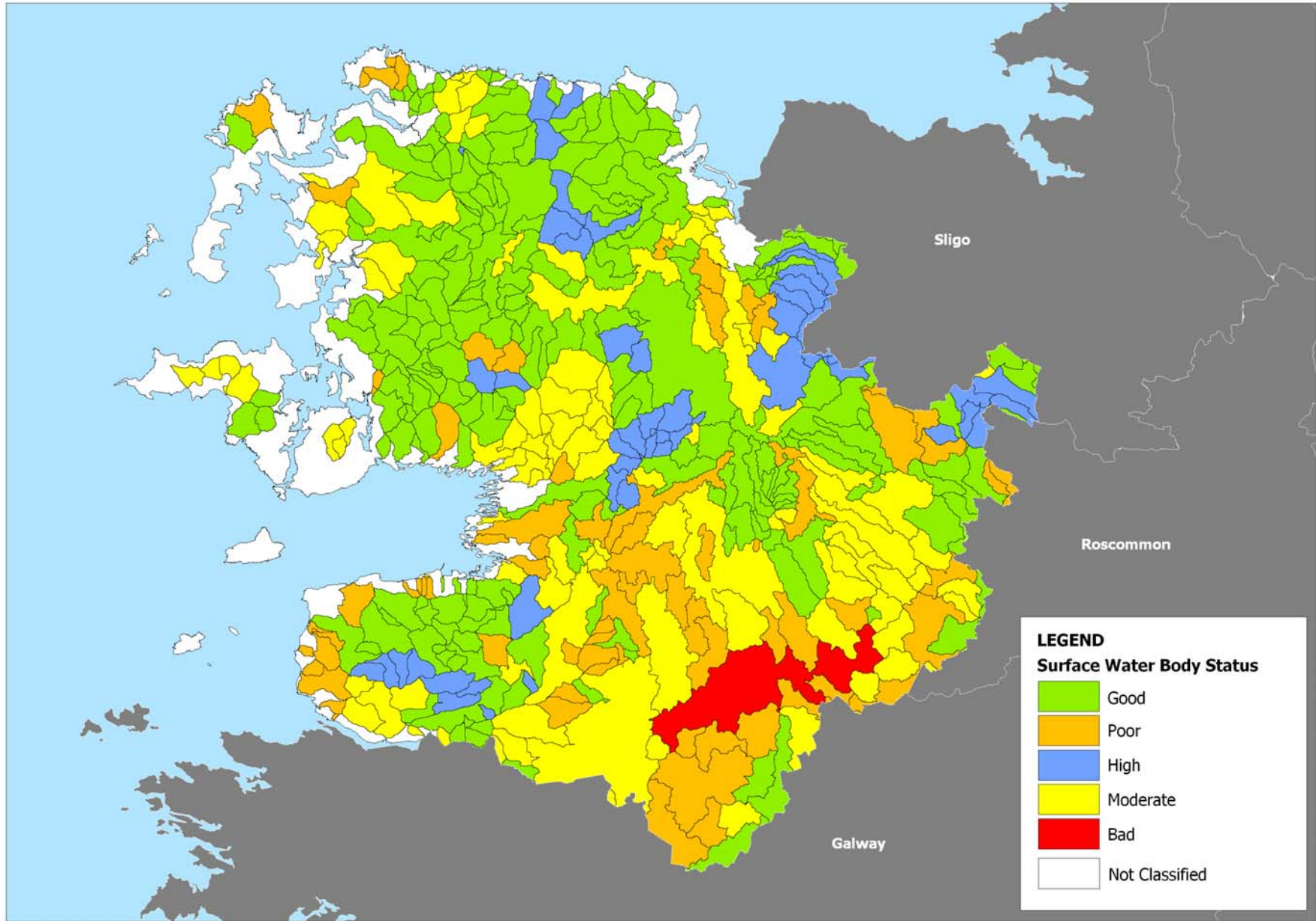


Figure 4.15 Current Water Body Status in Mayo (WRBMP)

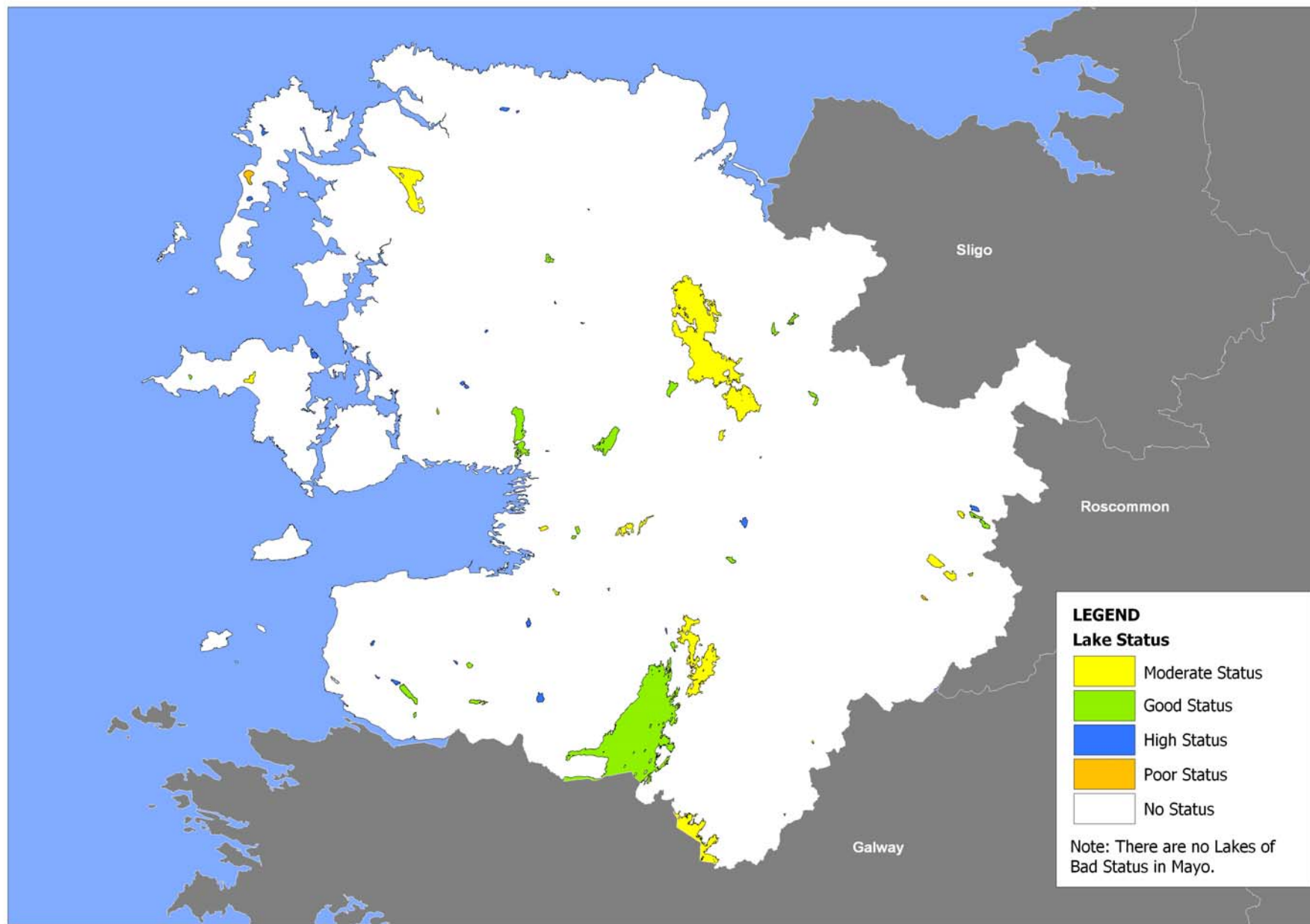


Fig 4.16 Current Status of Mayo Lakes (WRBMP)

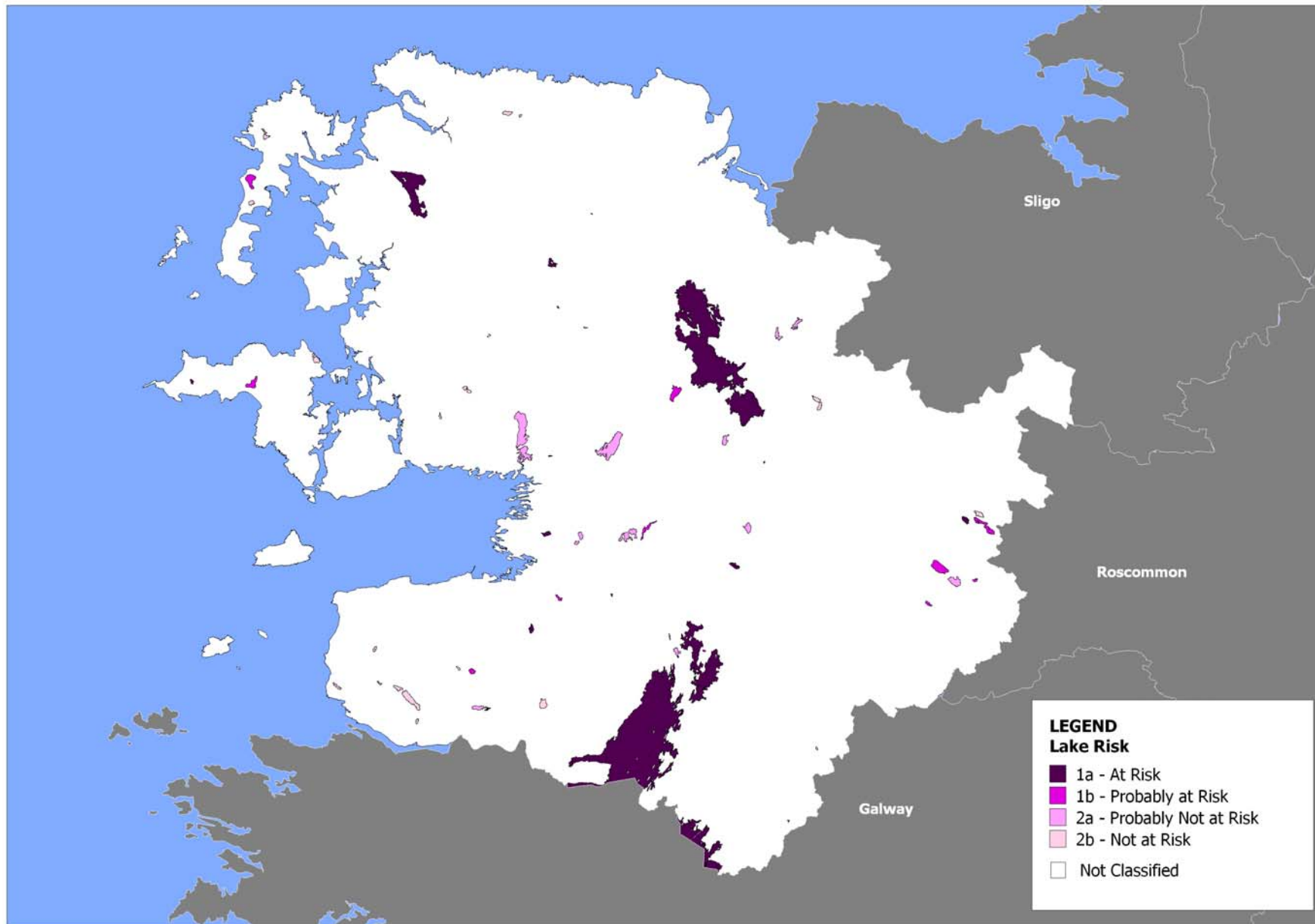


Fig 4.17 Current Risk Status of Mayo Lakes (WRBMP)

4.5.4 Freshwater Ecology

In line with the objectives of the WFD and the EU (Water Policy) Regulations, 2003 (S.I. 722 of 2003), (i.e. achieve good status and maintain high status by 2015), increasingly more emphasis has been placed on the freshwater ecology of Ireland’s lakes, rivers and streams. The terms ‘high status’ and ‘good status’ are synonymous with ‘high’ and ‘good’ chemical status, but also, more notably, with ‘high’ and ‘good’ ecological status. Risk scores of each individual water body in Mayo have been assigned almost solely with regard to the abundance and diversity of aquatic macroinvertebrates. Notable biological indicators such as the pollution-sensitive *Ecdyonurus* spp. or *Perla bipunctata*, in addition to more tolerant *Simulium* sp. and other dipterans, to name a few, have been sampled and identified at locations within every sub-catchment throughout the County and risk scores appropriately assigned. Hence, a *not at risk* allocation will essentially indicate a diverse and rich macroinvertebrate community, in addition to a well-oxygenated water body with little to no siltation and the absence of filamentous algae and which, on the balance of probabilities, will achieve the key objective of the WFD by 2015.

The risk scores and water bodies’ statuses in the aforementioned Water Quality Baseline Data can therefore be applied to the status of the freshwater ecology of Mayo.

Under Article 8 of the EU (Water Policy) Regulations, 2003 (S.I. 722 of 2003) the EPA established and maintain a register of Protected Areas in accordance with Article 6 of the Directive. Essentially, this list contains data on *inter alia*, Special Areas of Conservation (SACs, cSAC and pSACs) and Special Protection Areas (SPAs and pSPAs). Species listed include those of lake habitats including *Najas flexilis* (slender naiad) and *Salvelinus alpinus* (Arctic char). Otters (*Lutra lutra*), White-clawed crayfish (*Austropotamobius pallipes*) and Freshwater Pearl mussel (*Margaritifera margaritifera*) are just some river water-dependant taxa from river channels. In Mayo there are currently 52 candidate SACs designated and protected under the Habitats Directive (92/43/EEC) due to their conservation value for habitats and species. While not formally adopted as yet, the majority of these sites are designated for freshwater species and habitats, of which there are a total of 30.

Table 4.7 cSAC in Mayo: Designated for Freshwater Species

Site Code	Site identification	Site Code	Site identification
000461	Ardkill Turlough	001774	Lough Carra / Mask Complex
000466	Bellacorick Bog Complex	001529	Lough Cahasy, Lough Baun and Roonagh Lough
000471	Brackloon Woods	000297	Lough Corrib
000472	Broadhaven Bay	002177	Lough Dahybaun
000476	Carrowmore Lake Complex	000633	Lough Hoe Bog
001899	Cloonakillina Lough	001536	Mocorha Lough
000479	Cloughmoyne	000470	Mullet/Blacksod Bay Complex
000485	Corraun Plateau	001932	Mweelrea/Sheefrey/Errif Complex
001955	Croaghaun/Slievemore	002144	Newport River
000484	Cross Lough (Killadoon)	000534	Owenduff/Nephin Complex
000492	Doocastle Turlough	002006	Ox Mountain Bogs
001497	Doogort Machair / Lough Doo	002298	River Moy
000500	Glenamoy Bog Complex	000525	Shrule Turlough
000503	Greaghans Turlough	000541	Skealaghan Turlough
000504	Kilglassan/Caheravoostia Turlough Complex	001571	Urlaur Lakes

Mayo has a current total of 18 SPAs, not all designated for freshwater habitats and species¹. Figure 4.18 illustrates the distribution of current cSACs assigned on the basis of freshwater-dependant species in Mayo.

¹ See Appendices I of the Environmental Report of the SEA of MCDP 2008-2014 for site synopses for SPAs and SACs. See also Section 4.2 of this report which deals with Biodiversity, Flora and Fauna.

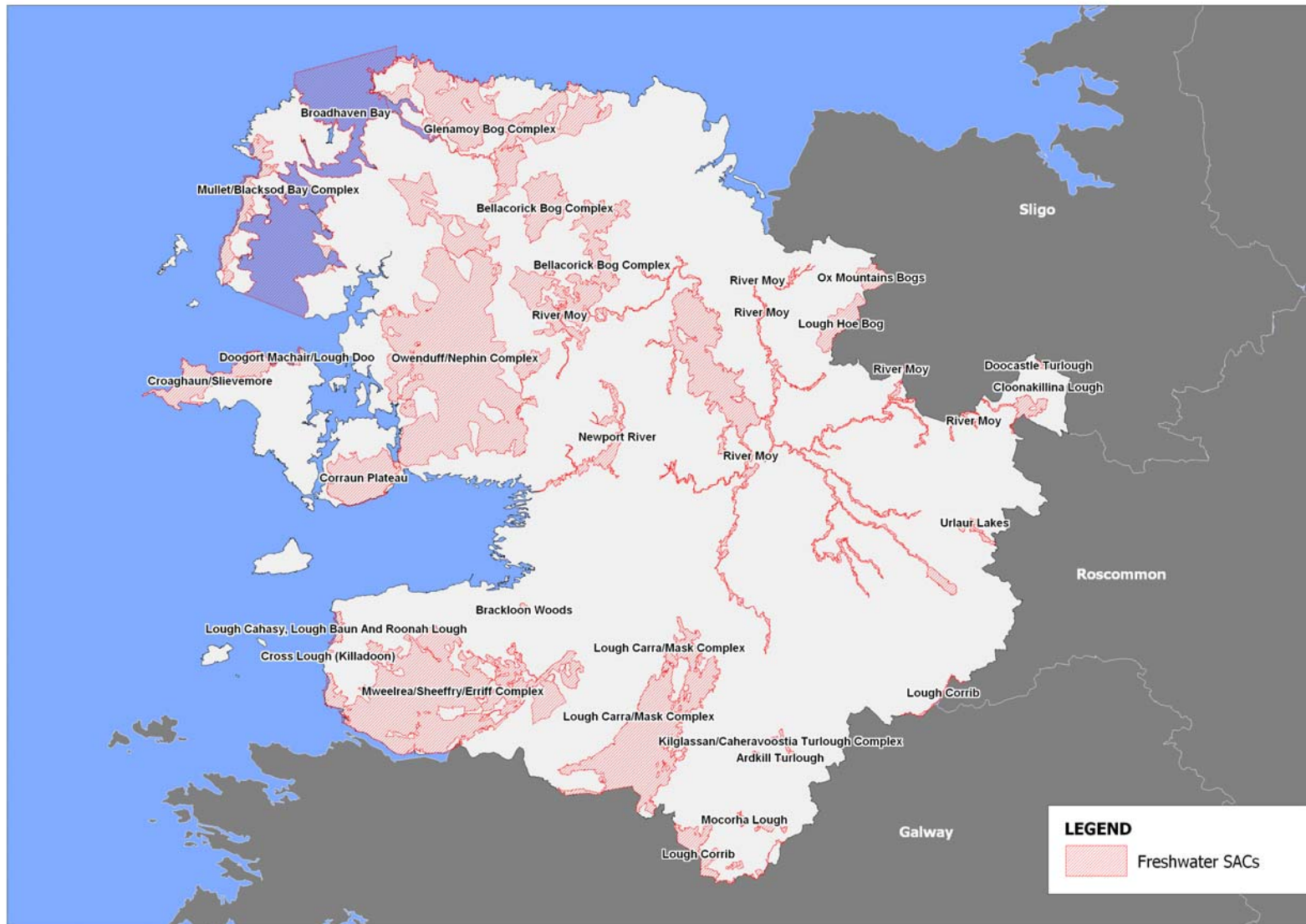


Fig 4.18 cSACs in Mayo Designated for Freshwater Species and Habitats

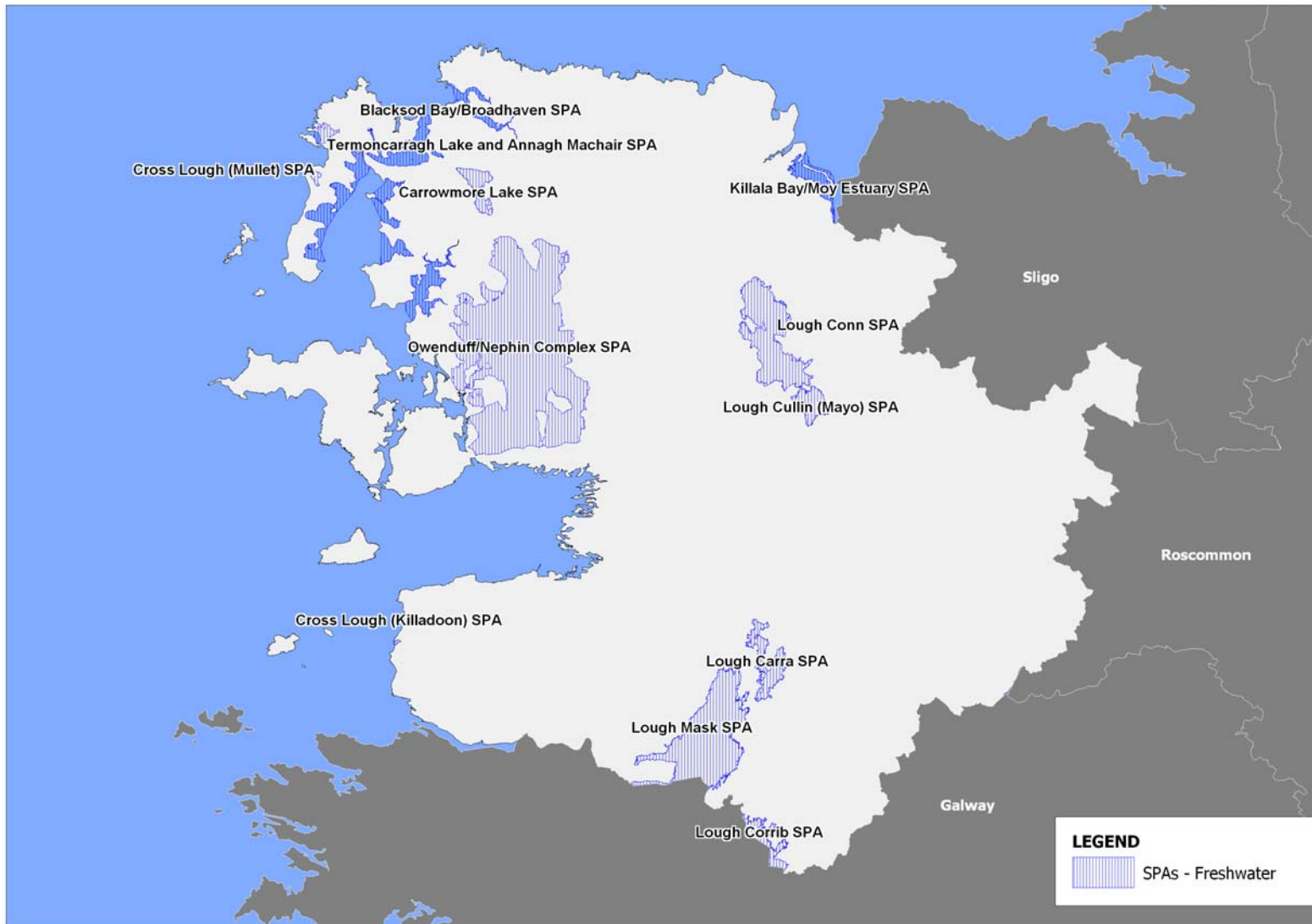


Fig 4.19 Proposed SPAs in Mayo; Designated for Freshwater Species and Habitats

4.5.6 Other Freshwater Designations

Figure 4.19 shows the distribution of pSPAs which are designated in consideration of freshwater species and habitats; approximately 93% of the current County SPA designations. SPAs are also dealt with in Section 4.2.2 of this report.

Freshwater ecological taxa are also afforded protection under EC (Quality of Salmonid Waters) Regulations (S.I. No. 293/1988). Designated Salmonid waters in County Mayo under this legislation include the River Moy and its network of tributaries; the Owengarve, Mullaghanoe, Spaddagh, Trimoge, Glore, Yellow, Gweestion, Manulla, Castlebar, Deel and Corry. No Mayo lakes have been designated. Possible candidate lakes include Carrowmore Lake, Lough Beltra and Lough Conn, once the home of a population of the glacial relict, Arctic Char (*Salvelinus alpinus*), now extinct due to the eutrophic status of this Great Western lake.

Finally, under the EC Environmental Objectives (Freshwater Pearl Mussel) Regulations, 2009, the conservation status of *Margaritifera margaritifera* (Freshwater pearl mussel) is the principal objective. Essentially, sub-basin plans must be implemented with measures to achieve specific objectives within a specified timeframe, investigate sources of pressures leading to the present unfavourable conservation status of the pearl mussel, the establishment of a programme for the reduction of pressures and a programme of monitoring in order to evaluate the effectiveness of measures and progress made. Simply put, the freshwater pearl mussel sub-basins are designated catchments which are afforded high protection and in Mayo two such sub-basins currently exist; in Bundorragha and the Newport River catchments.

4.5.7 Effluents and Protection of Water Quality

Currently, under Part II, Article 6 (5) of the Wastewater Discharge (Authorisation) Regulations, 2007, where it appears to the EPA that the discharge concerned, or the proposed discharge, as the case may be, is likely to have a significant impact on a European site, either alone or in combination with other operations or activities, the EPA shall cause an assessment to be made of the implications for the site in view of the conservation objectives of that site, and in considering the application the EPA shall have regard to the conclusions of the assessment. Wastewater Treatment Plants (WWTP) in Mayo are currently being assessed for their potential impact on the species and habitats on Natura 2000 Sites. To date, six WWTPs have been granted licences by the EPA, while an additional 44 Plants' reports are at various stages of development; a combination of data collation, application forwarded to the EPA and awaiting AA by independent consultants. WWTPs in Mayo vary enormously in their design and maintenance and as a consequence, in the quality of the final effluent discharged to water bodies. Plants with agglomerations over 1000 PE vary in the type of treatment afforded; some undergo primary treatment only while others undergo nutrient reduction, generally by chemical precipitation. Influent to Plants for agglomerations greater than 500 PE occasionally undergo a number of stages of treatment, while Imhoff tanks and Rotating Biological Contactors (RBCs) form the principal treatment option for many Plants.

Regarding Section 4 discharges, currently there are 58 licences listed as 'active' in Mayo, while 14 Section 16 licences are currently active (of 32 granted since 1988).

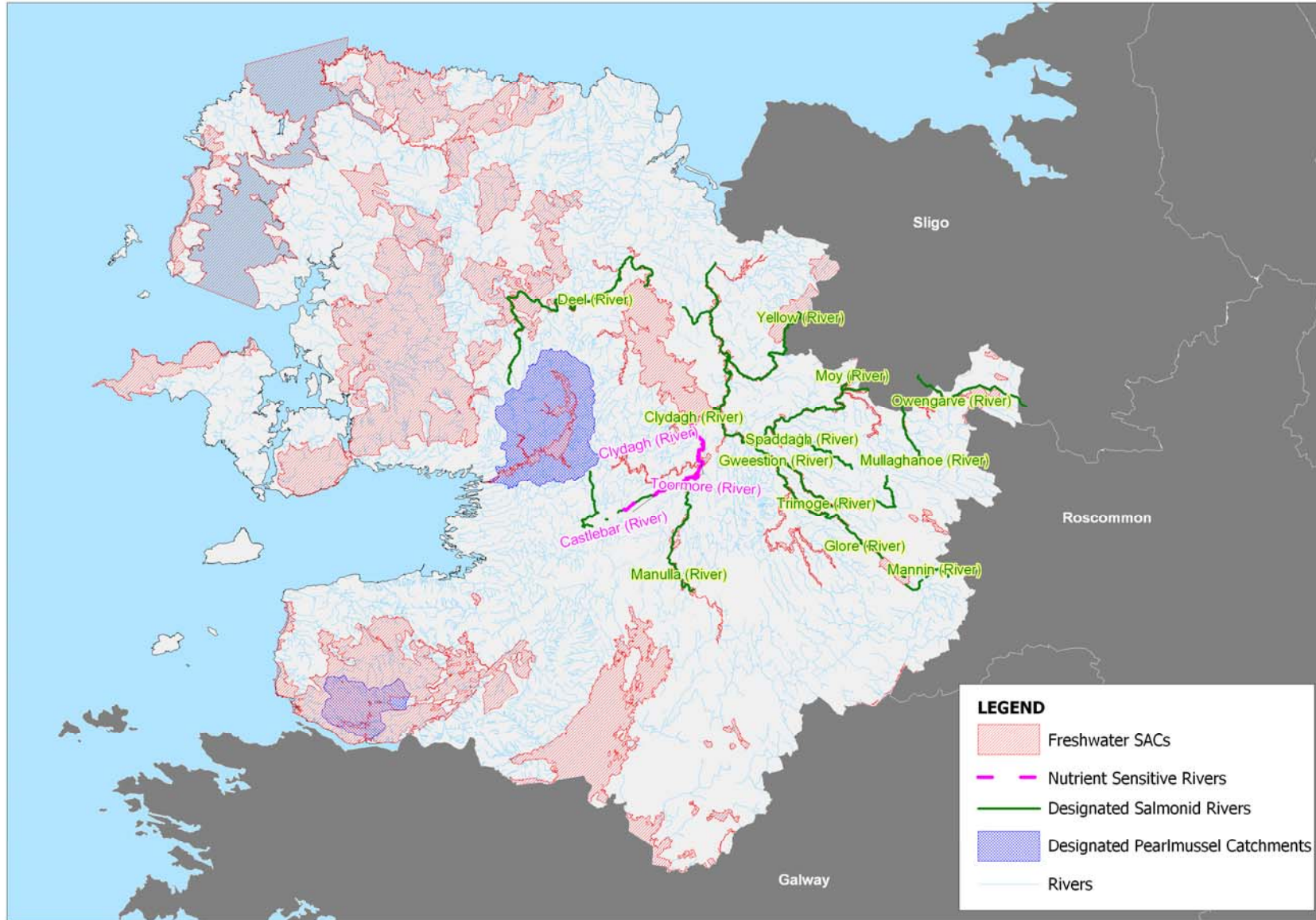


Figure 4.20 Freshwater Designations in Mayo; Salmonid Waters, Sensitive Waters, SACs and Freshwater Pearl Mussel Catchments

4.5.8 Marine Water and Ecology

Mayo has a coastline approximately 1,235km long representing approximately 13.5% of the total Irish coastline. Marine and coastal waters are important for tourism, for use as bathing locations, fisheries and for supporting marine wildlife. Key existing marine ecological and water quality features are shown in Figure 4.21 below, highlighting the importance and sensitivity of the Mayo coastline to marine species and habitats.

There are a total of 18 SACs incorporating marine habitats or species in County Mayo, representing an area of approximately 870km². Within these SACs, there are four Annex 1 marine habitats and a further 14 Annex 1 coastal habitats, four of which are considered ‘priority’ habitats under the Habitats Directive. Within the SACs, there are also three Annex II species, two exclusively marine – grey seal and harbour seal. A full list of these key species and habitats is included in Table 4.8 below.¹

Table 4.8 Annex 1 Habitats & Annex II Marine Species in Mayo coastal SACs
(Priority species and habitats marked with *).

Habitat Code	Habitat Name
Coastal Habitats	
1150*	Coastal lagoons
1210	Annual vegetation of drift lines
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1310	Salicornia and other annuals colonizing mud and sand
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)
2130*	Fixed coastal dunes with herbaceous vegetation (grey dunes)
2150*	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salix arenariae</i>)
2190	Humid dune slacks
8330	Submerged or partly submerged sea caves
21a0*	Machairs (* in Ireland)
Marine Habitats	
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1160	Large shallow inlets and bays
1170	Reefs
Species Code	Species Name
1364	<i>Halichoerus grypus</i>
1355	<i>Lutra lutra</i>
1365	<i>Phoca vitulina</i>

A total of eight coastal SPAs in Mayo are designated for a range of bird species. Cetaceans (whale, dolphin and seal species) are protected under the 1976 Wildlife Act and occur widely outside protected areas. The Irish Whale and Dolphin Group recorded 16 sightings of cetaceans off the Mayo coast in 2009 with bottlenose dolphin representing 36% of these sightings and harbour porpoise and killer whale representing a further 23%.

Many of the coastal SACs are also designated as NHAs. In addition, there are 14 coastal pNHAs in the County which are not included in the SACs.

¹ Section 4.2 of this report also deals with designated, non-designated sites and the Natura 2000 network

4.5.9 Bathing Waters

Bathing waters are monitored under the Bathing Waters Directive (2006/7/EC) the purpose of which is to ensure that the quality of bathing water is maintained and, where necessary, improved so that it complies with specified standards designed to protect public health and the environment. The Bathing Waters Directive, which was transposed into Irish Law by the Bathing Water Quality Regulations 2008 (SI No. 79 of 2008) aims to provide greater benefits in relation to improved health protection for bathers and a more pro-active approach to beach management including public involvement (*Source: EPA*).

In Mayo, 11 bathing beaches were awarded the internationally recognised Blue Flag status in 2010 – Dooega, Dugort Strand, Golden Strand, Clare Island, Mulranny, Bertra, Carrowmore, Keel, Keem, Mullaghroe and Elly Bay. To receive a blue flag, a bathing site, in addition to maintaining a high standard of water quality, must meet specified objectives with regard to the provision of safety services and facilities, environmental management of the beach area and environmental education. In addition to the above, 4 beaches achieved the Green Coast Award in 2010 as follows: Aughleam/Termon, Srah, White Strand and Carrownisky. This award is for beaches which meet EC bathing water quality standards, but which are also prized for their natural, unspoilt environment.

4.5.10 Shellfish Waters

Shellfish waters are designated and afforded protection under the Quality of Shellfish Waters Regulations 1994 (SI No. 200 of 1994) and the Shellfish Waters Directive 1979 (79/923/EEC) which is transposed into Irish law through the European Communities (Quality of Shellfish Waters) Regulations 2006 (SI No. 268 of 2006). Both Regulations require that shellfish waters are protected from the effects of the functions of planning authorities. There are 6 bays and estuaries that are designated as shellfish production areas in County Mayo as follows: Killala Bay, Blacksod Bay (Belmullet), Achill North, Achill South, Clew and Killary Harbour.

4.5.11 Fisheries

In-shore waters around the entire Mayo coastline provide valuable nursery and spawning areas for a number of commercial fish species including blue whiting, cod, haddock, hake, herring, horse mackerel, mackerel, megrim and whiting. There are extensive in-shore fisheries throughout the area for species including mussels, oysters, lobster, crab, salmon, whitefish and various open-water fish species.

4.5.12 Marine and Transitional Water Quality

Since 2006 the EPA monitors water quality and the ecological status of nine estuarine and coastal waters in County Mayo under the WFD Programme as follows: Erriff Estuary, Killary Harbour, Inner Clew Bay, Westport Bay, Newport Bay, Tullaghan Bay, Sruwaddacon Bay, Moy Estuary and Killala Bay, compared with only two waters prior to implementation of the WFD. The trophic (i.e. nutrient) status of all of these water bodies was classified as unpolluted in the most recent assessment (Lucey, 2009). However, under the biological status assessment of these water bodies, only two are classified as being of high status (Killary Harbour and Inner Clew Bay), with a further two of good status (Westport Bay and Sruwaddacon Bay) and the remaining four being of moderate status. Those water bodies not of high status, have lost this status due to the condition of their fish stocks, with the exception of the Moy Estuary and Killala Bay that are not of good status due to the high frequency of phytoplankton blooms and elevated abundance of opportunistic macroalgae although actual nutrient levels have been determined as being of natural levels at all of these water bodies.

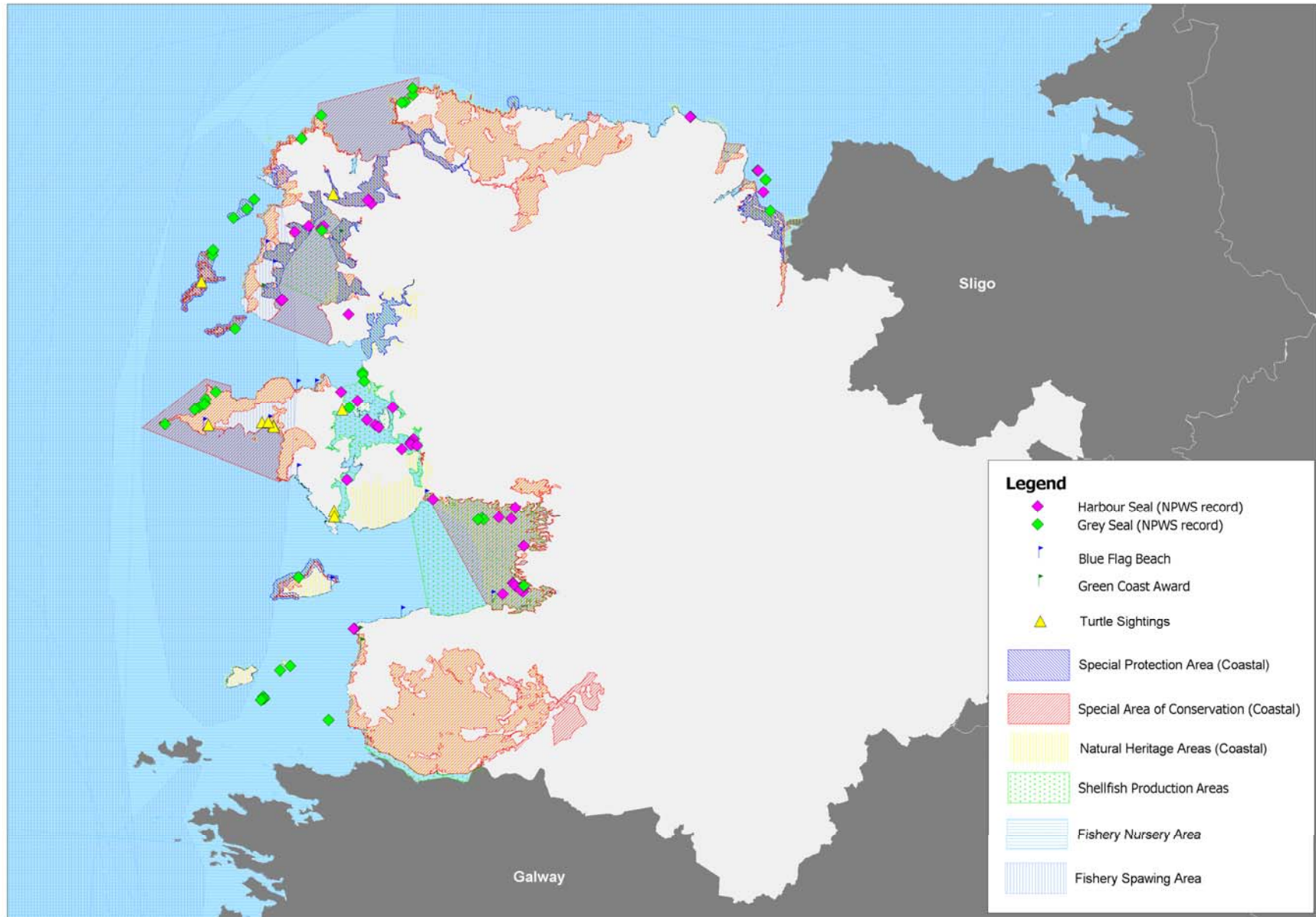


Fig 4.21 Existing Marine Ecology Features

4.5.13 Ground Water

Rocks which store and transmit groundwater are known as bedrock aquifers. Different bedrock types have differing abilities to store and transmit water, depending on their permeability and fracture intensity. The Geological Survey of Ireland (GSI) has classified all aquifers in Ireland into three main categories based on potential yield and extent:

- Regionally Important,
- Locally Important, or
- Poor.

Much of the east of County Mayo is classified 'Ll-Locally important, generally moderately productive in local zones' with much of the south and west of the County classified 'Rck- Regionally important, conduit karst aquifer, good development potential'. There is a relatively smaller amount of area classified 'Pl-poor aquifer, generally unproductive except in local zones' while an area south of Kilalla Bay is classified as 'Rk- Regionally important, karst aquifer, good development potential'. Impacts on aquifers with greater potential are generally more significant than impacts on aquifers with lesser potential.

There are further sub-categories based on the geology, the subsoil, the type of recharge (i.e. either point or diffuse) and the thickness of the unsaturated zone through which potential contaminants can move. The GSI uses a matrix comprising four groundwater vulnerability categories - extreme, high, moderate and low - for mapping purposes and in the assessment of risk to groundwater. The categories are based on the thickness of cover (overburden), which provides some attenuation for contaminants migrating toward the groundwater table from the surface or near subsurface.

Where the overburden is less than 3 metres thick, the Matrix Vulnerability Rating of the aquifer is considered extreme (i.e. the potential for contamination to reach the aquifer is extremely high). Where the overburden is greater than 10 metres thick and has a low permeability the vulnerability is considered to be low. Aquifers of extreme and high vulnerability are the two classifications of aquifers which are most sensitive to an imposed contaminant load. Aquifers of extreme vulnerability can be found to the east and south east of Lough Mask while aquifers of high vulnerability are mostly found in the east of the County.

The classification guidelines, as published by the GSI, are presented below:

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	> 3.0m	3.0 - 10.0m	3.0 - 5.0m	> 3.0m	N/A
Moderate (M)	N/A	> 10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	> 10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
 (2) Precise permeability values cannot be given at present.
 (3) Release point of contaminants is assumed to be 1-2 m below ground surface.

Figure 4.22 shows the WRBD Risk Assessment for groundwater in County Mayo.

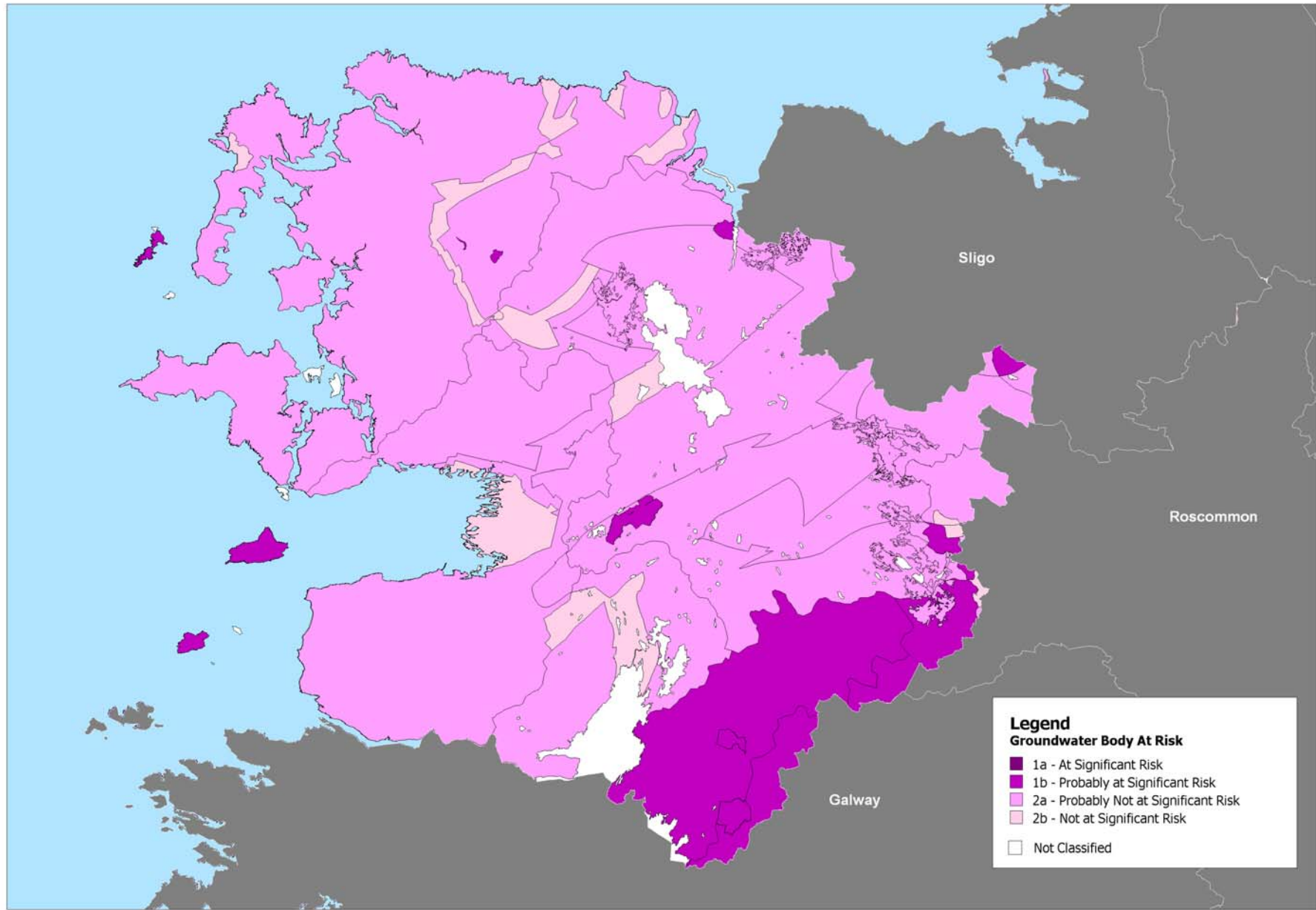


Fig 4.22 Risk Categorisation of Groundwater (WRBMP)

4.5.14 Existing Environmental Problems relating to Water

Freshwater and Ecology

The current challenges facing water quality in Mayo and subsequently water-dependant ecological factors, are pressures from urban wastewater and water treatment plant discharges, Section 4 discharges and those from Section 16-licensed and IPPC-licensed facilities. While a number of WWTPs are due for upgrade or the necessity of an upgrade has been identified, a large number of new sewerage schemes are required throughout the County. Because of insufficient or no treatment, water bodies are at risk from elevated nutrient loadings and consequential depletion of aquatic flora and faunal communities. Under the requirements of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007), all treatment plants and agglomerations are subject to a screening process to assess the need for a Habitats Directive Assessment (HDA). The ultimate aim of HDA is the protection and conservation of habitats and species of Natura 2000 Sites. To date, applications from 42 agglomerations have been submitted to the EPA, with currently six licences or certificates issued; Castlebar, Ballina, Westport, Achill Island Central, Ballycastle and Ballindine. Screening documents have identified the necessity or otherwise for HDA under the 2007 Regulations, in accordance with Articles 6(3) and 6(4) of the Habitats Directive.

Risks from agricultural lands and farm holdings are a very real threat to the quality of freshwater and to water-dependant ecological aspects of water bodies. In addition, runoff from forestry lands and peat bogs, may contribute dissolved nutrients to water bodies, in addition to suspended solids; all potential threats to aquatic species. Silt, suspended and dissolved solids can interfere with the gills of fish and macroinvertebrates while increased nutrients allow the growth of pollution-tolerant flora and the consequential loss of more sensitive taxa. Habitat loss is an additional problem; when habitats of water-dependant species such as *A. pallipes* are disturbed or damaged, these keystone species may be eliminated.

Competition from invasive species following introduction to water bodies is a notable challenge facing water quality and aquatic ecological elements. Typical examples include the Zebra mussel (*Dreissena polymorpha*) and African curly-leaved waterweed (*Lagarosiphon major*). While the former competes with existing lacustrine shellfish and other benthic macroinvertebrates, the latter is known to out-compete all indigenous macrophyte communities for space and light.

Abstraction for drinking water may place unrealistic demands on water bodies and can impact on water quality and their inhabitants. While not a common problem in the west of Ireland, Mayo experienced low rainfall figures during May and June, 2010 which resulted in drinking water shortages in some areas. Flooding is another challenge facing water quality and freshwater ecological elements. Areas prone to flooding within Mayo have been identified as benefitting lands by the OPW.

Environmental Problems relating to Waste Water Treatment

Following compilation of screening documents for many of the Waste Water Treatment Plants in Mayo and identification of those plants for which HDA is necessary, another problem was identified with the treatment of sewage and its discharge to fresh water. The waste assimilative capacity (WAC) of the receiving waters is not adequate to accept the final effluent and at least three receiving waters will deteriorate downstream of sewage treatment plant outfalls, even when treatment includes that of tertiary level.

With Section 4 and Section 16 licence discharges, current problems identified include the necessity to review a number of licences. While licences can be reviewed by a local authority at any time agreed between Mayo County Council Environment Section and the licensee, reviews can also be undertaken due to changes in discharge type or volume, or amendments to legislation. Due to significant changes to water legislation in recent years, namely the EU (Water Policy) Regulations, 2003 and the EC Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009, the review of relevant licences may be a viable undertaking.

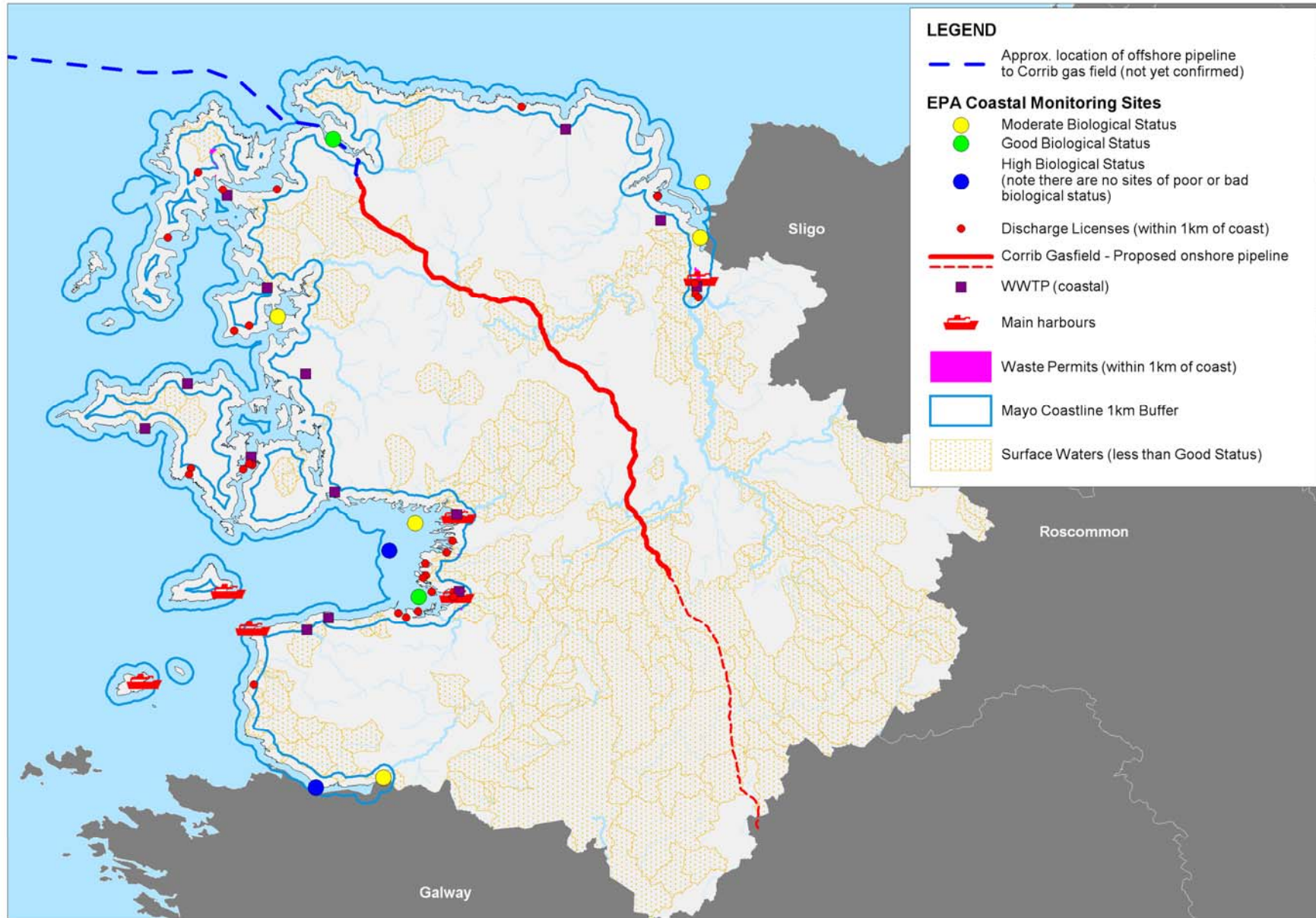


Fig 4.23 – Environmental Threats in Coastal Waters

Environmental Problems relating to Marine Water Quality and Ecology

Key environmental issues in the marine environment are described below. It can be seen from Figure 4.23 that inner Clew Bay/Newport/Westport bays and the Moy Estuary are currently subject to the greatest number of risks from land-based activities.

Eutrophication: Excessive inputs of nutrients are mainly a problem in coastal areas and in areas with restricted water exchange, such as enclosed estuaries and bays. Key sources of nutrients in the marine environment are generally considered to be agriculture, sewage and aquaculture. While coastal eutrophication has not been identified as a problem along Mayo's coastline (QSR, 2010) there is evidence of loss of ecological status in a number of transitional/coastal waters and these are likely indirectly attributable to nutrient inputs. The key contributors to nutrients in Mayo's marine environment are: (a) 14 Wastewater Treatment Plants (WWTPs) discharging into the marine/estuarine environment, (b) Circa 4,600 houses, 200 commercial premises, and 1600 'mixed-use' buildings (predominantly agricultural) which are located within 1km of the coast, but are not included within one of the above WWTP agglomerations, (c) Fish and shellfish farming with finfish farms in particular contributing to eutrophication and (d) nutrient enriched rivers draining wider catchments in-land. It is considered the RES will not particularly influence the nutrient status of marine waters.

Hazardous substances: These are normally associated with heavy industry and can enter marine waters and sediments through a range of environmental pathways. Key sources include fish farming, shipping, oil and gas extraction and discharges from inland sources such as industry and agriculture. The status and nature of priority dangerous substances are detailed in the Quality Status Report 2010. The status of mercury in biota is considered uncertain and there are lindane 'hotspots' while the status of other dangerous substances along the coastline is considered acceptable within the County.

There are nine facilities in Mayo which are subject to an IPPC License by the EPA; none of which are located within 1km of the Mayo coastline and are thus not considered a significant source of potential hazardous substances into marine environment. There are 17 facilities that are subject to waste permits and a further 28 facilities subject to discharge licenses from Mayo County Council that are located within 1km of the Mayo coastline and may be potential sources of hazardous substances. There are nine quays, six harbours and 80 piers along the Mayo coastline that further present a risk of pollution to marine waters along the Mayo coastline from boats or facilities operating at these sites. The RES may influence the frequency and nature of use of these quays, piers and harbours and thus influence any potential impacts on marine ecosystems.

Radioactive Substances: These can result from offshore oil and gas installations and the phosphate fertiliser industry not just nuclear developments. There are no such existing developments within Mayo that would represent a risk. The Corrib gas field currently under construction could be a potential future source of such discharges.

Fisheries: These have a range of impacts ranging from depletion of fish stocks, indirect impacts on non-target species through by-catch, damage to habitats and loss of spawning beds. Protected marine species such as seals, whales and dolphins can be negatively impacted by noise and pollution from boats. Mariculture (e.g. salmon farms) has a range of impacts ranging from transfer of parasites and diseases, spread of non-indigenous species, pollution and the release of chemicals into the environment (QSR 2010). There are two fishing ports in the County – Achill and Belmullet. It is considered that the RES could influence fisheries depending on the extent of marine developments.

Tourism & Recreation: This can generate a range of impacts from littering of beaches, to noise disturbance to marine species, and pollution and transfer of non-indigenous species from recreational boating. The RES may interact with these impacts.

Off-shore wind farms: There are currently no off-shore wind farms in County Mayo although these could be a feature of the RES.

Environmental Problems relating to Groundwater

There are severe environmental problems in County Mayo with regard to water quality which have the potential for significant adverse impact upon biodiversity and flora and fauna, drinking water supplies and human health. Most of the aquifers in County Mayo are assessed as being probably not at significant risk with some aquifers classified as being not at risk. Aquifers which underlie and surround the settlements of Castlebar, Killala, Bellacorrick, Ballinrobe, Claremorris and Ballyhaunis and a large portion of the south east of the County have been assessed as being probably at significant risk.

4.5.15 Evolution of Water in the Absence of the RES

Freshwater and Ecology

The primary objective for water quality and freshwater ecological elements in Mayo is to achieve good status by 2015, but with current anthropogenic and natural pressures this is quite a challenging target. In the absence of the RES the existing WES and renewable energy policies and objectives in the MCDP 2008-2014 will continue to guide the planning and development of renewable energy developments in the County. Wind farm development is open to consideration in parts of central Mayo and generally permitted in the east of the County, while not permitted in the west (although encouraged in a number of locations such as Belderrig, Ballycastle, Porturlin, Eskeragh, Bellacorrick, Sheskin, Doogary, and Louisburgh). A continuation of this conflicting situation would be likely to have a negative impact on freshwater and its ecological elements as there would be no framework directing renewable energy developments in ecologically-sensitive locations as well as in the vicinity of designated 'at risk' and 'probably at risk' water bodies. The identification of the most appropriate locations for the various renewable energy technologies/sources is a vital aspect of the RES and without this and a strengthened policy in relation to all renewable energies, freshwater quality and its ecological elements will likely be negatively impacted by future developments, with a likely outcome that the principal objective of the WFD will be a less achievable goal.

Marine Water and Ecology

Impacts of climate change are now becoming evident and represent a major threat to marine ecosystems off the Mayo coast. Key impacts include increased plankton blooms, increased disease potential for farmed fish and shellfish and increased invasion of non-indigenous species. These impacts are particularly relevant in County Mayo, where there is extensive shellfish and finfish production in the marine inlets and bays. Impacts in relation to algal blooms and fisheries are already evident from the EPA Water Quality in Ireland Report (Lucey, 2009). A summary of key climate change issues is included in the 2010 Quality Status Report. A continuation of business as usual, in the absence of a renewable energy strategy to halt climate change, will lead to further negative impacts on marine ecosystems and water quality from climate change.

The Corrib gas field off the northwest coast is currently under development. This will include offshore wells, subsea facilities and offshore pipeline to landfall in Mayo, onshore pipeline and a gas terminal at Bellanaboy. Such facilities represent a potential risk to marine species, habitats and water quality. In the absence of the RES, development of facilities like this would continue to be required representing a potential significant risk to marine ecological communities. In addition, development and use of non-renewable resources will continue to put a strain on marine ecosystems, particularly as non-renewable energy sources have a greater potential to cause pollution of water as well as indirect climate change impacts.

Groundwater

Based on the risk assessment included in the WRBD Characterisation Report (2005), a sizable proportion of water bodies in County Mayo would be unlikely to meet their commitments under the WFD. If development was to occur without appropriate waste water infrastructure then it is likely that additional water bodies would fail to meet WFD commitments. Also, the extent and severity of adverse impacts with regard to biodiversity and flora and fauna, drinking water supplies and human health as a result of poor water quality would be likely to increase.

4.6 Air Quality and Climatic Factors

4.6.1 Air Quality

Air quality is dependent on many factors including local and national weather conditions as well as emissions of substances to air from within and outside the County. On assessment of the geographic location of County Mayo, it was noted that no significant pollution emission sources are located within the area and existing air quality is considered to be within current air quality standards, based on published EPA data. The primary influences on the existing air quality in the County include emissions from transport and domestic/commercial heating sectors. The prevailing westerly wind from the Atlantic Ocean ensures good dispersion of pollutants and background air pollutant concentrations are low.

Air quality monitoring is undertaken in accordance with relevant Irish ambient air standards which have been adopted from the EC Air Framework Directive (96/62/EC) and the associated Daughter Directives on air quality (1999/30/EC, 2000/69/EC). The Irish Air Quality Standards Regulations, S.I. No. 271 of 2002 specify limit values in ambient air for sulphur dioxide, lead, particulate matter, (Stage I) and carbon monoxide, nitrogen dioxide and oxides of nitrogen, particulate matter and benzene¹.

For the purpose of assessment and management of air quality under the Air Framework Directive, Ireland is divided into four zones as defined in the Air Quality Regulations (2002) as amended. County Mayo is located in Zone D. The EPA report “Air quality in Ireland 2008: Key indicators of ambient Air quality” indicates that air quality monitoring for Zone D on the concentrations of regulated pollutants is well below the required limit values. There are five categories used to describe air quality information, which include very good, good, fair, poor to very poor. The index rating for Zone D is very good.

Meteorological conditions play a major role with regard to the levels of air pollutants measured. The prevailing wind is from south–southwest direction with an average annual speed of about 5.2-7 metres/second and increasing wind speeds detected on western coastal areas. Annual rates of precipitation in the Mayo region are about 1200 mm with the maximum amounts occurring during the winter months. Precipitation is an important factor for releasing both natural and anthropogenic pollutants from the atmosphere. There are two synoptic meteorological stations within County Mayo that provide hourly wind direction/wind speed, cloud cover and cloud height. This data is important in undertaking air quality dispersion modelling studies.

To date air quality monitoring data for the region indicates very good air quality with concentrations of specific pollutants being well within the emission limits values. Therefore the implementation of Special Control Area Orders or Air Quality Management Plans for the County has not been required.

4.6.2 Potential Sources of Air Emissions

The low level of industrialisation in Mayo, in comparison to more industrialised areas, has contributed to a good standard of air quality in the County; however it is important that future developments are controlled to ensure that air emissions/odours do not have a negative impact. There are currently nine facilities with an Integrated Pollution Prevention and Control (IPPC) licence in the County at locations as shown on Figure 4.24 The industries range from intensive agriculture to pharmaceutical operations.

Certain commercial activities also have the capacity to impact on air quality and which are regulated under Directive 2004/42/EC on the limitation of emissions due to the use of organic solvents in certain paints, varnishes and vehicle refinishing products (Decorative Paints Directive). This directive was transposed into Irish law by the Limitation of Emissions of Volatile Organic Compounds due to the use of Organic Solvent in Certain Paints, Varnishes and Vehicle Refinishing Products Regulations 2007 (S.I. No. 199 of 2007) or Deco Paints Regulations. There are currently 50 premises in the County registered under such Regulations. Such premises relate solely to vehicle refinishing companies. The Emissions of

¹ The limit values have been set with regard to scientific and medical evidence on the effects of the particular pollutant on health or depending on the context of the wider environment.

Volatile Organic Compounds from Organic Solvents Regulations 2002 - S.I. No. 543 of 2002 also addresses emissions from dry cleaning operations; currently there are 11 premises registered under such Regulations in County Mayo.

There are approximately 112 known quarries in County Mayo, (see Figure 4.24) of which 100 are registered under Section 261 of the Planning and Development Act 2000. Dust from quarry sites can affect air quality, although the severity will depend on factors such as local microclimate conditions, the concentration of dust particles in the ambient air, the size of the dust particles and their chemistry. Unfortunately there is very little accessible data with regard to active/non-active quarries. However it is understood that many registered quarries are non active and were registered solely for land value reasons.

4. 6. 3 Noise

Environmental noise is defined as the summary of noise from transport, industrial and recreational activities. The Environmental Noise Directive 2002/49/EC provides for a common approach intended to avoid, prevent or reduce the harmful effects of environmental noise. In general, the main sources of environmental noise in County Mayo of relevance to this SEA include²; infrastructural noise (roads, windfarms and transmission lines) as well as associated construction noise. Sound received by a receptor arises from a combination of sources; therefore it is also important to consider commercial/industrial noise (IPPC and waste sites, industrial operations, workshops, factories, quarries) and recreational noise in the vicinity of renewable energy developments. An important feature of noise emissions is how the noise is perceived by the receptor which varies considerably.

The EC Environmental Noise Directive 2002/49/EC and its transposition into Irish law in the form of the Noise Regulations 2006 require that strategic noise maps be produced for sources of road, train, and airport noise sources above certain thresholds³.

Noise from Traffic and Transportation

The only noise source which requires an action plan in County Mayo is road traffic noise. The Mayo Local Authorities Noise Action Plan addresses road traffic noise as required by the Environmental Noise Regulations 2006 (see Appendix 3 which shows action plan areas for Castlebar and Ballina, Figures A and B). The aim of the action plan is to manage existing road noise and to protect the future noise environment within the plan area. While no limits exist for environmental noise in Ireland, the EPA recommends that proposed onset levels for assessment of noise mitigation measures due to road traffic are as follows: 70dB, Lden and 57dB, Lnight. Noise maps were prepared for major roads in the County based on a road noise computation model run by the NRA. These maps present calculated environmental noise levels from major roads in coloured noise contour bands from 55dB Lden and 50dB Lnight, to greater than 75dB Lden and greater than 70dB Lnight, in 5 dB bands. The EPA has estimated that a total of 1769 individuals are resident within the noise mapping/action planning area. Assessments carried out indicated that population exposures were below the required reporting thresholds.

Regarding noise generated by airport traffic, the number of movements per year at IWAK at present is significantly lower than the threshold required for Action Planning under the Environmental Noise Directive. As a component of the EIS undertaken for IWAK in 2010, the noise levels recorded at all locations were dominated or heavily influenced by road traffic noise from the existing N17 and R367.

Noise related to Wind Energy Generation

There are two distinct noise sources associated with the operation of wind turbines; aerodynamic noise caused by blades passing through the air, and mechanical noise created by the operation of mechanical elements in the nacelle - the generator, gearbox and other parts of the drive-train. Aerodynamic noise is a function of many interacting factors including blade design, rotational speed, wind speed and inflow turbulence; it is generally broadband in nature and can display some “character” (swish). Mechanical noise from a wind turbine is tonal in nature. Advances in turbine technology and design have resulted in

6363

² As adopted from the Irish Government Consultation Paper on Noise 2008)

³ The thresholds are as follows: major railways with more than 60,000 trains per annum; major airports with more than 50,000 flights per annum; major roads with more than 6 million vehicles per annum; agglomerations of greater than 250,000 inhabitants (none of which are applicable to Mayo).

reduced noise emissions. The most recent direct drive machines have no high-speed mechanical components and therefore do not produce mechanical noise.

Turbine noise increases as wind speeds increase, but at a slower rate than wind generated background noise increases. The impact of wind energy development noise is therefore likely to be greater at low wind speeds when the difference between noise of the wind energy development and the background noise is likely to be greater. Wind turbines do not operate below the wind speed referred to as cut-in speed, usually around 5 metres per second. Larger and variable speed wind turbines emit lower noise levels at cut-in speed than smaller fixed speed turbines. Noise from wind turbines is radiated more in some directions than others, with areas down-wind experiencing the highest predicted noise levels. At higher wind speeds noise from wind has the effect of largely masking wind turbine noise. In general larger turbines have a greater noise potential due to longer rotors.

The factors affecting noise levels from wind farms are topography and the remote nature of the sites which can influence how noise is produced. As noise radiates sound waves hemispherically, multiple wind turbines can appear as a point source so that the number of turbines doubles the acoustic output by 3 dB. Absorption and screening of noise can be influenced by atmospheric conditions, objects and vegetation. The latter is only effective on a seasonal basis. Meteorological conditions such as wind and temperature can refract or bend sound towards the ground thereby increasing sound levels.

The character of noise associated with wind farms is primarily based on the mechanical components of the turbines which will be perceived as tonal in character. The attitude of the listener depends on the context in which the noise of wind turbine arises which is primarily in a rural location where background ambient noise levels are low. The total perceived noise at any noise sensitive location is the logarithmic sum of background noise and wind turbine noise therefore wind turbine noise must be taken within the context of other noise sources.

Wind turbines operate in wind speeds of 3-25m/s. The noise emitted by turbines will increase with wind speed between 1-4dB LAeq per m/s. Therefore noise from wind farms at noise sensitive locations will depend on the speed of the turbines and the distance from the turbine. However it should be noted that the wind itself will mask the turbine noise at the noise sensitive location. Noise from turbines can carry for a long distance but is unlikely to be problematic for noise sensitive locations situated 350-400m from the turbine. The DoEHLG Guidelines suggests a “lower fixed limit of 45dB(A) or a maximum increase of 5dB(A) above background noise at nearby noise sensitive locations”. The latter requirement may be relaxed in areas with low background levels. A fixed limit of 43dB(A) at night time is deemed appropriate, as there is no requirement to protect external amenity.

Commercial/Industrial

Activities that are subject to an IPPC license or a Waste license are required to comply with noise limit values imposed by the EPA. The EPA publication “Guidance Note for Noise in Relation to Scheduled Activities” contains suggested noise limits of 55 dB(A) LA_{r,T} for daytime and 45dB(A) LA_{eq,T} for night-time; with said limits to be applied to “sensitive locations”⁴. There are currently nine IPPC licensed facilities in the County (Fig 4.24); all licences have noise control requirements. Under the Environmental Noise Regulations 2006 no maps were produced for industrial plant activity, as individual plants were below the reporting threshold required in the Directive. Extractive industries are associated with many noise-generating activities. Under Section 261 of the Planning and Development Act 2000, there are a total of 100 registered quarries in the County. Depending on the complexity of the quarrying operation, noise conditions were included as part of the registration process and as part of the planning process for quarry extension applications. However, there is currently very little information available in relation to compliance with noise conditions.

⁴ Whilst these limits have a very specific application, they have appeared in many different contexts and often form the basis for conditions in planning permissions. Similar noise conditions are also imposed on waste-licensed facilities.

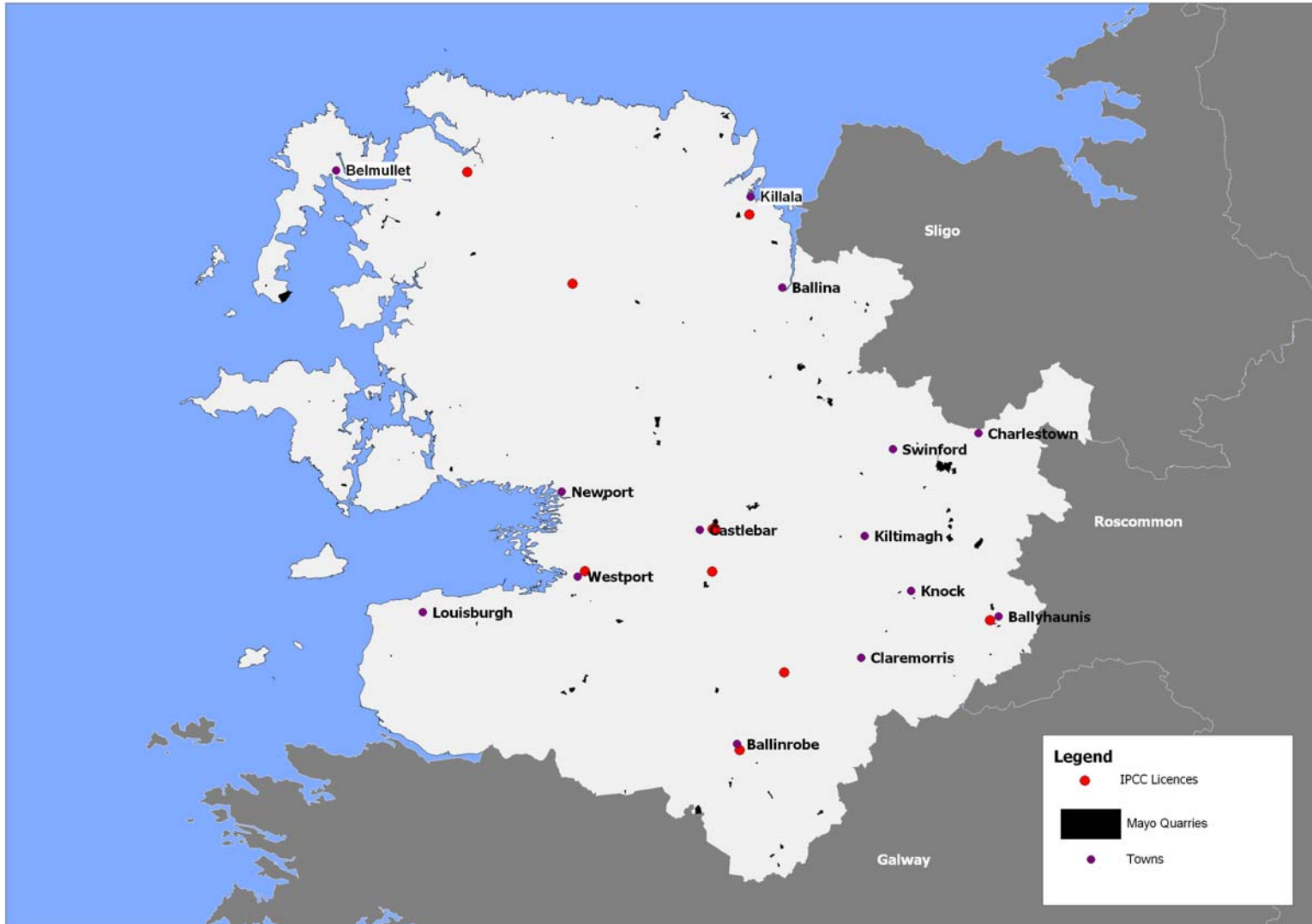


Fig 4.24 Locations of Facilities with IPPC Licence and Quarries

4.6.4 Climatic Factors

Climate Change is recognised as the most serious and threatening global environmental problem. While natural variation in climate over time is normal, it is recognised that the rate of climate change is increasing as the emission of greenhouse gases (GHGs) into the atmosphere increases. The primary GHG is carbon dioxide (CO²) generated by the burning of fossil fuels. It is generally accepted that in order to reduce GHG emissions it is necessary to increase the use of energy from renewable sources.

The current strategy for the reduction in the use of fossil fuel and an increase in renewable energies stems from the Kyoto Protocol, an international agreement linked to the United Nations Framework Convention on Climate Change. The Kyoto Protocol sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions. The targets amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

Specific baseline data on GHGs is not available for County Mayo therefore National data is used as an indicative template for Mayo until specific data becomes available. National baseline data is taken from the EPA publication 'Ireland's Greenhouse Gas Emissions in 2009'. Figure 4.25 shows the contribution from each of the NCCS sectors.

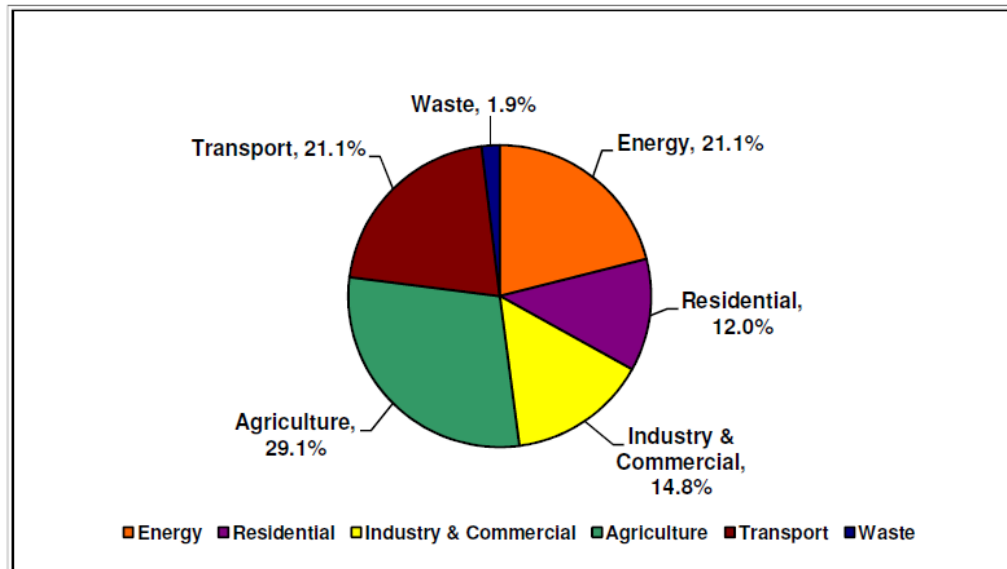


Figure 4.25 Greenhouse Gas Emissions in 2009 by Sector

The European Union Directive 2009/28/EC on the promotion of the use of energy from renewable sources establishes the basis for the achievement of the EU's 20% renewable energy target by 2020. Under the Directive, each Member State has a binding renewable energy target, which will contribute to the achievement of the overall EU goal. Apart from a sub-target of a minimum of 10% in the transport sector that applies to all Member States, there is flexibility for each country to choose how to achieve their individual target across the sectors. Ireland's overall target is to achieve 20% of energy from renewable sources by 2020 (Draft National Renewable Energy Action Plan 2010 DCENR)

The **National Climate Strategy 2007-2012** builds on Ireland's first Climate Change Strategy (2000) and its purpose is to limit the growth in GHG emissions. The National Climate Change Strategy 2007-2012 sets out ways to achieve national targets for the period 2007-2012 and to identify areas in which further measures are being researched and developed to meet our 2020 commitment. The targets will be achieved through a number of means including harnessing more renewable energy and using energy more efficiently.

Ocean Energy in Ireland 2005 & the Draft Offshore Renewable Energy Development Plan 2010

'Ocean Energy in Ireland 2005' outlines a strategy to advance Ireland's research and development capabilities so that ocean energy can contribute to meeting Ireland's growing demand for renewable energy from 2005 through to 2016 and beyond. The draft 'Offshore Renewable Energy Development Plan' (OREDPA) describes the policy context for development of offshore wind, wave and tidal stream energy in Irish waters for the period up to 2030. The OREDPA indicates that offshore, Mayo has potential to harness 18,500 – 19,500MW of renewable energy from fixed wind, floating wind and wave resources. However it is considered that less than half of this (4,900 to 7,900MW) may be exploited in an environmentally sensitive manner. Tidal resources have not been considered for the west coast.

National Renewable Energy Action Plan (NREAP)

The National Renewable Energy Action Plan (NREAP) sets out the Government's strategic approach and measures to deliver on Ireland's 20% target under Directive 2009/28/EC.

The Government has set a target of 40% electricity consumption from renewable sources by 2020. Ireland achieved 14.4% electricity consumption from renewable sources in 2009 and is on track to exceed the national target of 15% in 2010. The significant growth in electricity from renewable sources in recent years is largely attributed to onshore wind. The Government is also looking beyond 2020 in terms of the significant opportunities to develop Ireland's abundant offshore renewable energy resources.

Table 10 in the NREAP, reproduced below, sets out an interim scenario for the development of electricity from renewable sources.

Table 10 Modelled Scenario

Estimation of total contribution (installed capacity, gross electricity generation) expected from each renewable energy technology in Ireland to meet the binding 2020 targets and the indicative interim trajectory for the share of energy from renewable resources in electricity 2010-2014

	2005		2010		2011		2012		2013		2014	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro:	234	760	234	701	234	703	234	701	234	698	234	720
<1MW	18		18		18		18		18		18	
1MW-10MW	20		20		20		20		20		20	
>10MW	196		196		196		196		196		196	
Of which is pumping	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0	0	0	0
Solar:	0	0	0	0	0	0	0	0	0	0	0	0
photovoltaic												
Concentrated solar power												
Tide, Wave, Ocean	0	0	0	0	0	0	0	0	0	0	0	0
Wind:	494	1,588	2,088	4,817	2,325	5,965	2,370	6,189	2,794	7,478	2,907	7,756
Onshore	469		2,052	4,701	2,289	5,848	2,334	6,073	2,542	6,663	2,856	6,942
offshore	25		36	116	36	116	36	117	252	815	252	814
Biomass:	20	116	77	347	81	393	84	479	131	839	134	864
Solid	2	8	15	28	19	73	22	158	69	519	72	544
biogas	18	108	62	320	62	320	62	321	62	320	62	320
Bioliquids	0	0	0	0	0	0	0	0	0	0	0	0
Total	748	2,465	2,399	5,866	2,640	7,060	2,688	7,369	3,159	9,014	3,275	9,340
Of which CHP	2	13	5	37	6	42	7	47	7	51	8	56

	2015		2016		2017		2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydro:	234	714	234	705	234	705	234	705	234	692	234	701
<1MW	18		18		18		18		18		18	
1MW-10MW	20		20		20		20		20		20	
>10MW	196		196		196		196		196		196	
Of which is pumping	0	0	0	0	0	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0	0	0	0	0	0
Solar:	0	0	0	0	0	0	0	0	0	0	0	0
photovoltaic	0	0	0	0	0	0	0	0	0	0	0	0
Concentrated solar power	0	0	0	0	0	0	0	0	0	0	0	0
Tide, Wave, Ocean	0	0	0	0	13	42	25	81	38	124	50	162
Wind:	3,151	8,339	3,172	8,404	3,367	8,985	3,858	10,235	3,888	10,258	4,649	11,970
onshore	2,899	7,525	2,920	7,587	2,951	7,639	3,329	8,534	3,354	8,553	4,094	10,228
offshore	252	814	252	817	416	1,345	529	1,702	533	1,705	555	1,742
Biomass:	137	887	140	914	143	936	146	960	150	984	153	1,006
Solid	75	567	78	593	81	616	84	640	88	664	91	687
biogas	62	320	62	321	62	320	62	320	62	320	62	319
Bioliquids	0	0	0	0	0	0	0	0	0	0	0	0
Total	3,522	9,939	3,546	10,023	3,757	10,668	4,263	11,982	4,309	12,058	5,073	13,842
Of which CHP	9	61	9	65	10	70	10	70	80	561	80	561

Existing Renewable Energy Production in Mayo

Mayo currently has renewable energy related activity, both at macro and micro levels. Renewable energy production is mainly produced from wind energy in the form of wind farms. There are currently seven wind farms operating at four locations in the County generating approximately 41.3 MW of electricity¹. Planning permission has been granted for an additional six wind farms with an estimated total output of 371.4 MW.

The largest wind farm development in the County with planning consent is that proposed at Bellacorrick, in close proximity to the existing wind farm. It comprises of 180 turbines with an output of approximately 306MW and although it has not been constructed to date, it is listed on the Gate 3 ITC Programme.

There are approximately 40,500 watts of wind micro-generation installed and 4,300 watts of solar micro-generation installed in Mayo in October 2010². A further 87,950 watts of wind micro-generation and 2,000 watts of solar microgeneration have been applied for but are not connected to date. There are two micro hydropower stations in Mayo at present, one in Tourmakeady and one in Ballinrobe, generating 0.66MW in total.

6868

¹ On 31/05/2010. (Source: IWEA website).

Eirgrid have calculated that on 24th May 2010 there was 39.6MW installed wind capacity in Co. Mayo, with a further 6.3MW contracted with a target date of July 2010 (Source: eirgrid.com).

²Source: SEAI. The number of watts received are the number of watts applying for connection (i.e. NC6 form)

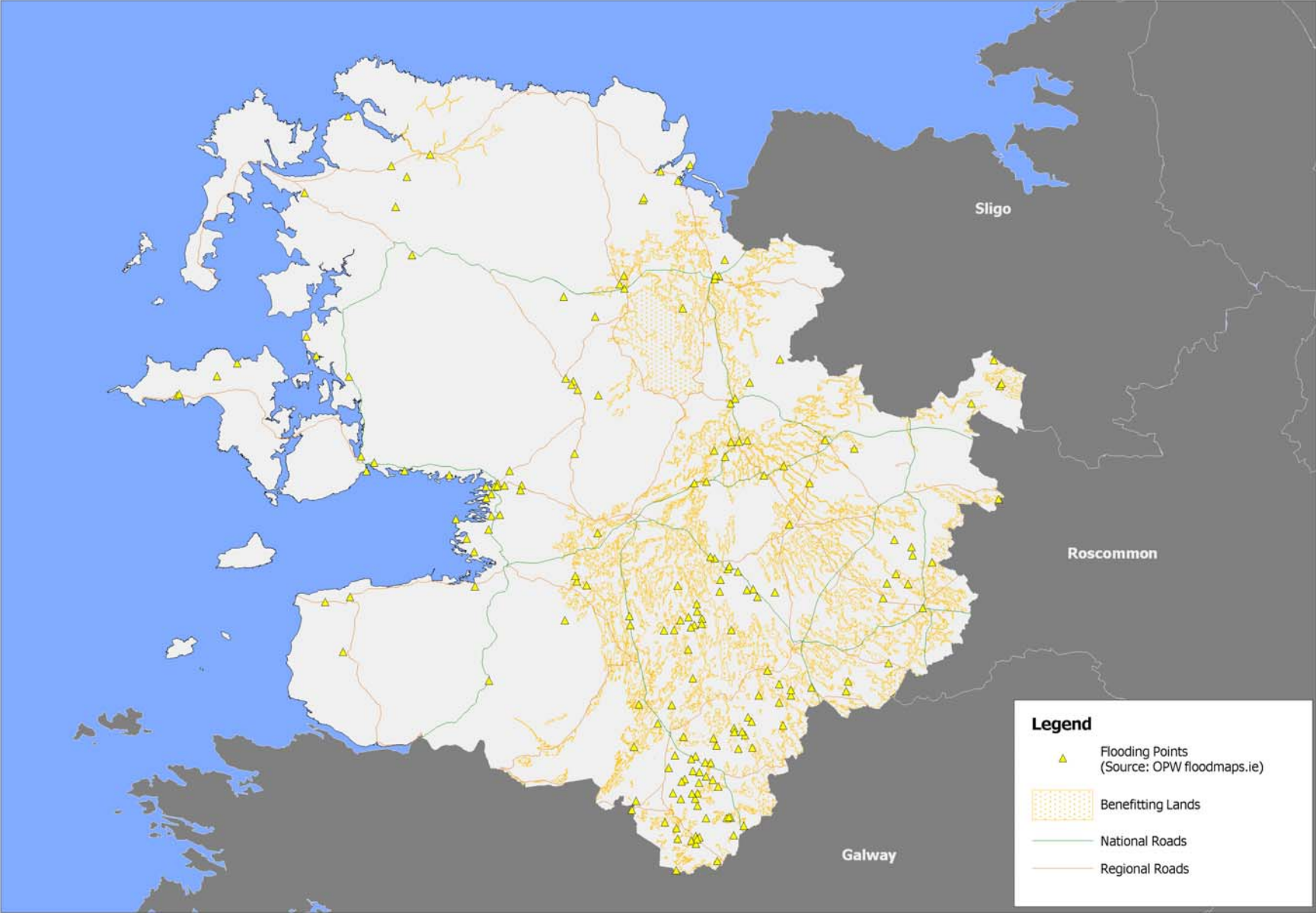
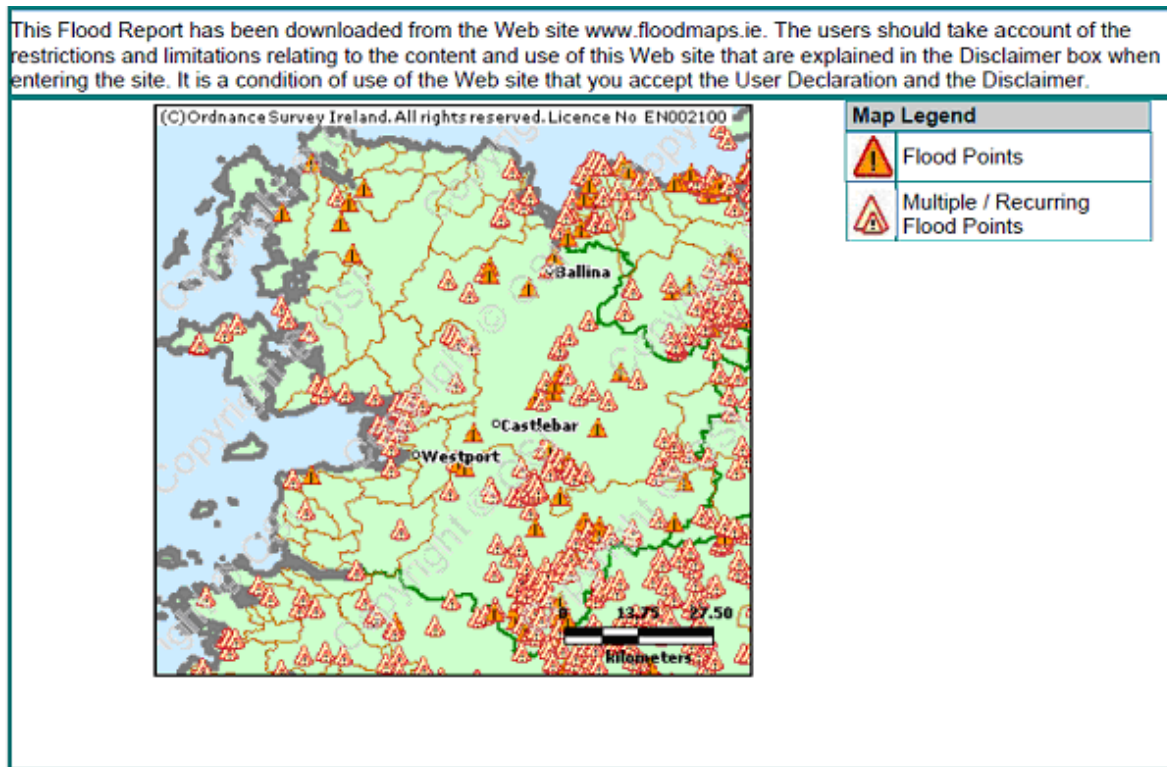


Fig 4.26 Flood Events in County Mayo

4.6.5 Flood Issues

This section is based on the Flood Risk Report, which was prepared as part of the preparation of the RES and which is attached to the rear of this report.

The mapping of historical flood events in County Mayo (sourced from OPW Flood Hazard Mapping www.floodmaps.ie) as shown below and Figure Map 4.26 gives a general indication, based on reported past floods, of where flood vulnerable locations are in County Mayo.



On www.floodmaps.ie, the number of flood point locations for County Mayo is 193. This data is based on minutes of meetings held between the OPW and officials of Mayo County Council in 2005/2006. Based on the above information and further discussions in September 2010 (which take account of local improvements carried out since 2005/2006), the following areas of County Mayo are prone to flooding;

Ballina Area: Details of flood events
1. Road flooding on Howley St./Sligo road during high tides. Road gully's are pumped to the sewers.
2. Road flooding on Bachelors Walk, Ballina town during high tides.
3. Road flooding in Quignamanger area from river Moy during extreme high tides, it is a rare event.
4. Road flooding on Barret St. from river Moy during extreme high tides, it is a rare event.
5. Extensive town flooding in Crossmolina from the Deel river in October 1989. Roads and property flooding.
6. Land flooding west of the R315 from turlough during winter time only, dry during the summer.
7. Road and property flooding at junction in Tonrehowan area from Cloonaghmore river once or twice a year.
8. Road flooding in Ross area during high spring tides once/twice a year.
9. Road flooding in Kilgobban area on R314 once or twice a year due to high tides.
10. Road flooding in Greenpark area on R314 once or twice a year due to high tides.
11. Road flooding on Humbert street in Ballina in past but is a very rare event.
12. Road flooding in Lacken strand area on regular basis due to high tides.

Achill Area: Details of flood events

1. Land flooding from inundation from sea. The spit connecting the main land & the Corraun point headland follows a cyclical pattern of building up from deposition and in periods of erosion. Occasionally the erosion reaches a stage where the spit washes away and the land and fields adjacent to Dooreel bay get flooded during high tides and from wave/wind action. Some property can become isolated during this flooding.
2. Road flooding over a 2km stretch of N59 in Castlehill area during periods of heavy rain. Road is lower than surrounding drainage and consequently floods.
3. Road and land flooding during high tides and winds, existing breakwater is overtopped. Mallaranny pier road cut-off during flooding.
4. Road, land and property flooding on N59 east of Mallaranny during periods of heavy rain when runoff from high ground cannot discharge into the gully system because it is blocked by debris washed down from high ground.
5. Road flooding on R312 during periods of heavy rain when Boghadoon river overflows its banks and floods a 1km stretch of road.
6. Land flooding during periods of heavy rain when Boghadoon river floods surrounding land.
7. Road & low-lying land flooding in Dooagh area during periods of heavy rain when runoff from high ground cannot drain to sea & causes flooding over a stretch of approximately 0.5km of road.
8. Road flooding over a stretch of approximately 0.5km during periods of heavy rain, runoff from Slievemore cannot drain off road and causes flooding.
9. Road flooding in vicinity of Dooagh strand during high tides and strong winds.
10. Road and land flooding from a combination of storm sea state and high flows in the Tenreege river after heavy rain. Event frequency approximately 1/5 years
11. Land and road flooding in vicinity of Rosturk strand during high tides and strong winds peninsula is completely cut-off at sea inundates old sea wall with damages sluice gates.
12. Road flooding on N59 adjacent to Bellacragher bay as a result of high tides, event frequency approximately 1/5 years, road was blocked in 2002 event.
13. Roads, N59 and R317 and land flooding from a combination of high tides and heavy rain when the runoff cannot discharge through existing sluice to sea because of the tides.
14. Road flooding over a stretch of approximately 0.5km south of Newport channel during high tides when sea deposits seaweed on road and causes flooding.
15. Road flooding west of the N59 in Carrowbeg South area as a result of high tides.
16. Road flooding over approximately a 1km stretch north of Rockfleet bay as a result of high tides.
17. Road flooding in Roslave area as a result of high tides.
18. Road flooding over approximately a 1km stretch as a result of high tides, Inisnakillew island cut-off, rare event.
19. Road flooding at low point near bridge in Derrykill area north of the R317 during periods of heavy rain river swells and can be up to 3ft of water ponding.

Castlebar Area: Details of flood event

1. Land flooding in Stonepark area during periods of heavy rain.
2. Land and road flooding on N60 north of Balla in the vicinity of Drumadon / Lagnamuck area during periods of heavy rain occurs at least once per year.
3. Land flooding at present in Brees area but historically the N60 road flooded but was raised in the past and does not flood anymore. Land flooding is recurring.
4. Land flooding south of Ballintober ponding on fields during periods of heavy rain.
5. Land & road flooding from Toormore river during periods of high flows river backs up onto N5 at Bellavary railway bridge but ponding is limited to the hard shoulder, main carriageway is unaffected.
6. Road flooding from Beltra lake in Kilgarve area when it swells after periods of heavy rain and floods R312. Occurs about once per year.

Ballinrobe Area: Details of Flood events

1. Land flooding east of the R334 at Neale crossroads, pumping turlough exists and causes land flooding even without any rainfall but is more extensive with rainfall.
2. Road and land flooding at Turloughmore floods to 3-4ft depth during periods of heavy rainfall. Road can be blocked for extended period of time and it appears to be connected to Cahernagry area.
3. Road flooding during periods of heavy rain at Ballynacarra. The mechanism of flooding appears to begin in Thomastown turlough which fills up and water makes its way crossing the N84 to fill up the dip in the road at Ballynacarra between local house and field gate.
4. Road and land flooding from Thomastown to Coolisduff turlough during periods of heavy rainfall. Turlough fills up fields and causes water to flow across road and on into wood where it flows down the road into Coolisduff turlough. This is a precursor to water heading into Ballynacarra turlough.
5. Land flooding from Skealaghan turlough during periods of heavy rain, used to flood road but road was raised approximately 15 years ago.
6. Mweelish turlough floods almost every year on land and onto road up to 15 inches of water on road.
7. Ballymangan turlough floods almost every year on land and onto road up to 15 inches of water on road.
8. Bushfield turlough floods road on regular basis impassable for cars during periods of heavy rain.
9. Killeenreevagh turlough/swallow hole floods road on a regular basis and land up to house boundary on both sides.
10. Land flooding in Annagh area during periods of heavy rain lake level rises and land flooding results.
11. Land flooding in Aghinish area during periods of heavy rain as Lough Mask level rises.
12. Land flooding in Moyne area during periods of heavy rain.
13. Land and road flooding in Gortbrach area during periods of heavy rain when Lough Corrib swell and river backs up.

Claremorris Area: Details of Flood Events

1. Road flooding in Ballymackeogh area on road from Balla to Mayo, repairs to road required from time to time after flood damage, problem has not been resolved.
2. Road flooding in Monard area, road impassable at times and problem has not been resolved. Would require the road to be raised by greater than 3ft.
3. Road and land flooding in Curraghadooey area during periods of heavy rain when the Robe River overflows its banks and makes road impassable.
4. Road flooding at Ballyhankeen, relatively minor problem but unresolved.
5. Road flooding on R327 just west of Tulrohau, road can flood to a depth of circa 4ft in some events. Drainage of the area is to a swallow hole.
6. Road flooding in Carn More area during periods of heavy rain low-lying area flood depths are circa 2-3ft.
7. Road flooding in Screeg area during periods of heavy rain low-lying area flood depths are circa 2-3ft.
8. Road flooding in Ballynacloy area during periods of heavy rain low-lying area flood depths are circa 1ft.

Swinford Area: Details of Flood Events

1. Road and land flooding in Foxford town during times of high flow in the River Moy.
2. Land flooding in Kiltamagh in vicinity of the GAA pitches from the river Pollagh overflowing its banks, occurred a few years ago and is not a frequent event.
3. Road flooding in Srah Upper area from the Coarse River during periods of high flow in river, occurs every few years.
4. Land flooding during periods of heavy rain at the confluence of the Gweestion River and the Trimoge River.
5. Land flooding in Aghaward area from high flows in the river Moy.
6. Land flooding in the callows near Derrygaury south of Foxford from the river Moy during particularly wet winter.
7. Land flooding in Creegagh area during periods of heavy rain from the Yellow river overflowing its banks.
8. Road flooding in Derrykinlough area as streams through forested areas back up and flood road, can be flooded for up to 1 month at a time.
9. Land and road flooding to rear of burial ground in Doocastle area. Caused by presence of a turlough nearby.

The OPW are currently involved in preparing Preliminary Flood Risk Assessments (PFRA's) with the relevant Local Authorities, the EPA and other key agencies. This will identify Areas with Potentially Significant Flood Risk (APSR's) based on historic and predictive data and consultation with stakeholders. Catchment-based Flood Risk Assessment and Management (CFRAM) studies will be undertaken focusing on these areas. These CFRAM studies will produce flood maps and establish, within a Flood Risk Management Plan a prioritised set of flood risk management measures for their relevant areas, including the use of physical and management responses.

Nationally, the PFRA's will be provisionally completed in 2010 with formal completion in 2011, and will identify areas of potentially significant flood risk. This is a screening exercise based on available and readily-derivable data. Detailed flood mapping will then be prepared for areas deemed to be potentially at significant risk by 2013. The focus of the CFRAM studies is on risk management as well as flood prevention. The PFRA plans are not yet available for County Mayo.

4.6.6 Existing Environmental Problems relating to Air and Climatic Factors

Air

In Ireland air quality is very good by international standards, however, pollutants from road traffic and household fires, especially in urban areas, pose the main threat to air quality. The primary environmental issues with regard to air quality in the County are detailed below:

Road Traffic Emissions: Motor vehicles are a major source of emissions of carbon monoxide, benzene, and nitrogen dioxide as well as a wide range of volatile organic compounds (VOC's). In general, concentration levels of these air pollutants are normally below limit values in the air quality standards; however road traffic emissions can directly affect human health, adversely effect the environment and are a major source of secondary pollutants such as tropospheric ozone. The pollutant emissions emanating from vehicular sources are also those to which the public may be most readily exposed, and they present a considerable risk in areas subject to heavy traffic.

In County Mayo there is high dependence on individual car ownership. The rural context of the County means that travel to and from work by car is necessary. Although technological advances with regard to fuel and engine issues may off set any rise in tail pipe emissions due to population increase, the problem of controlling emissions from vehicles is complex and requires various control measures as motor vehicles represent a very large number of small sources, each of the sources are mobile and each source emits different amounts and proportions of pollutants according to how the vehicle is used. The contribution of road traffic to the levels of various air pollutants can vary dramatically in urban areas.

Emissions from Power/Heat Generation: The principal pollutants from power plants are those that arise from the combustion of fuel, namely sulphur dioxide (SO₂), carbon dioxide (CO₂) and nitrogen oxide (NO). The emission from power plants depends on the fuels used, methods used to generate electricity and pollution abatement equipment. Air quality can be affected by the introduction of pollutants which can chemically react in the atmosphere to produce secondary pollutants such as acid rain or ozone. A high reliance on fossil fuel for domestic and commercial space heating in the County is compounded by the lack of district heating networks as well as combined heat and power plants. Natural gas is the least polluting of all the fossil fuels used for energy production, emitting less SO₂, CO₂ and NO_x per unit of energy than any other fossil fuel. The recent introduction of natural gas supplies to County Mayo will reduce dependencies on more polluting fuels in urban areas.

Emissions from Uncontrolled Burning: While road traffic and fuel combustion for power and heat requirements are contributing factors to air pollution, one of the major sources of air pollution in County Mayo is the burning of gorse and forest fires. On average Mayo County Council Fire Brigade attend approximately 300 incidents of gorse and forest fires annually. The majority of such responses are concentrated during the period from April to June. The burning of vegetation is a major source of many air-borne particles and trace gases that influence the concentration of ozone at ground level.

Other sources of air pollution are odours primarily from the application of slurry and animal storage. Such problems are dealt with via legislation on good agricultural practice.

Noise

A brief analysis of the noise sources suggests that there are very few areas of environmental noise or noise nuisance that are not covered by some legislative provision. However, the effectiveness of the existing controls is adversely affected by the following factors:

- Lack of powers of a type which can result in immediate or short-term abatement action e.g. powers of entry, intervention, seizure or closure, in situations where nuisance is severe
- The burden on the citizen in terms of following through on a noise complaint
- The resources available to enforcement authorities nationally and locally both in following up legal proceedings and in provision of an out of office hours service
- Lack of national standards for best practice or codes of practice or guidelines with some statutory backing results in inconsistent application of controls.

A more integrated approach to noise management is required because of the variety of sources and the remedies which can be applied.

Climate Change

The increasing rate of climate change is intensifying existing environmental problems arising from more extreme and unstable weather conditions, more storms and floods, and more coastal erosion.

Flood Issues

Flooding is a natural occurrence that can happen at any time in a wide variety of locations and plays a role in shaping the natural environment. River and coastal flooding are the most common forms, which are noticeable especially after prolonged and intense rainfall. Seasonal flooding can be caused by turloughs, seasonal lakes that are a feature of limestone lowlands of County Mayo. River flooding tends to be more common during the wetter months when soils are near saturation and can be exacerbated in coastal areas when interactions occur between high tides and high flows. Urban environments, which contain hard impermeable surfaces, can exacerbate the consequences of flooding through development in flood plain areas, which places property and people at risk or by building in areas where existing drainage infrastructure is deficient or inadequate. Flooding may impact on the economy, social well-being, public health and the environment. It can impact on individuals and communities resulting in personal suffering and financial loss and damaging effects on the environment.

In County Mayo the areas more prone to flooding and its effects are described below:

Ballvary: The Castlebar River can burst its banks causing flooding along the N5 near the railway bridge at Ballvary forcing a single-line traffic system to be introduced.

Ballinrobe/Neale Area: In the Ballinrobe area between November 2006 and January 2007 unprecedented levels of flooding was caused by prolonged periods of intense rainfall. The floods coincided with Lough Corrib and Lough Mask exceeding all previously high water levels. In addition to roads and fields being flooded, waters entered houses and resulted in a number of areas being cut off. Dwelling houses were accessed using agricultural vehicles.

The Neale cross roads were completely closed where there was three to four feet of water blocking the road. Mayo County Council were forced to close the road and traffic normally travelling to Galway through Cross and Glencorrib was diverted through the longer route from Ballinrobe, out the Kilmaine Road and into Shrule.

Crossmolina: In December 2006 in Crossmolina town, twelve hours of uninterrupted rainfall caused the River Deel to burst its banks. Twenty premises were evacuated as flood waters rose to a depth of three foot in some areas. Chapel Street, Church Street, Erris Street and parts of Main Street were underwater within an hour of the river bursting its banks. For businesses in the town, the floods brought devastation as Christmas stock fell foul to the raging waters. Flooding also occurred in Crossmolina in 1989 causing damage to the town centre and outlying areas.

Newport / Westport Area; In February 2006 heavy rain caused the Black River at Newport to burst its banks while at the Quay area of Westport crashing waves came over the sea wall and into some nearby properties. In July 2008 the Newport, Glenhest and Belmullet areas bore the brunt of the damage as torrential rain swept the County. A landside occurred at Killawalla, outside Newport and flood damage was caused to homes and businesses in Newport and the surrounding area.

The effects of flooding can cause the road network to be severely disrupted and require improvements to be carried out afterwards.

4.6.7 Evolution of Air and Climatic Factors in the absence of the RES

Air Quality

The evolution of air quality following adoption of the RES would depend on the strategies engaged. However the application of a RES will generally contribute to the good standard of air quality in the County. Air emissions from biofuels, biogas and biomass products will be more significant than the other methods of renewable energy generation. The impacts of renewable energy projects will depend on a number of variables such as the location, type and scale of projects and planning controls for such developments. It is important that a policy of energy efficiency is implemented in conjunction with the RES in order to conserve natural resources of fuel and subsequently maintain good air quality status.

The absence of a RES could lead to:

- The development of non strategic projects in isolated areas resulting in increases in transport and therefore increases in the emission of air pollutants. Air pollution has knock-on effects on human health especially on sensitive groups within the population and within the ecosystem
- Continued reliance on fossil fuels for heat and power requirements, hence continued direct/indirect emissions from fossil fuel combustion and extraction of fossil fuels. Issues associated with climate change such as flooding, drought, biodiversity distribution changes and sea level rise would continue to incur social and economic impacts. The trans-boundary nature of air pollution requires that it is considered in terms of scale from local to global.
- The impact of individual developments could not be assessed as to their overall effectiveness.

A primary objective for air quality in County Mayo in the absence of a RES is to ensure compliance with the Clean Air for Europe (CAFÉ) Directive (2008/50/EC). It envisaged that compliance with this directive will be achieved as emission levels in County Mayo are well below the specified limit values for the CAFE directive.

Noise

The evolution of noise emissions without the implementation of a RES in County Mayo can only be considered within a generic context as very little baseline data exists to accurately model future scenarios at a local level. The evolution of noise emissions/nuisances, following the adoption of the RES is dependant on the strategies engaged. Noise emissions from various projects may have negative impacts on ambient noise levels given the low background levels predominant in the County.

In the absence of the RES, there would be no framework directing renewable energy developments and associated infrastructural requirements to appropriate locations within the County. This may result in negative impacts for noise sensitive locations such as schools, libraries, hospitals, nursing homes, funeral homes and churches.

The impact of renewable energy projects will depend on a number of variables such as the location of the projects, the type and scale of projects and planning controls for such developments during construction and operation.

In the absence of a RES, the primary objective for Noise control in County Mayo is to ensure compliance with the Environmental Noise Directive. Work is already underway to achieve compliance with this Directive by the compilation and implementation of a noise action plan for County Mayo. It is envisaged that compliance with this Directive will be achieved by measures proposed in this plan. Noise abatement requires a local and tailor-made approach to reduce noise along existing roads and for existing dwellings. There are also many synergies between measures abating noise and other sustainable transport and development measures e.g. many measures to abate noise also improve air quality.

Climatic Factors

In the absence of a RES, the development of renewable energy will take place in a haphazard, unplanned manner leading to a delay in meeting binding national targets and adverse impacts of climate change on the environment will continue.

Flood Issues

In the absence of a RES development sites will be required to comply with the provisions of the DoEHLG/OPW publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'. Sites will be required to avoid areas of flood risk and where there is a strategic case for allowing development in such areas, these proposals will be subject to the '**justification and sequential tests**' in the Flood Risk Management Guidelines and assessed to ensure that flood risk can be reduced and mitigated as appropriate.

Sites identified for renewable energy development will support the provision of adequate surface water drainage infrastructure, promote the use of a sustainable drainage system (SUDS) approach and techniques and manage flood risk through the protection of natural drainage systems, the appropriate location and design of different types of development and the incorporation of flood risk assessments and works where necessary.

4.7 Material Assets

4.7.1 Introduction

It is considered that the relevant material assets in the context of the RES are roads and transport infrastructure (including rail, piers and harbours); waste infrastructure; water and waste water infrastructure; and commercial forests (Mayo Forest Estate).

4.7.2 Roads & Transportation Infrastructure

Roads

Mayo is served by some 398.7km of National Routes of which 131.981km are National Primary and 266.719km are National Secondary. Some of these have been upgraded to current best standard single carriageway roadways in recent years, including sections of the N5 from the County boundary to Castlebar; N17 Claremorris to Charlestown; and a section of the N26 between Foxford to Ballina. Other schemes recently or currently at design or proposal stage (National Routes) are detailed below.

Mayo is served by some 628.4km of Regional Roads and by some 5331km of Local Roads. Schemes on Regional Roads at design or proposal stage include those shown below.

National Routes:	Regional Roads
Ballina Orbital Route Project	R335 road at Lecanvy.
N60/N83 Ballyhaunis Outer Distributor Road.	R334 road at Cross.
N59 Crossmolina-Ballina Road Project.	R334 road at Moyne Bridge.
N17 Charlestown Bypass.	R311 road at Clooneshill.
N17 Ballindine Bypass.	R321 from Bohola to Kiltimagh.
N5 Westport – Bohola.	R327-Cloonfad Road at Kilknock.
Castlebar Ring Roads.	R314-Killala-Ballycastle Road at Killybrone and Killala inner Relief Road.
N26 Ballina – Bohola.	Proceeding to Part 8: R312 at Glenisland.
N60 Castlebar – Claremorris.	Completed: R311 Link Road from Lannagh Road to Newport Road.
N84 Ballinrobe Relief Road.	

All Local Roads are sensitive to trucks with abnormally large and wide loads such as those that would be required for the transport of construction material/equipment associated with the development of renewable energy developments. Most of the Regional, and all of the National Roads, are capable of catering for trucks with abnormally large and wide loads used in the construction of wind turbines or other renewable plants.

Existing road and other transport infrastructure are shown on Figure 4.27.

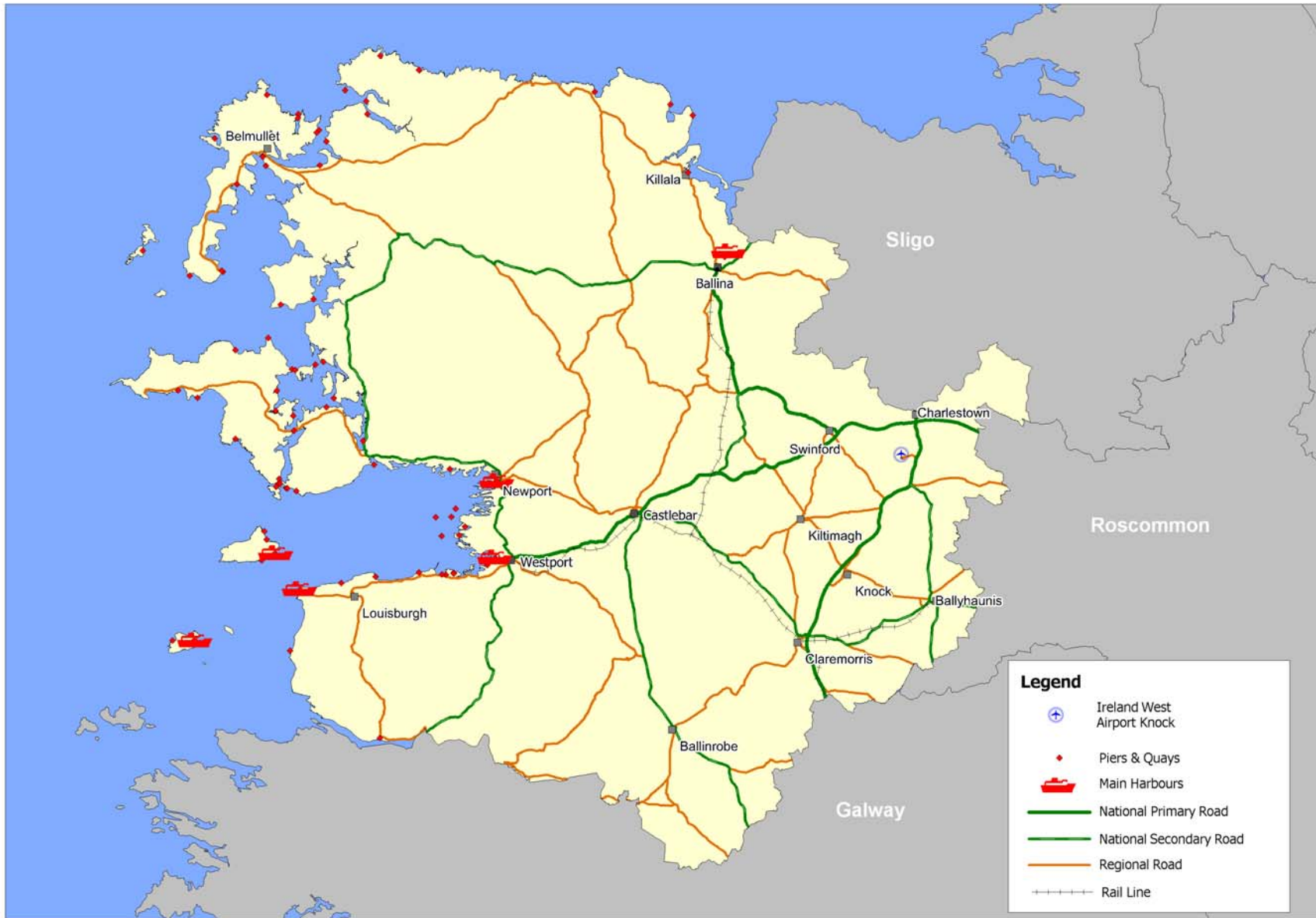


Fig 4.27 Road and Transport Infrastructure

Piers and Harbours

Piers and Harbours are considered a material asset in terms of the SEA process. There are 78 piers and harbours in County Mayo for which Mayo County Council has statutory responsibility for operation and maintenance. The piers and harbours in the County vary widely in size, sale and usage. All of the piers and harbours in the County area are used primarily for landings for aquaculture, seaweed gathering, commercial fishing and marine leisure and tourism. There are no piers or harbours being used for the importation of goods on a commercial scale. All piers and harbours in the County area are accessed by the public road system; no pier or harbour is connected directly to the rail network.

There are two distinct categories of pier and harbour, those located on the mainland, of which there are 65 and those located on islands of which there are 13.

The current strategy for the development of the County's piers and harbours is set out in the "Assessment of Piers, Harbours and Landing Places" 2004 which categorises each of the 78 locations from Category 1 which are "*High priority where development and short term measures should be pursued immediately, based on the value of landings and level of activity at the structures.*" to Category 4 which are "*Very low priority where there is little or no activity at the structure and where repairs should be carried out to meet health and safety requirements.*". Following the 2004 assessment significant improvements were made to 3 category 1 ports, Roonagh, Clare Island and Blacksod totalling €20 million. The Mayo County Development Plan 2008-2014 identifies the locations that have been prioritised for improvement during that period.

No new pier or harbour is proposed in the Mayo County Development Plan 2008-2014

Piers and harbours in the County can be utilised for the development of renewable energy as follows;

1. Construction and servicing of wave / marine energy projects including off-shore wind farms
2. Importation of materials for biomass plants
3. Importation of materials for on-shore wind energy.

Currently none of the County's piers and harbours are suitable in terms of size, landing facilities, connection to the transport network or tidal conditions to have a significant contribution to make to the development of renewable energy in Mayo.

Rail

Iarnród Éireann provides four return services a day from Westport and Ballina to Dublin. These services also stop at stations in Foxford, Castlebar, Manulla Junction, Claremorris and Ballyhaunis. The Council is committed to the promotion of rail services and the growth of settlements along the Western Rail Corridor, the full reopening of which is also supported, and it is a policy in the MCDP 2008-2014 to support and encourage the provision of a high quality rail network for passenger and freight carriage. The railway network would be an important consideration in terms of the sustainable transport of material etc as an alternative to road transport, particularly in relation to biomass.

Ireland West Airport Knock (IWAK)

IWAK is a major part of the region's critical transport infrastructure. In the last four years, the airport has experienced a period of unprecedented growth and is the fastest growing airport in terms of passenger throughput. In 2006, IWAK catered for 620,000 passengers, contributed €63 million of total spending by inbound tourists and supported 800,000 bed nights in the region. In addition, the airport is a significant employer in its own right providing 185 full time jobs on site and supporting 786 jobs in the wider region.¹ Projections by independent experts see this growth continuing into the future with passenger numbers reaching 2.5million by 2025. The airport has also installed and implemented a new Instrument Landing System thus reducing by 98% the possibility of aircraft diversion to other airports.

The siting of renewable energy development and associated infrastructure projects may have implications for the operations of the Communications, Navigation and Surveillance systems used for safety of

Aircraft. Development and infrastructure projects such as wind turbines or power lines may have implications for the flight paths of aircrafts.

In order to ensure the safety and efficiency of aircraft operations in the vicinity of airports, the International Civil Aviation Organisation (ICAO) has defined a volume of airspace above which new objects are not permitted. The Irish Aviation Authority published “Obstacles to Aircraft in Flight, Order, 2005 (S.I. 215 of 2005) which sets out the criteria used to determine whether or not any object anywhere in Ireland is deemed to be an obstacle affecting aircraft operations.

A safe guarding map was produced for IWAK, which shows the obstacle limitation surfaces for the runways for the purposes of safeguarding the airport against developments which would have an adverse effect for aircraft operations. Obstacle limitation surfaces are a series of imaginary surfaces in space, the dimensions and gradients are provided by the ICAO which defines the limits to which objects may project vertically into the airspace surrounding the airport so as to permit aircraft to be operated safely.

The Obstacle Limitation Surfaces for IWAK in accordance with the International Civil Aviation Organisation (ICAO) Publication Annex 14, Volume 1, ‘Aerodromes’ are as follows:

- The approach surface which commences at 60m from the runway threshold and slopes upwards at a gradient of 2%. The surface is 300m wide, centred on the runway centreline and splays at 15%. It extends to a distance of 15km and ceases to rise once it reaches a height of 150m
- The transitional surface which slopes upwards at a gradient of 14.3% away from each side of the runway and the approach surface. It commences 150m from the runway centre line or edge of the splay section of the approach surface, and extends to a maximum height of 45m
- The inner horizontal surface which has a radius of 4000m centres on the airport and extends to a height of 45m
- The conical surface which commences at the outer edge of the inner horizontal surface (at a height of 45m) and extends upwards at a gradient of 5% until it reaches a height of 100m (145m) above the aerodrome
- A 13km radius exclusion zone around the airport has been adopted in the Mayo County Development Plan 2008 – 2014. This exclusionary zone defines an area within which no new conventional or residual landfills shall be constructed. This restriction on the construction of landfills is in line with the ICAO recommendations.

In order to ensure that development does not interfere with aircraft safety the safe guarding map includes a 13km radius exclusion zone around the airport. The exclusion zone indicates that development may have an impact on aircraft safety and consultation with the airport authority and the Aviation Authority is mandatory before commencement of any project falling within specific height categories, in this exclusion zone. For example, in the outer areas of the exclusion zone any development exceeding 90m in height above ground level would need to be assessed to ensure it has no impact on aircraft safety. Similarly closer to the airport, the same assessment would be required for developments exceeding 10m in height above ground level.

4.7.3 Energy

Energy infrastructure in the County is transmitted through the National Grid. The National Grid is Ireland’s power transmission system and is a meshed network of high voltage, overhead lines and underground cables and transmission stations. It delivers power to bulk transfer points all over Ireland where power can be taken onwards on lower voltage lines to customers premises. The power is generated by power plants and wind farms throughout the country, utilising a variety of fuel or energy sources – including gas, oil, coal, peat, hydro, wind and other sources such as biomass and landfill gas, and all feed into the national grid and power is transmitted nationwide, including Mayo. Although some energy is generated in Mayo the energy provided to the customer is provided through the national grid and its original source may be from a number of sources, both type (i.e. renewable or conventional) and location (national, imported). Mayo has two 110kV lines traversing the County, from Bellacorrick to Sligo and Bellacorrick to Claremorris, with 110Kv stations at Bellacorrick, Moy (Ballina), Castlebar, Westport and Dalton (Claremorris). Currently the grid has limited capacity.

The strategy for the development of Ireland's Electricity Grid for a Sustainable and Competitive Future is set out in Grid25. Mayo forms part of the North West Region in Grid25 – an area which has been identified as having the largest (35%) expected regional distribution of the renewable generation capacity, as the area is particularly rich in wind and ocean renewable energy resources.

4.7.4 Waste Infrastructure

County Mayo forms part of the Connaught waste management region. Mayo County Council is the lead and nominated authority in the Region. The current 'Replacement Waste Management Plan for the Connaught Region 2006-2011' details the region's integrated waste management approach and policies with specific targets to be achieved by 2013. The targets are derived from the EU waste Hierarchy and require that of waste arisings, 48% is recycled, 33% is used for energy recovery and 19% of residual waste is sent for disposal.

The 2008 Connaught Waste Management Region Annual report indicates an increase in commercial and industrial waste although construction and demolition waste arisings have fallen. This is in line with the current downturn in the construction industry. Construction and demolition waste remains a target area due to the potential to achieve much greater recycling and recovery in this sector.

The annual report confirms that the quantity of household waste being produced in the region is rising. This is also the national and European trend. Separate Organic waste collection service is being expanded. Waste Collection permits have been modified to ensure that the third bin is provided to 100% of commercial premises and 20% of households (to increase to 40% by 31st December 2010). A targeted Environmental Awareness campaign is underway to promote this but enforcement action may be needed to accelerate the roll out of brown bins in the County.

Waste infrastructure includes a number of EPA licensed facilities and Local Authority authorised waste facilities including transfer stations, waste permit sites and ATFs (authorised treatment facilities to depollute end of life vehicles). There is an extensive network of bring banks for collection of glass and aluminium cans and the plan provides for the expansion of this network. There are two recycling centres (Derrinnumera, Newport and Rathroeen Ballina) which accept a range of household wastes including hazardous wastes. It is proposed to provide additional facilities at two other locations within the County; Claremorris and Belmullet are being considered.

Sludge is managed in accordance with the Sludge Management Plan and is treated out of County. A proposal for a sludge hub in the County was unsuccessful.

All waste streams generated can be managed through permitted waste collectors who are authorised to collect in Mayo and to transfer wastes to specific authorised facilities inside and outside the County.

Mayo County Council has two EPA licensed landfills (Derrinnumera, Newport and Rathroeen Ballina), one of which is operational at the present time. All waste accepted at these facilities must now be pre treated to ensure diversion of bio-waste.

There are a number of historic landfills in the County. Of these, five fall under the 2008 Certification regulations. Two have been classified as moderate risk and two have been classified as low risk. Further investigation is underway.

4.7.5 Waste Water

The treatment of wastewater is governed by the Urban Waste Water Treatment Directive (91/271/EEC) (amended by Directive 98/15/EEC) transposed into Irish law by the Urban Waste Water Treatment Regulations 2001 (S.I. 254 of 2001). The Directive aims to protect the environment from the adverse effects of wastewater discharges by ensuring that wastewater is appropriately treated before it is discharged to the environment. The Regulations stipulate that sewage treatment facilities are in place in all towns in the County by 2005.

The treatment of wastewater is also linked to the WFD which requires all public bodies, including Mayo County Council, to coordinate their policies and operations so as to maintain the good status of water bodies which are currently unpolluted and bring polluted water bodies up to good status by 2015. The National Development Plan (2007-2013) recognises the need to address the infrastructural deficit in the water services sector and an increased level of funding is now in place and this will have the effect of accelerating the provision of waste water infrastructure over the next number of years.

The policy of Mayo County Council is to improve and extend Water Services in the County. Expansion and improvement of waste water services is necessary to encourage and facilitate industrial and commercial development in the County, including development that may be generated as a result of renewable energy development, as well as to serve existing and proposed development. Maintaining a proper balance between protecting and enhancing the environment and economic and sustainable development is a central goal of Mayo County Council.

Figure 4.18 shows existing and proposed sewerage schemes in the County and also towns/villages where upgrades of existing infrastructure and provision of new sewerage schemes are required (Assessment of Needs).

As it is likely that most renewable energy developments will be in rural areas, development sites will be in un-sewered areas and, where required, on-site treatment systems will be relied on to treat wastewater. If systems are not located in suitable areas; not designed to the appropriate standards or not working properly, pollutants can be released to groundwaters, nearby wells or receiving surface water bodies.

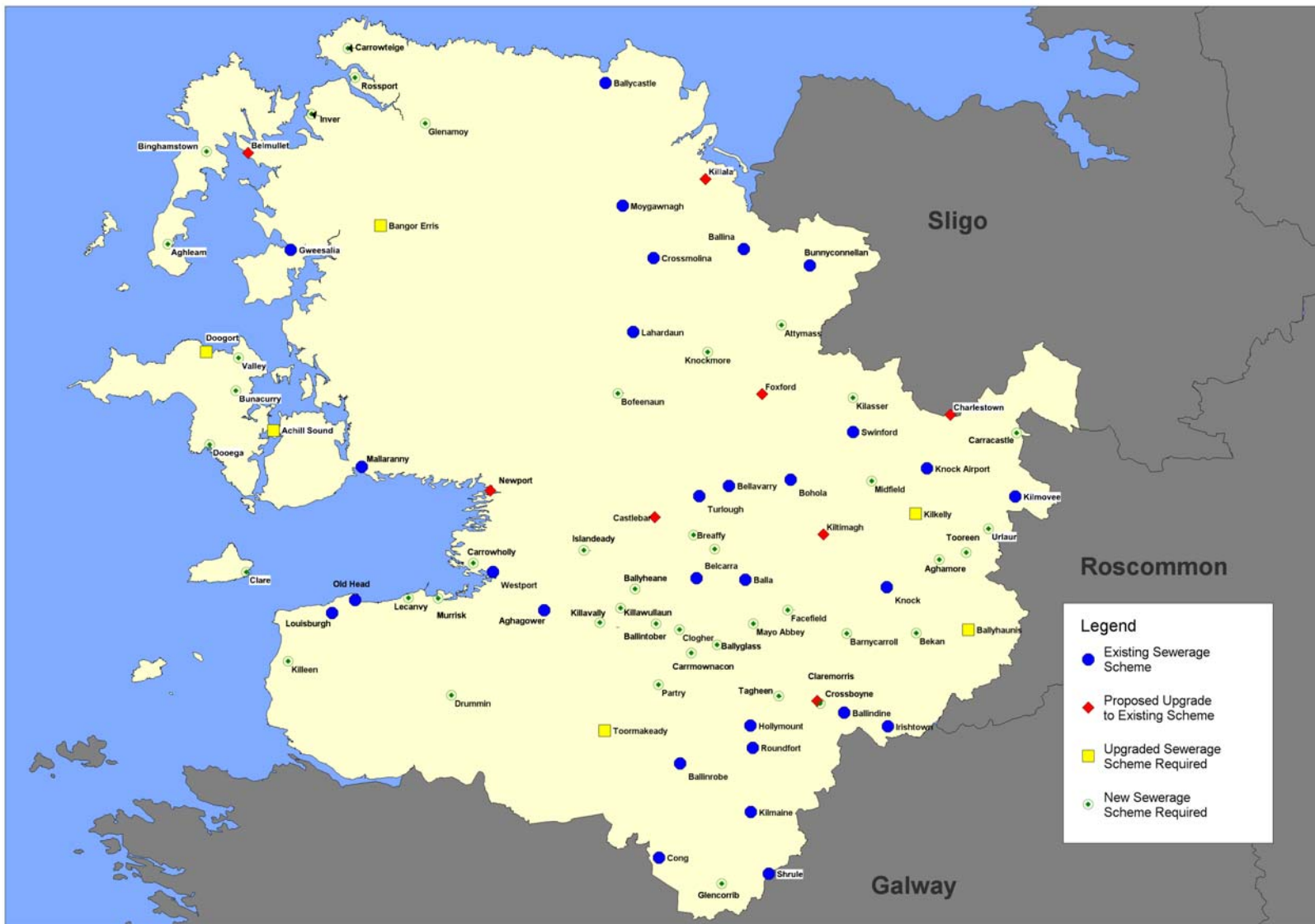


Fig 4.28 Public Sewerage Schemes

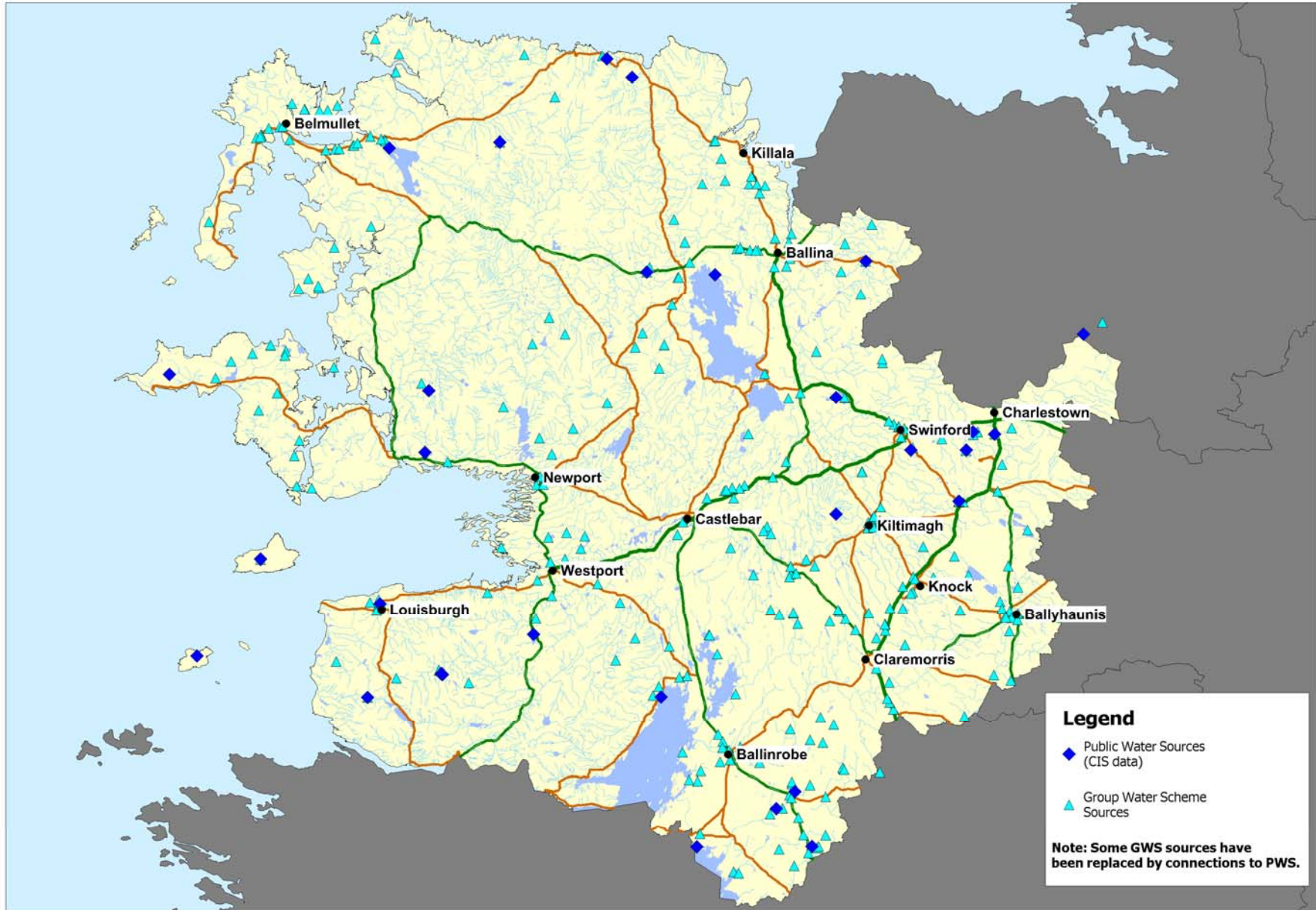


Fig 4.29 Public and Group Water Supply

4.7.6 Drinking Water

Much of the relevant environmental legislation relating to Drinking Water has been driven by Directives from the European Union i.e. Freshwater Fish Directive (78/659/EEC) (later amended by 2006/44/EC), the Urban Waste Water Treatment Directive (91/271/EEC) and the Nitrates Directive (91/676/EEC), Groundwater Directive (80/68/EEC) later amended by 2006/118/EEC and the Water Framework Directive (2000/60/EC). Over time many of these Directives have been transposed into Irish law by Regulations i.e. European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2006. The principal objectives of such legislation focus on protecting waters and maintaining good quality water, such as those that serve as drinking water supplies.

Drinking Water Source protection is monitored under the EC (Good Agricultural Practice for Protection of Waters) Regulations, 2006, which provides statutory support for good agricultural practice to protect waters against pollution from agricultural sources. The measures include the control and management of slurry, soiled water and land spreading of organic matter.

Groundwater quality and quantity must be protected in their own right under the requirements of the WFD (2000/60/EC) and the Groundwater Directive (80/68/EEC) and (2006/118/EEC). They establish clear Environmental Quality Objectives, groundwater quality standards and threshold values for classification of groundwater protection against pollution and deterioration.

The majority of Mayo County Council's Public Water Supplies and Group Water Schemes are sourced from surface waters (i.e. lakes), which together with an extensive system of rivers and streams, sustain highly valuable fishery resources. The water quality of the County's lakes, rivers and aquifers must therefore be maintained to the highest possible standards.

The EC (Drinking Water) (No. 2) Regulations 2007 (S.I. 278 of 2007) (the Regulations) fully transpose and implement the EU Council Directive 98/83/EC on the quality of water intended for human consumption. They aim to protect human health from adverse effects of any contamination of water intended for human consumption or use in food and drink manufacture by ensuring that it is wholesome and clean.

Mayo County Council is responsible for 25 Public Water Supplies (PWS) serving a population of 78,021 (EPA, 2009); Lough Mask, Lough Conn, Carrowmore Lake and Moher Lake providing water to the greatest number of houses in the County. Sources of Drinking Water are shown on Figure 4.29.

At the end of 2009, there were no active boil water notices or water restriction notices on Mayo County Council PWS. However, the Council was issued with four directions in 2009 (Lough Mask for Trihalomethanes; and Mulranney, Achill and Westport for aluminium). The quality of the Public Drinking Water supplies remains high. However, the poor microbiological quality of the private group water schemes continues to be a challenge.

There are 94 Public Group Water Schemes, 86 Private Group Water Schemes and a number of Single Private Sources in the County (EPA, 2009). The overall rate of compliance in 2007 in County Mayo was 94% which was below the national average. The EPA report highlighted that the Private Group Water Schemes were only 69.3% compliant with the microbiological parameters. There are still ongoing problems with those parameters; however improvements are evident where schemes have been taken over by a public supply and by amalgamation of schemes. Further improvement will occur from the bundling (amalgamation of group water schemes due to a superior water quality in a neighbouring scheme) of schemes which is in operation at present.

Mayo County Council is currently undertaking Source Protection work on the Public Water Supplies, initially to ensure that the source is not being impacted on by agricultural activities within a 250m buffer zone.

Mayo has Groundwater interim vulnerability mapping, which has allowed risk assessments to be undertaken. The GSI is currently carrying out an aquifer study in Mayo which involves the preparation of Aquifer maps, Groundwater Vulnerability and Groundwater Resource Protection Zone maps. The overall aim of a scheme is to preserve the quality of groundwater, particularly for abstraction purposes, for the benefit of present and future generations.

4.7.7 Mayo Forest Estate

An important material asset in the context of the proposed RES is the Mayo Forest Estate (commercial forests). Approximately 10% of Mayo is covered with forestry. A little over 11% of the total forest estate in the County is classified as broadleaf, with oak and birch the main broadleaf species. The remainder is mainly conifer forests, where the predominant tree species are lodgepole pine and Sitka spruce, mostly planted from the 1960s with the aid of Government and EU supported grant schemes. Although the planting of diverse species has been encouraged since the late 1980s (all forestry applications must have a minimum of 20% diverse species), spruce still comprises the bulk of planting in the County. Coillte manage 6%, while the remainder is in private ownership. Over 50% of privately owned forestry is established by full-time farmers, while of the remainder, over 90% are involved in part-time farming. The main areas of afforestation, which were planted in the 1960s and 1970s, are in the north and west of the County, in areas around Bellacorrick, Glenamoy and Ballycastle. These plantations are dominated by lodgepole pine. Private forestry, planted mainly in the 1990s is predominantly concentrated on enclosed or improved farmland in the east of the County.

Under the National Forest Standard 2000, all afforestation projects must conform to a suite of environmental guidelines. Under these guidelines all features of biodiversity value; hedgerows, wetlands, stream banks and existing woodland have to be retained and protected. Up to 15% of the plantation must be set aside for open space and the retention of existing habitats; in plantations in Mayo however this would be as high as 25%.

There are a number of forest parks and forest recreation areas in the County including the Millennium Forest, near Tourmakeady; Ard na Geeha/Cong Forest, between Cong and Clonbur; Sheefry overlooking Tawnyard Lake near Doolough, Doogry on the Nephin Drive, near Castlebar. Brackloon Wood, near Westport is a native Atlantic Oak Woodland as is Laughil Wood on the shores of Lough Conn in Pontoon. Forests and forest roads provide hundreds of kilometres of walkways throughout the County, including the Western Way, the Bangor Trail, and the various loop walks and marked trails including around Shramore, north of Loughs Feagh and Furnace.

The NeighbourWood Scheme is a woodland grant scheme available to local community groups through the Forest Service of the Department of Agriculture, Fisheries and Food (DAFF) and managed by the local authority to fund the development/establishment of new and existing woodlands in close proximity to towns and villages. To date five Neighbourwood schemes have been undertaken in the County; Belleek Wood, Ballina; Northwood, Westport; Brabazon Park, Swinford; Newport Town; McMahon Park, Claremorris.

The native woodland scheme also funded by the Forest Service (DAFF) encourages the protection and expansion of Ireland's native woodlands. Conservation and biodiversity are prioritised, with wood production encouraged where appropriate. Since 2002, 17 native woodland projects have been funded in Mayo, eight of which comprise native woodland conservation in existing woodland, and the remainder new native woodland establishment, covering a total area of 177 ha.

Recently introduced funding by the Forest Service under the Forest Environment Protection Scheme (FEPS) provides grant aid and premiums to encourage farmers to combine the establishment of high nature-value woodland with their participation in the Rural Environment Protection Scheme (REPS). The establishment of woodland under this scheme is designed to maximise its environmental contribution. There have been almost 500 hectares of woodland, encompassing over 47 sites, established in the County under this scheme since 2007.

The uniform monoculture coniferous plantations favoured by past forestry policy can be of limited biodiversity, landscape and amenity value. In addition, the interaction of these plantations with certain pollutants in the atmosphere (e.g. sulphur dioxide) can change the chemical composition of rain, as it falls through the forest canopy, which in turn can lead to the acidification of surface waters. Forestry activities, including fertilisation and clearfelling can also lead to nutrient enrichment and sedimentation in rivers and lakes, which has a negative impact on the aquatic ecology of these waterbodies.

While on the one hand our forests are vulnerable to the effects of climate change, forestry provides a range of opportunities to mitigate rises in greenhouse gas levels. Globally, deforestation is one of the major contributors to climate change, and currently accounts for 17% of global greenhouse gas emissions. Deforestation at the national level needs to be controlled in order to protect the climate change mitigation benefits of Ireland's forests. Other opportunities to mitigate increases in greenhouse gas levels arise from appropriate afforestation/reforestation, sound management of existing forests, increased use of wood products and use of forest products for bioenergy to replace fossil fuel.

The Mayo Forest Estate is shown (indicatively) on Figure 4. 30.

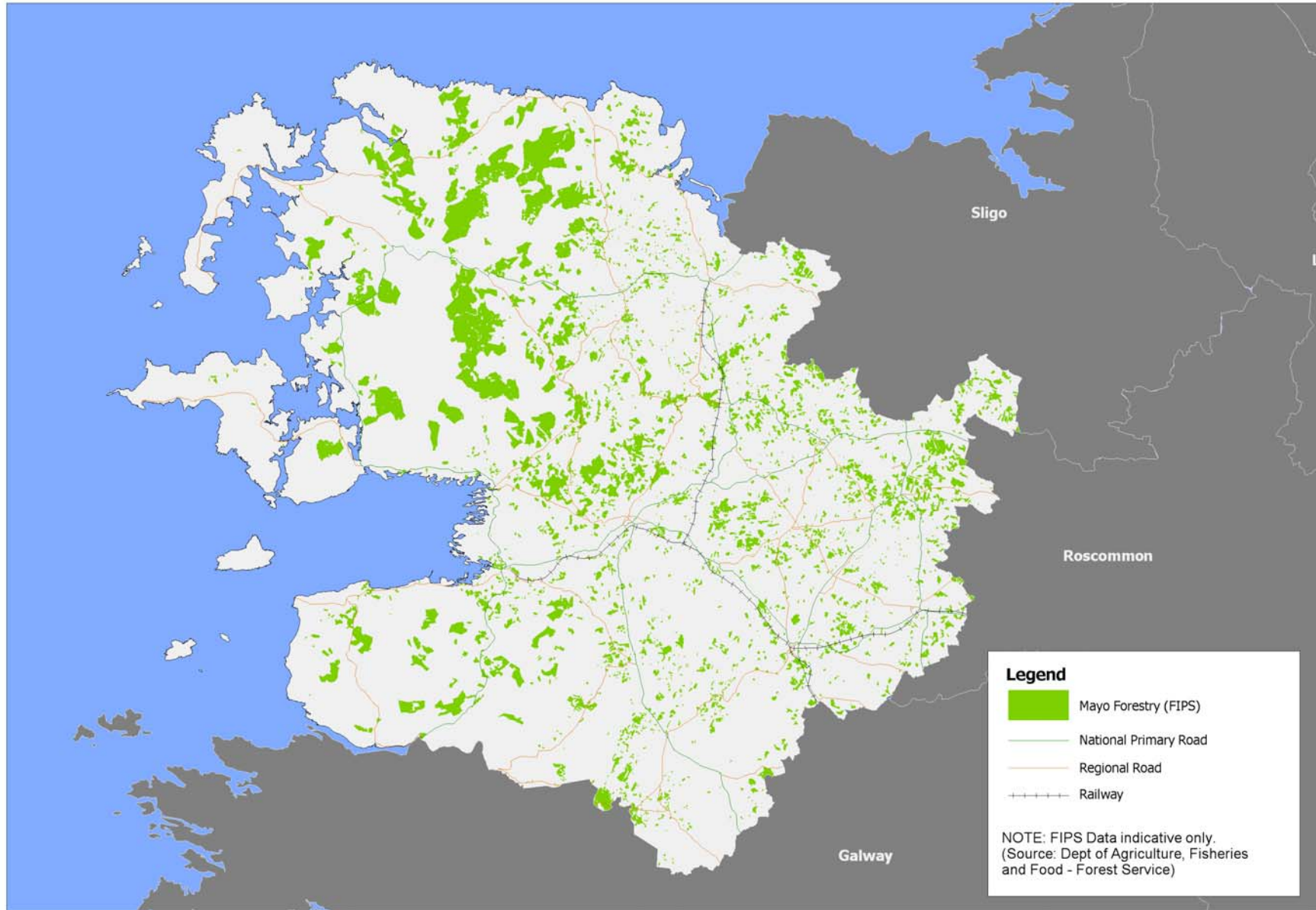


Fig 4.30 Mayo Forest Estate (Indicative)

4.7.8 Existing Environmental Problems relating to Material Assets

Roads and Transportation

The existing road network is adequate for transporting heavy goods from one centre of population to another along National and Regional roads. The introduction of renewable energy schemes will require the movement of large quantities of heavy goods for the construction of renewable energy development. Where renewable energy developments are proposed in rural/remote areas, this may be problematical due to the absence of or deficiencies in existing transportation infrastructure servicing these areas.

Piers and Harbours

All piers and harbours are by their nature situated in environmentally sensitive locations. The development of natural resources for renewable energy is not dependant on the existing piers and harbours in the County, however the development of marine renewable energy will, in all probability, require the upgrading of at least one pier for the construction and servicing of the proposed wave energy testing site.

Energy

The existing grid network is almost at capacity and it will not be possible to utilise Mayo's natural resources for renewable energy without essential upgrades to the grid.

Waste Infrastructure

The integrated waste management Hierarchy Pyramid illustrates the approach that must be taken for waste management. Preventing waste arisings is a significant challenge set against a trend which shows an increase in the volume of waste being generated. Of the waste produced, disposal is the last resort. The diversion of waste from Landfill and separate collection of organic wastes and dry recyclables for appropriate treatment in order to achieve National and EU targets is being advanced. However not all of the infrastructure included in the Connaught Waste Management Plan has been developed to date. There is no thermal treatment and energy recovery facility in the region and the network of facilities identified for the County is not fully established. These include facilities for the collection and processing of green waste.

It has been identified that uncollected waste is an issue as there is no statutory obligation on householders to avail of a kerbside waste collection service. This is being managed locally through enforcement of waste presentation bye-laws. Accurate data is key to monitoring progress and considerable effort is required to achieve this.

Waste Water Infrastructure

There is a lack of waste water treatment infrastructure in many parts of County Mayo. The lack of this infrastructure is likely to be adversely impacting upon water bodies across the County - most river catchments, the majority of lakes, all assessed estuarine water bodies and sizable aquifers are *at significant risk* or *probably at significant risk* in terms of achieving the WFD's objectives by 2015 (see Section 4.5).

Drinking Water Infrastructure

Relevant drinking water data (MCC) for 2009 relating to Mayo's water supplies indicates that a number of parameters repeatedly exceed the limits set out in the Drinking Water Regulation; Aluminium, Iron, Turbidity, Trihalomethanes and Coliform bacteria are common problems in the Public Water supplies. Along with the parameters listed above E-coli., Closteridium perfringens, pH and Manganese appear as problematic in group water schemes. Iron is present in significant amounts in soils and rocks principally in insoluble forms. However water passing through these areas can give rise to more soluble forms of iron. Manganese is found widely in soils and is a constituent of many ground waters.

Water scarcity can become an issue at certain times of the year in schemes around the County due to high demand, but also during the winter period due to leaks and taps left running.

Pollution complaints have resulted from point and diffuse sources including wastewater and industrial discharges, land spreading of organic manure, poor maintenance of on-site wastewater systems and an incidence of poor management in forested areas.

Mayo Forest Estate

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4.7.16 Evolution of Material Assets in the Absence of the RES

Roads

It is likely that in the absence of the RES, unmanaged developments in the renewable energy sector would result in adverse impacts to the road network. There would be no framework directing renewable energy developments and associated infrastructural requirements (e.g. new roads) to appropriate locations within the County. This could have potential negative impacts on existing and possibly proposed road infrastructure.

Pier and Harbours

In the absence of the RES, the programme of improvements to Mayo's piers and harbours will continue.

Energy

In the absence of the RES, energy infrastructure may not be upgraded in a manner that allows renewable energy to be harnessed from Mayo. In addition, future upgrades to the electricity network may be provided through the construction of a multiplicity of lower voltage lines traversing the landscape, having a greater impact on the environment and local communities, rather than one or two large strategically planned voltage lines which could have regard to potential renewable energy development sites identified in the RES.

Waste Management Infrastructure

In the absence of the RES the Connaught Waste Management Plan will continue to drive waste management in the County. Constantly evolving environmental legislation will assist in achieving targets in waste management. The RES will provide a framework for the development of renewable energy infrastructure. Some of the proposed renewable energy developments outlined in the RES, may provide outlets for waste arisings, e.g. biogas. In the absence of this, continued efforts in encouraging private sector development will be required.

Waste Water Infrastructure

In the absence of the RES all developments proposing to discharge to a public sewerage system will continue to be assessed through the planning system on a case by case basis to determine what impacts, if any, developments will have on the Waste Water Treatment Plant.

Drinking Water Infrastructure

The WFD Directive aims to achieve high status by 2015. In the absence of the RES there may be less awareness of possible impacts in combination with location of drinking water sources. The RES will assist in decision-making on the location, nature and control of developments and activities in order to protect surface waters and groundwater. The RES will help to ensure that due regard is taken to maintain the beneficial use of these waters.

Mayo Forest Estate

If renewable energy developments are not guided by an overall strategy, the potential of forestry to mitigate climate change will not be fully realised. Although forests can mitigate climate change, they are themselves vulnerable to the impacts of climate change, and this must be considered when planning the management of future forests. Development of wind turbines often necessitates clearfelling of forestry. The absence of a RES could lead to proposals for wind energy developments that would require clearfelling of forestry, in areas that may be sensitive to runoff and water pollution.

4.8 Cultural Heritage

4.8.1 Introduction

Heritage, by definition, means inherited properties, inherited characteristics and anything transmitted by past ages and ancestors. It covers everything, from objects and buildings to the environment. Cultural heritage includes physical buildings, structures and objects complete or in part, which have been left on the landscape by previous and indeed current generations. Mayo's heritage is a unique resource which is fundamental to the cultural identity of the County and the quality of life of its citizens – it is central to how we see ourselves and to our identity as individuals and communities. Historic buildings can define a region's localities and communities and can become a focus of community identity and pride. A historic church or park, for example, can help define a neighbourhood and create a sense of local cohesion.

4.8.2 Archaeological Heritage

The 1992 European Convention on the Protection of the Archaeological Heritage (the Valletta Convention) provides the basic policy framework for protection of the archaeological heritage. The Convention was ratified by Ireland in 1997. Its aim is to '*protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study*'. Ireland is party to the UNESCO¹ Convention concerning the Protection of the World Cultural and Natural Heritage². The Ceide Fields Archaeological Complex in North Mayo is on the tentative list for designation as a UNESCO World Heritage Site.

The archaeological heritage includes National Monuments in the ownership/guardianship of the State, National Monuments subject to Preservation Orders, archaeological and architectural monuments and sites listed in the Record of Monuments and Places (RMP) and the Register of Historic Monuments, zones of archaeological potential in Historic Towns; the underwater archaeological heritage, including Historic Wrecks; unknown and unrecorded archaeological sites (including subsurface elements with no visible surface remains); potential sites located in the vicinity of large complexes of sites or monuments, present or former wetlands, unenclosed land, rivers or lakes, or inter-tidal zones. Monuments can be described as any artificial or partly artificial building structure, or erection. Monuments protected under the National Monuments Acts 1930-2004 include places and artifacts associated with commercial, cultural, economic, industrial, military, religious or social activity.

County Mayo has a rich archaeological heritage as reflected in the RMP which lists and protects monuments and places under Section 12 of the National Monuments (Amendment) Act, 1994. Nearly 6,000 areas of archaeological importance (representing almost 8,000 elements) are included in the RMP for County Mayo spanning over 7,000 years (Figure 4.31). There are 51 National Monuments in the County in the ownership or guardianship of the State and a further 11 National Monuments that are subject to Preservation Orders.

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¹ United Nations Educational Scientific and Cultural Organisation

² The World Heritage Convention

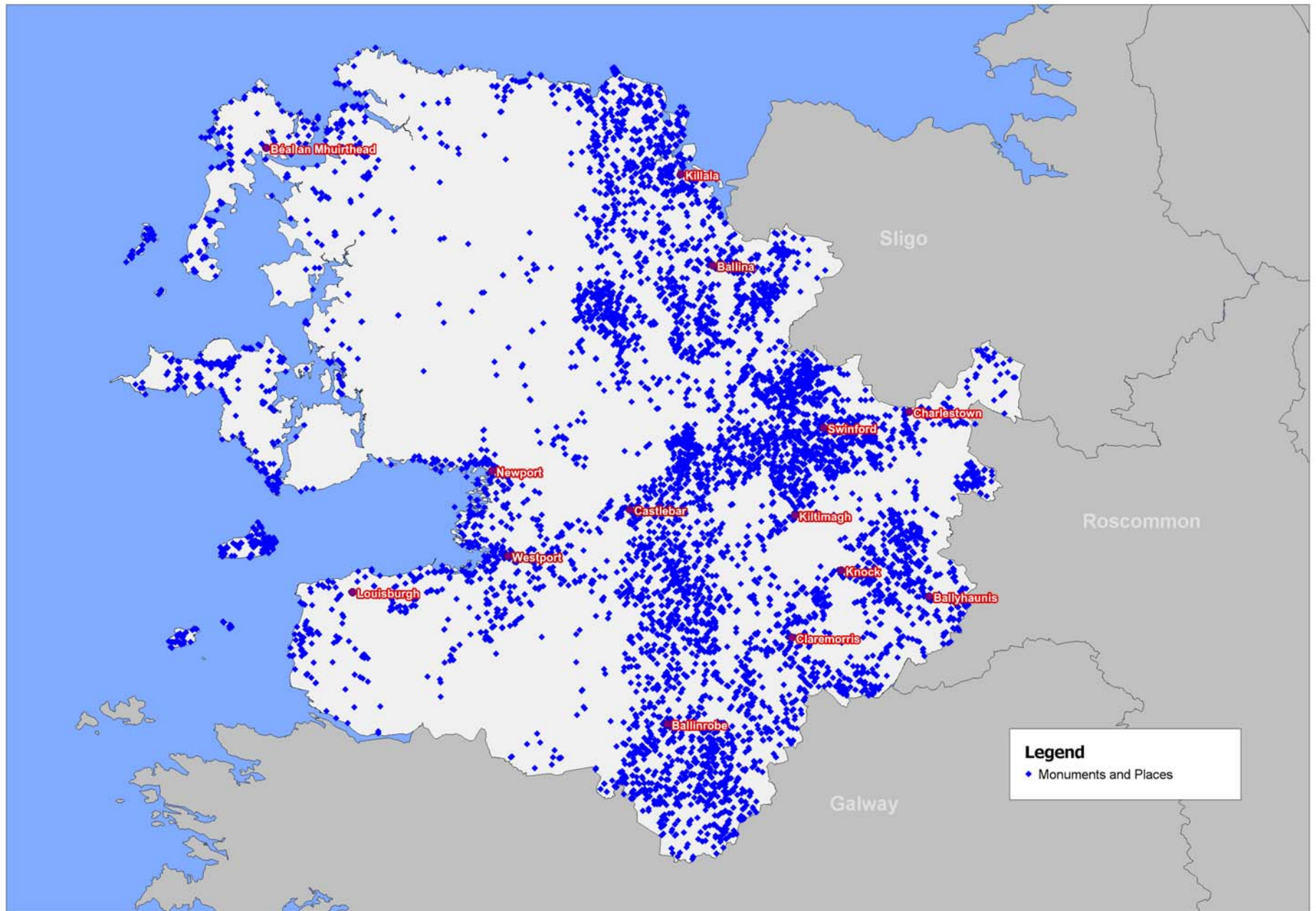


Fig 4.31 Distribution of Recorded Monuments and Places in County Mayo

4.8.3 Architectural Heritage

The term ‘architectural heritage’ is defined in the Architectural Heritage (National Inventory) and Historic Monuments Act, 1999, as meaning all structures and buildings together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings, and sites which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Within this range of building types are structures, streetscapes, village and town cores of such architectural heritage significance or special character that they are deemed worthy of protection either as individual elements which are listed on the Record of Protected Structures (RPS), as groups of buildings within Architectural Conservation Areas (ACAs) or as particular built heritage types that have been recorded (by inventories) because they form part of the unique identity of Mayo.

The legislative framework covering architectural heritage includes the National Monuments Act 1930-2004 which constitutes a broad piece of legislation dealing with the protection of historic monuments; and the Planning and Development Acts 2000 – 2002. Apart from National Legislation there are also European and International Legal Frameworks to be consulted in relation to architectural heritage including the Venice Charter 1964; the Washington Charter 1987; the Burra Charter 1979/ 1981/ 1988; the Nara Document on Authenticity 1994; and the Granada Convention for the Protection of Architectural Heritage of Europe (1985).

County Mayo has a rich architectural heritage, of which 273 structures are included in the RPS (See Fig 4.32). The full list of protected structures and a brief description of each structure listed is set out in Document 7 of the MCDP 2008-2014. Whilst the RPS includes some of the architectural heritage of the County deemed worthy of preservation and conservation, it could not be described as a definitive list. In addition, there are many buildings and structures, not included in the RPS which are important in their own right as part of the built heritage of the County.

Mayo’s architectural heritage spans many centuries. This heritage reflects past lives and is an important record of the economic and social history of the County. Architectural heritage in town cores includes churches, courthouses and prominent commercial and institutional buildings including banks and post offices.

Maritime, Transport and Industry

The coastline of Mayo is served by a large number of lighthouses, quays, piers and coastguard stations, all of which are part of this architectural heritage. Transport related heritage is also of importance with nineteenth-century railway architecture, including railway stations, bridges and other related railway infrastructure forming part of the county’s architectural heritage. The many fine stone bridges of Mayo are fine examples of engineering and craftsmanship. The county’s industrial legacy of mill buildings and associated warehouses mark the landscape, both rural and urban.

Historic Gardens

Historic gardens and designed landscapes associated with country houses and demesnes are also of importance. Many provided a landscape setting for the larger house with enclosing tree plantation belts, walled gardens and perimeter walls. The land redistribution arising out of the Encumbered Estates Act of 1849 to the Land Acts of the late 19th and early 20th centuries have all resulted in significant change to these landscapes.

Agriculture

Agriculture has shaped the landscape throughout the centuries, as farmers created fields, defined boundaries, built houses and outbuildings, and laid out gardens. Ranging from the architecturally designed country houses with their formal outbuildings to the smaller holdings of single-storey and two-storey vernacular farmhouses, usually with outbuildings and a yard. This heritage is an intrinsic part of the Mayo landscape. Also of significance are the cottiers dwellings, with the thatched house and thatched farm building forming a distinctive part of the Mayo landscape.

Other Vernacular Architecture

In addition to the above, there are more modest buildings that define distinctive local character both in the countryside and in the towns and villages. Alongside banks, churches and public buildings there are many distinctive shop fronts and domestic architecture which define the streetscape.

Architectural Conservation Areas

Another form of legislative protection in relation to architectural heritage is the Architectural Conservation Area (ACA). An ACA is a place, area, group of structures or townscape, taking account of building lines and heights, that is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or that contributes to the appreciation of a protected structure, and whose character it is an objective of a development plan to preserve. The areas provided for in County Mayo under this mechanism are Westport, Pearse Street, Ballina and The Quays, Ballina.

Inventories of the Architectural Heritage

Supplementing the RPS and ACAs, inventories of various aspects of the architectural heritage of County Mayo have also been undertaken by Mayo County Council including the Railway Heritage Survey, Heritage Bridge Survey (Figure 4.33) and Thatch Survey (Figure 4.34).

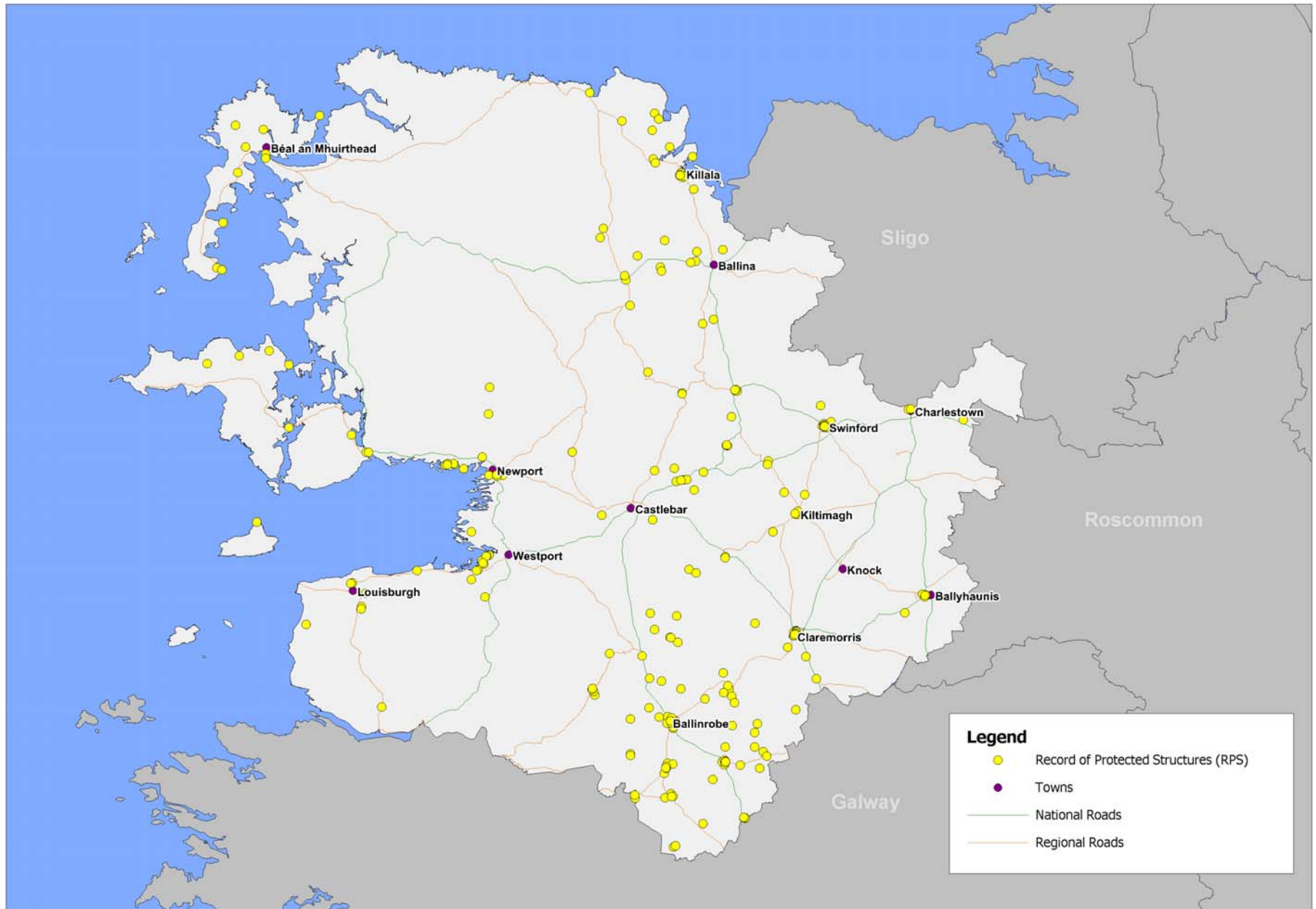


Fig 4.32 Protected Structures

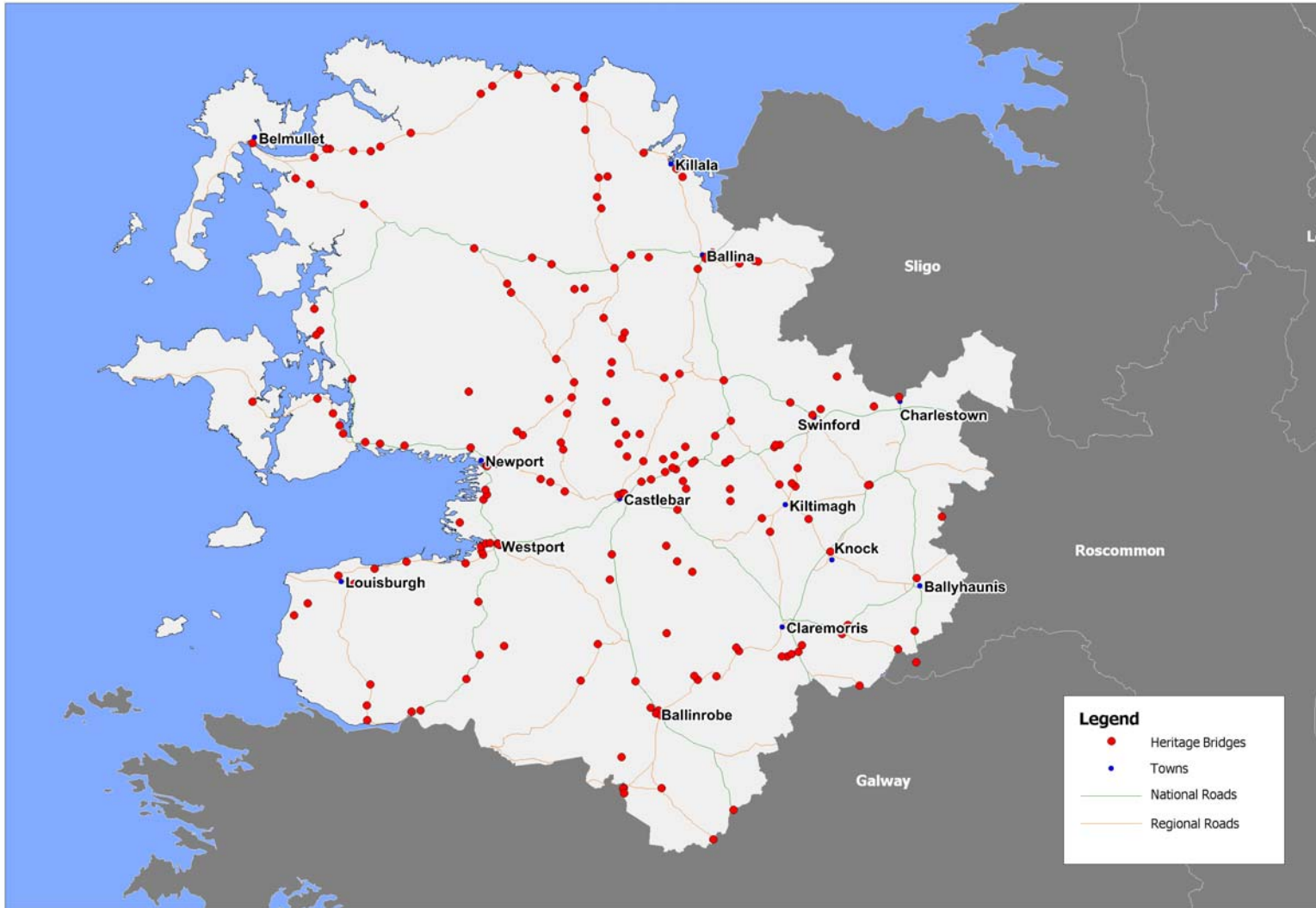


Fig 4.33 Heritage Bridges

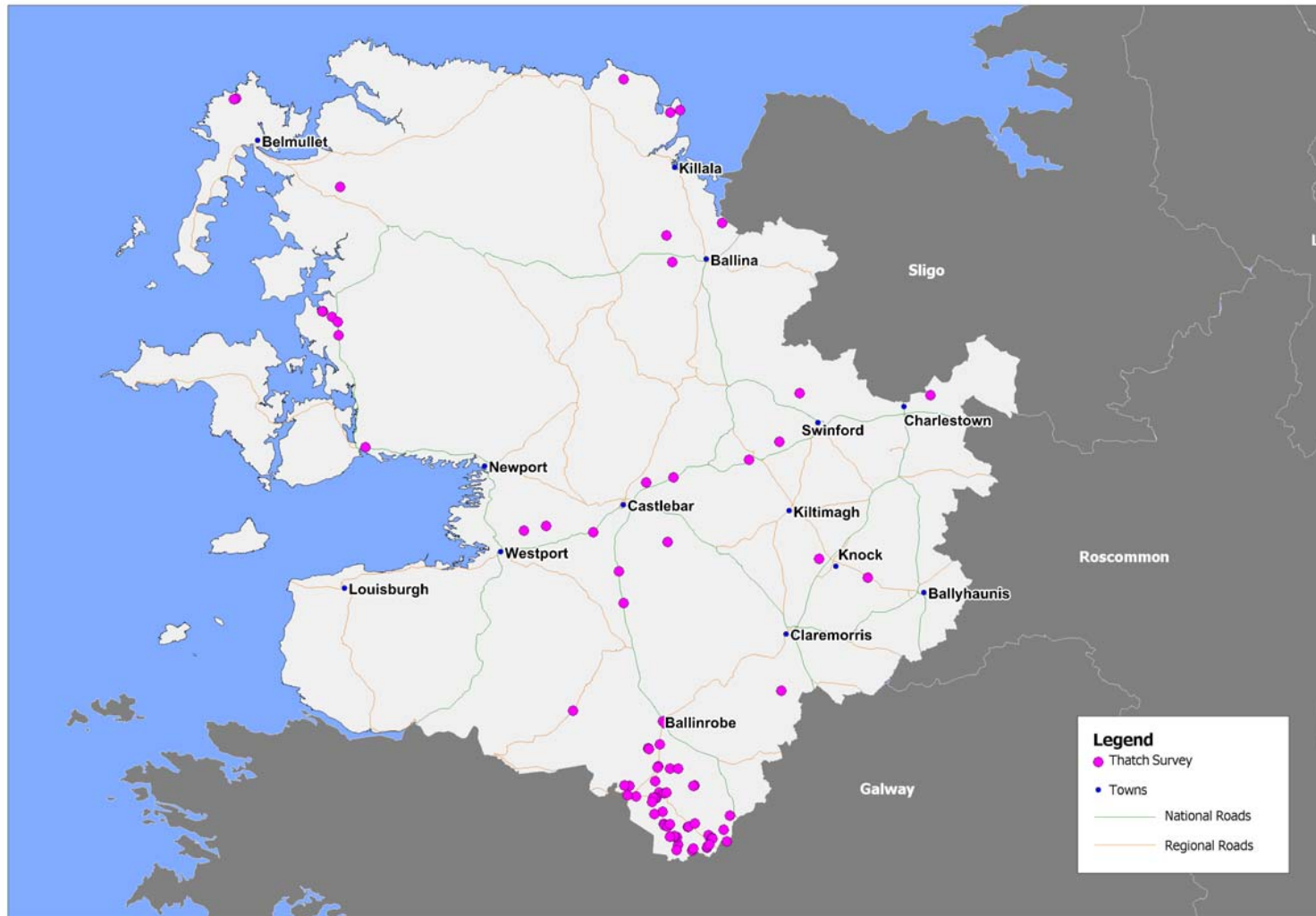


Fig 4.34 Thatch Survey Sites

4.8.4 Existing Environmental Problems relating to Cultural Heritage

Archaeological Heritage

The archaeological heritage is a non-renewable resource. Increased development pressure raises the potential for impact on the archaeological resource. Although this cultural heritage is protected under legislation, impacts can still occur as a result of development. Proposed developments which cause ground disturbance can damage previously unknown subsurface archaeology.

The encouragement and facilitation of development on brownfield sites contributes to mitigating a number of the adverse impacts associated with greenfield development on archaeology, however, brownfield development has the potential to significantly adversely impact upon cultural heritage if not mitigated. The context and setting of archaeology in both townscapes and landscapes can also be adversely impacted upon by developments if unmitigated against.

Architectural Heritage

Only some of architectural heritage of County Mayo, as outlined above, is listed in the RPS and the NIAH Mayo County Survey is not yet complete. Many owners and occupiers of protected structures are unaware of their legal responsibilities to maintain them and this has resulted in deterioration, loss or damage to the historic fabric. Unauthorised developments have resulted in physical loss or loss to the context in the surrounding landscape or streetscape where architectural heritage exists. The availability of skilled labour in traditional skills can result in inappropriate repairs to historic structures. Finally the costs associated with the repair and maintenance of Protected Structures can be prohibitive.

4.8.7 Evolution of Cultural Heritage in the Absence of the RES

Archaeological Heritage

In the absence of a renewable energy strategy for County Mayo, renewable energy development would have no guidance as to where to be directed and planning applications would continue to be assessed on an individual basis. The archaeological heritage would continue to be protected under a number of strategic actions relating to archaeological protection. The archaeological heritage would be impacted upon by the nature of permitted applications.

Architectural Heritage

In the absence of the RES, planning applications would continue to be assessed on an individual basis and would be subject to relevant statutory requirements and guidelines in place for the protection of the architectural heritage.

4.9 Landscape

4.9.1 Introduction

Landscapes are areas which are perceived by people and are made up of a number of layers; landform, which results from geological and geomorphological history; land cover, which includes vegetation, water and human settlements and; human values which are a result of historical, cultural, religious and other understandings and interactions with landform and land cover.

Mayo presents a wide range of landscapes. These range from complex agricultural patterns in the lowlands with small roads and houses; to a deeply indented and islanded Atlantic coastline; to the great and often empty uplands and moorlands of the west and north of the County. County Mayo's Landscape Appraisal (Mayo County Development Plan 2008-2014) subdivides the County into sixteen distinct landscape character units, each containing an area of land with similar character-giving elements such as slope, vegetation and land use. The appearance of the landscape is relatively uniform within each Character Unit.

The Landscape Appraisal identifies vulnerable features across the County including river banks, lake shorelines, the coastline and the skylines of the County's uplands. It is a policy of the Council to recognise and facilitate appropriate development in a manner that has regard to the character and sensitivity of the landscape and to ensure that development does not have a disproportionate effect on the landscape and scenic views in terms of location, design and visual prominence.

With regard to both the character units and the vulnerable features, the Appraisal groups together character units into Policy Areas which provide for the guidance of development across the County. There are four Landscape Policy Units in County Mayo. See Figure 4.35.

Policy Area 1: Montaine Coastal

This area is visually distinct in County Mayo landscape terms as it incorporates, in a relatively small area, two dramatic landscape attributes being a steep and rugged shoreline and mountains rising immediately above. These elements make it a desirable setting for visitors and also particularly sensitive to inappropriate development.

Policy Area 2: Lowland Coastal

This area, despite the mildly variant terrain and land cover, has as a principle landscape factor a visual association with the coastline. The lowland coast is considered a separate core policy area, in relation to the other steeper coastal area, as it has significantly different landscape attributes, sensitivities and robustness.

Policy Area 3: Uplands, moors, heaths or bogs

These distinctive and vast areas of the County form a single policy unit due to the similar visual characteristics of smooth topography, limited shelter vegetation, often steep slopes and prominent ridge lines, rendering this policy unit similar suitability to absorb development.

Lakeland Sub-policy Area 3A

This distinctive area of the County comprises the landscapes of Policy Areas 3 and 4, which bound Lough Conn. The environs of this Lough are often slopes and secondary ridgelines with limited shelter vegetation to the south and undulating areas of pasture, woodland and forest with underlying glacial drumlins to the north.

Policy Area 4: Drumlins and Lowlands

These undulating areas of pasture, woodland and forest make up the remainder of the County and are considered to have a generally similar ability to absorb development. Many of these areas are underlain by glacial drumlins and incorporate low-lying lakelands.

Lakeland Sub-policy Area 4A

This distinctive area of the County comprises the landscapes of policy areas 3 and 4, which bound Lough Mask. It bounds often steep slopes and prominent ridge lines with limited shelter vegetation to the west and undulating areas of pasture, woodland and forest with underlying glacial drumlins to the east.

Views and Prospects

Mayo County Development Plan 2008-2014 also identifies scenic landscape areas in the form of listed Highly Scenic Views, Scenic Viewing Points, Scenic Views and Scenic Routes. It is the policy of the Council (P/EH-VP1) to ensure that development does not adversely interfere with views and prospects and the amenities of places and features of natural beauty or interest when viewed from the public realm. Views and prospects worthy of preservation and protection which are identified in the County Development Plan are shown on Figure 4.36. It is also the policy of the Council (P/EH-VP2) to ensure that all proposals have regard to the potential effects of development on views from the public realm towards sensitive or vulnerable features and areas.

Summary of Policy Area Sensitivities

County Mayo's eastern landscapes (Policy Area 4) are the most robust in the County and are least sensitive to change. All other landscapes are highly sensitive to change.

The existing walking and cycling routes in the County are also generally located in sensitive scenic landscapes.

4.9.2 Existing Environmental Problems relating to Landscape

An existing environmental problem with regard to the environmental component of landscape is the visual impact of development which has occurred in the County's sensitive and vulnerable landscape areas and scenic views/routes.. Development which individually may not have significant adverse impacts, cumulatively have the potential to have significant adverse impacts upon these sensitive landscapes. Climate change is also attributing to landscape environmental problems such as coastal erosion resulting in loss of habitats and landscape features.

4.9.3 Evolution of Landscape in the Absence of the RES

It is likely that in the absence of the RES there would possibly be an accelerated change of character across all areas due to unmanaged development in the renewable energy sectors resulting in significant adverse impacts on landscape quality. In the absence of the RES, there would be no framework directing renewable energy developments and associated infrastructural requirements such as new roads, upgrading of the national grid, connections to the national grid and areas for growing crops associated with biomass and biofuel, to appropriate locations within the County. This may result in negative impacts upon sensitive and vulnerable landscapes and scenic routes and views.

Mayo has extensive areas designated as conservation areas, for wildlife, geological or landscape reasons. Although many of these features may be at risk through the provision of renewable energy developments, equally so, many of these features may also be at risk due to climate change. The renewable energy development may be part of a solution to combat climate change. Therefore in the absence of a renewable energy strategy that considers the character of the County and designates appropriate locations for renewable energy developments, the landscape character of Mayo may be considerably negatively altered through loss of landscape features resulting from climate change.

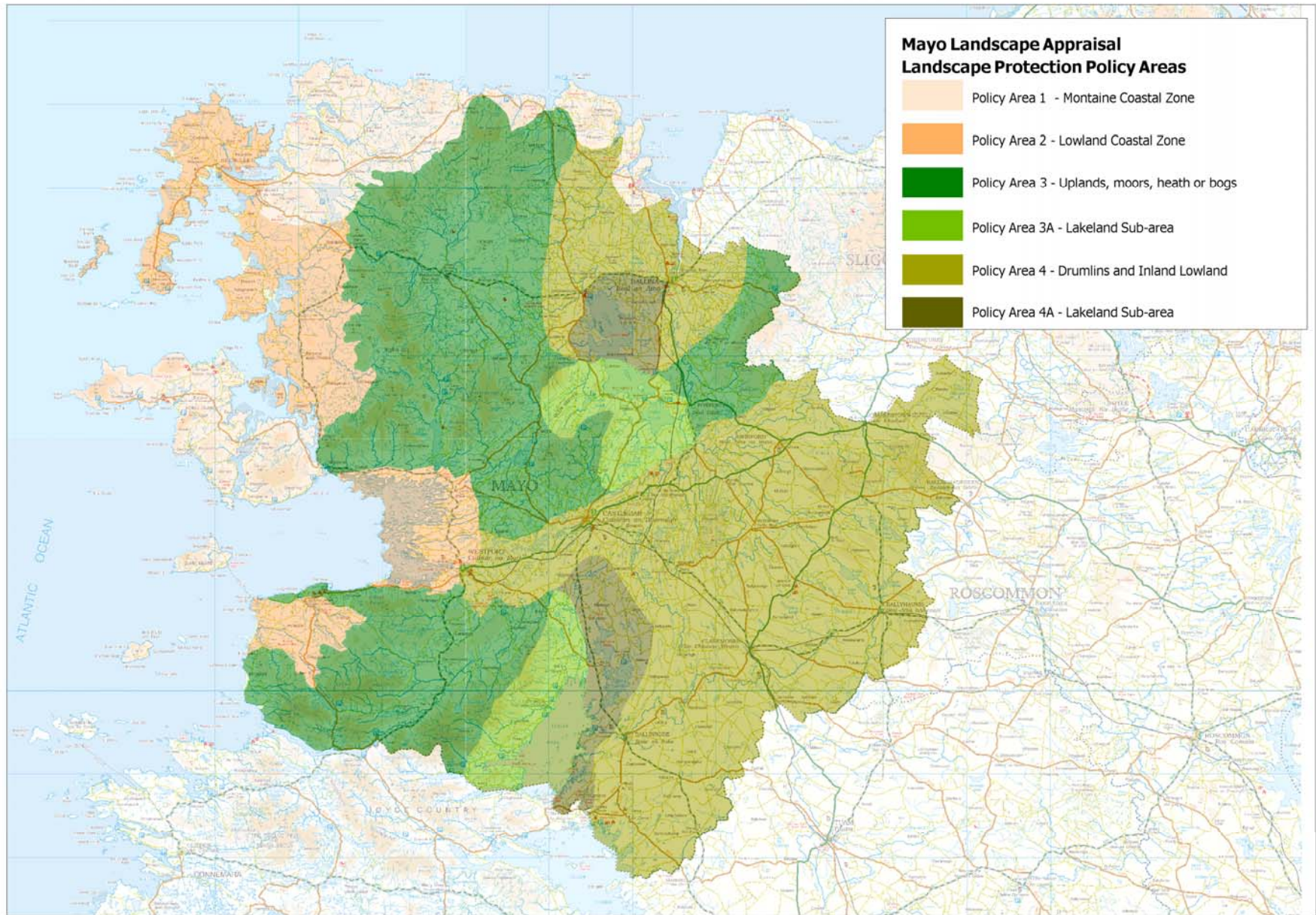


Fig 4.35 Landscape Protection Policy Areas (Mayo Landscape Appraisal)

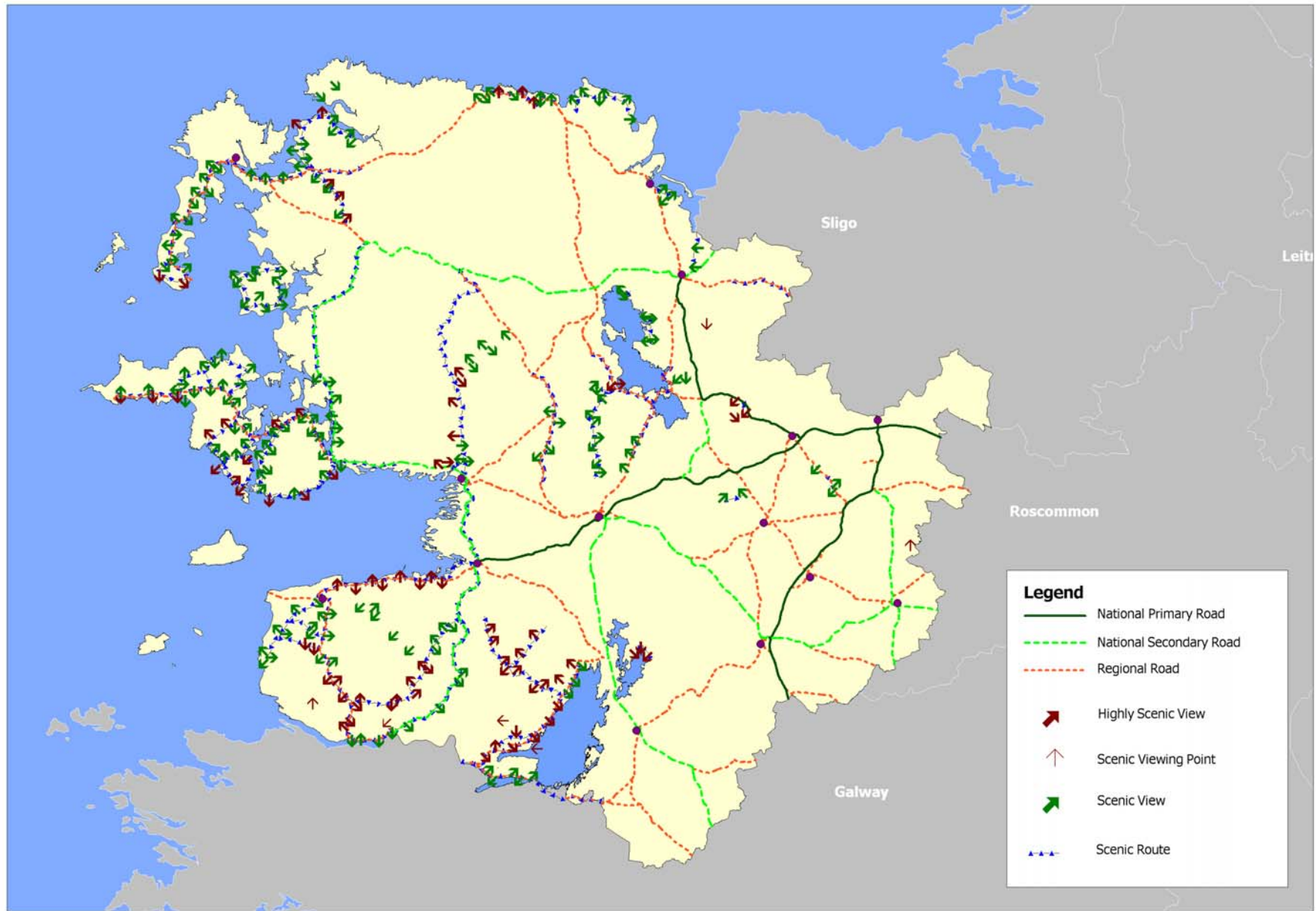


Fig 4.36 Scenic Views (Mayo County Development Plan 2008-2014)

4.10 Interrelationships between Environmental Factors

The environmental baseline encompasses the components of biodiversity, flora and fauna, population, human health, soil, water, air and climatic factors, material assets, cultural heritage and landscape together with the interrelationship between these components. As is evident from the baseline description of the various environmental components, there is a complicated set of interrelationships between these components, direct and indirect which potentially impact on the state or general health of individual components. An obvious example is that of water; changes in water quality will have impacts on population and human health and biodiversity. These interrelationships are discussed throughout the report as they arise.

4.11 Overlay Mapping of Environmental Sensitivities and Outcomes

Having established the environmental baseline; the main environmental problems and the interrelationship between the different environmental components, in order to identify where the most sensitive areas within and adjacent to the County occur, environmental factors, as described in the baseline were mapped using GIS (as described in Paragraph 2.4.1).

This overlay mapping was used to identify areas with the least environmental/planning constraints. This enabled the identification of areas suitable for different types of renewable energy development and with the least potential for conflict with the Environmental Protection Objectives (EPOs).

4.12 Consideration of Impacts of the RES on Adjoining Authorities

Environmental impacts do not recognise administrative boundaries and therefore the potential impacts of the RES on adjoining authorities must also be taken into consideration. During the Scoping Stage, the DoEHLG highlighted that the RES has potential to have significant effects on Natura 2000 sites both within and outside the County. However, it is recognised that the RES also has potential to impact on other environmental components such as water quality, landscape, cultural heritage and material assets such as roads and population. Having regard to Departmental guidance, a study area, extending 15km from the County boundary, as shown on Figure 4.37, was established in order to take into account the potential for in combination effects with other plans and projects inside and outside the plan area. Adjoining local authorities within this 15km study area are counties Galway, Sligo, Roscommon; and the town councils of Castlebar, Westport, Ballina and Tuam.

The adjoining Councils or Town Councils do not have renewable energy strategies to date, however, policies and objectives in relation to renewable energy are set out in their respective County or Town Plans. Siting of renewable energy developments tend to focus on wind farms. All plans outline environmental designations (international, national, regional and local) and policies and objectives in relation to their protection, which is considered relevant in this content.

County Mayo

The Town Councils of Ballina, Castlebar and Westport are located within County Mayo.

Ballina

The Ballina and Environs Plan 2009-2015 sets out the development framework for Ballina. It identifies a number of environmental designations (e.g. the Moy River, local habitats, Belleek Wood); built heritage (Architectural Conservation Areas, Protected Structures and Recorded Monuments) and listed views which are protected from inappropriate development in the plan.

Castlebar

The Castlebar and Environs Development Plan 2008-2014 sets out the development framework for Castlebar. Whilst there are no designated environmental sites in Castlebar the plan identifies the Castlebar River as a tributary of the Moy River (cSAC); lists two local protected landscapes Lough Lannagh and Saleen Lough; lists one protected view (south from the R311); and lists two protected tree stands in the town.

Westport

The Westport Town and Environs Development Plan 2010-2016 sets out the development framework for Westport. The Plan highlights that the town is one of the few planned towns in Ireland and is located within a context of sensitivities, such as prominent ridge lines; listed views; an Architectural Conservation Area along with a number of Protected Structures and Recorded Monuments; five Local Biodiversity Areas and linking corridors; and is located adjacent to Clew Bay (cSAC and pNHA).

County Roscommon

Roscommon County Development Plan 2008-2014 is the current development plan for County Roscommon. Roscommon County Council currently does not have a Renewable Energy Strategy or a Wind Energy Strategy. However northern Roscommon is identified as an ideal location for the development of wind energy, along with “certain suitable exposed areas” in the Roscommon County Development Plan. In assessing proposals for wind farm development proposals will generally be discouraged in or close to pNHA, cSAC, SPA designations, scenic routes and protected views and highly sensitive rural landscapes. Wind farms will only be permitted in locations that do not negatively impact upon the scenic value of rural areas and comply with planning considerations.

The Landscape Character Assessment for Co. Roscommon categorises the County into 36 Character Areas. Nine categories adjoin or are within 15km of County Mayo.

Areas 11, 21, 22, 23, 24, 25, 26 and 27 are designated as ‘Moderate Value’. Area 10, which adjoins County Mayo (east of Ballyhaunis) is designated as ‘High Value’. Area 10 - The Suck River Source and Lough O’Flynn Boglands character area - of High Value due to its quiet wetland landscape offering fishing, boating and walking amenities. The scenic views around Lough O’Flynn are valued and should be protected from inappropriate development, especially along its shoreline.

There are a number of small cSACs and pNHAs located adjacent to, or in close proximity to, the Mayo/Roscommon border.

County Galway

Galway County Development Plan 2009-2015 is the current development plan for County Galway. The Plan contains policies and objectives regarding the siting of renewable energy developments (including wind farm developments) in the County, along with Landscape Conservation and Management objectives. The plan facilitates the continual development of renewable energy sources having regard to residential amenities, biodiversity and landscape sensitivities. In general, wind farms are guided to the landscape areas shown on Map IS1, subject to visual and environmental impact assessment, including consideration of designated environmental sites. Three classifications lie along the Galway/Mayo border; ‘No Go Areas’ where wind farm development is considered inappropriate; ‘Areas for Consideration’ where each project would be dealt with on its merits and ‘Strategic Areas’ where wind farm development is considered appropriate subject to environmental and scenic factors.

The Development Plan contains a map indicating the Landscape Value Rating. The areas adjoining Mayo are classified as ‘Outstanding’ along the north- west of the County (Galway) and ‘Low’ along the north east of the County (Galway).

Although Galway County Council does not appear to have a Renewable Energy Strategy, the Council’s website does list a number of energy projects within the County ranging from the Galway Bay marine test site, wind farm developments to energy efficient housing schemes.

Tuam Town Council lies within 15km of the Mayo/Galway border. The Tuam Local Area Plan is the current plan for the town. There are no specific policies/objectives in relation to renewable development but there are policies for the protection of the natural environment such as watercourses, flora and fauna.

County Sligo

Sligo County Development Plan 2010-2016 is the current development plan for County Sligo. It states that County Sligo has the resources to generate 2.25% of the State's renewable energy potential through wind energy, wood biomass (short rotation forestry and forest residue) and small-scale hydroelectric power generation. In addition, it is stated that Sligo's mountainous landscape and exposed location on the western seaboard combine to create the ideal conditions for the generation of wind power. However it is also stated that the siting of wind turbines requires careful consideration and proposals will generally be discouraged in or close to pNHAs, cSACs, SPAs, designated Sensitive Rural Landscapes, Visually Vulnerable Areas, Scenic Routes, protected views, Zones of Archaeological Potential and existing towns and villages. In addition development proposals should avoid locations that are immediately adjacent to coastal settlements or significant tourist attractions.

There are two large SACs and pNHAs along the Sligo / Mayo boundary.



Fig 4.37 Adjoining Authorities 15km Study Area

Section 5 Environmental Protection Objectives

5.1 Introduction

Environmental Protection Objectives (EPOs) are methodological measures against which the environmental effects of the RES can be tested. The EPOs are set out under a range of topics and are used as standards against which the RES can be evaluated in order to help identify areas in which significant adverse impacts are likely to occur, if unmitigated. If complied with in full, EPOs would result in an environmentally neutral impact from implementation of the RES. The use of Environmental Protection Objectives fulfils obligations set out in Section F, Schedule 2B of the Planning and Development (SEA) Regulations 2004. They are used as a tool to cross check the policies and objectives of the RES, in order to maximize the environmental sustainability of the Strategy. The cross checking process will help identify policies/objectives that would be likely to result in significant adverse impacts so that alternatives may be considered or mitigation measures put in place.

The SEA Directive requires that the evaluation of plans etc. be focused upon the relevant aspects of the environmental characteristics of areas likely to be significantly affected. In compliance with this requirement, Environmental Protection Objectives were developed for the various environmental factors set out in Schedule 2B of the SEA Regulations 2004. However, most attention has been given to environmental receptors which are likely to be impacted upon as a result of the implementation of the RES.

Following consultation with the statutory consultees, EPOs were formulated/adapted by the multi-disciplinary in-house SEA Team having regard to the checklist of objectives established at international, European and national level, the sample objectives in Table 4B of the DoEHLG SEA Guidelines; and EPOs listed in the SEA Environmental Report for MCDP 2008-2014.

The EPOs are linked to indicators which serve to assess/ measure the success of the EPOs and to facilitate monitoring the implementation of the RES. They are also linked to targets which the RES can help work towards. Use of the EPOs in assessing both the alternative scenarios and the detailed policies and objectives of the RES (and as a basis for mitigation measures) enables them to be fully integrated into the preparation of the RES from the outset.

From the outset, environmental considerations were built into the Strategy. However, as the SEA process and the Draft RES evolved, it was necessary to alter and amend the Draft Strategy in response to the SEA process. These areas are highlighted in green in the draft Strategy and are recorded in Section 8 of this Report.

5.2 Biodiversity, Flora and Fauna: EPOs, Targets and Indicators

Biodiversity, flora and fauna are protected under a broad spectrum of international, European and National legislation and guidelines.

The UN Convention of Biological Diversity 1992 was ratified in 1996. It aims to conserve biological species, genetic resources, habitats and ecosystems; to ensure the sustainable use of biological materials; and to guarantee the fair and equitable sharing of benefits derived from genetic resources. The European Biodiversity Strategy (1998) aims to anticipate, prevent and attach the causes of significant reduction of loss of biodiversity at the source.

The Convention on Wetlands of International Importance (Ramsar Convention 1971) provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Each Member State must recognise and preserve internationally important wetlands.

The EU Habitats Directive aims to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species at a favourable conservation

Environmental Report
Draft Renewable Energy Strategy for County Mayo

status. The Habitats Directive was transposed into Irish Law by the European Communities (Natural Habitats) Regulations, 1997 (S.I. 94 of 1997).

In relation to Bird species, the EU Birds Directive: (79/409/EEC) for the conservation of naturally occurring species of wild birds and their habitats throughout the EU; requires that special measures be taken to conserve the habitats of listed migratory and wetland species to ensure their survival and reproduction in their area of distribution.

The EU Council Directive on the Conservation of Natural Habitats & of Wild Flora & Fauna (92/43/EEC) aims to protect and restore the conservation status of a list of key habitats. For Ireland, these include raised bogs, active blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets. Member states are required to designate these habitats as SACs. The SAC and SPA areas combined constitute the Natura 2000 network.

At the National level, the Wildlife Act 1976 seeks to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems, to provide for the development and protection of game resources and to regulate their exploitation. The Wildlife (Amendment) Act, 2000 extended the scope of the 1976 Act to give statutory protection to NHAs (including geological and geomorphological sites) and also new measures to enhance the conservation of wildlife species and their habitats and the promotion of biological biodiversity. Under the National Biodiversity Plan, the overarching objective is to secure the conservation, including where possible the enhancement, and sustainable use of biological diversity in Ireland and to contribute to conservation and sustainable use of biodiversity globally.

At the local level, Mayo County Council has published a Local Biodiversity Action Plan to raise awareness of and promote the conservation of the natural heritage and biodiversity of the County.

The following EPO's, targets and indicators have been developed having regard to the environmental baseline and the objectives of the above strategic actions:

Table 5.2 EPOs, Targets and Indicators for Biodiversity, Flora and Fauna

EPOs	Targets	Indicators
B1: Conserve and enhance the diversity of protected habitats and species	Target B1: No loss or degradation of habitat or species as a result of renewable energy developments	Indicator B1i: Number of sites for Nature Conservation adversely affected by the Strategy Indicator B1ii: Changes in population and range of protected species Indicator B1iii: Changes in habitats areas and/or populations of flora and fauna
B2: Protect, conserve and enhance habitats, species and areas of national or international importance and promote the sustainable management of ecological networks	Target B2i: Maintenance of favourable conservation status for all habitats and species protected under national and international legislation Target B2ii: No loss of ecological networks	Indicator B2i: Area or proportion of total of SACs/SPAs/NHAs damaged or lost as a result of renewable energy developments Indicator B2ii: Ecological networks lost as a result of renewable energy developments

5.3 Population and Human Health: EPOs, Targets and Indicators

The impact of implementing the RES on population and human health is determined by the impacts which the RES may have on other environmental components including water quality, soils, air, noise, and biodiversity. Along with the EPOs, Indicators and Targets for such environmental factors the following EPOs, Indicators and Targets for population and human health are considered appropriate:

Table 5.3 EPOs, Targets and Indicators for Population & Human Health

EPO	Target	Indicator
PH1: To protect human health from hazardous nuisances arising from exposure to incompatible land uses	Target PH1: No spatial concentration of health problems arising from environmental factors as a result of renewable energy developments	Indicator PH1: Occurrence of any spatially concentrated deterioration of human health

5.4 Soils and Geology: EPOs, Targets and Indicators

To date, there is no legislation which is specific to the protection of soil resources. In 2006 the European Commission adopted a Soil Thematic Strategy, on the protection of soils, which is designed to halt and reverse the process of soil degradation, ensure healthy soils for future generations and remain capable of supporting the ecosystems on which our economic activities and well-being depend¹. The Strategy includes a proposal for a Soil Framework Directive which proposes common principles for protecting soils across the EU. Article 5 of the proposed Directive states that for the purposes of preserving the various functions of soil; sealing – the development of artificial surfaces on top of soil resources, should be limited. The proposed Directive also states that soil should be used in a sustainable manner which preserves its capacity to deliver ecological, economic and social services, while maintaining its functions so that future generations can meet their needs. Having regard to the above, the baseline study of the soils and geology and the policies identified in the Mayo County Development Plan 2008-2014, the following EPOs have been established for Soils and Geology:

Table 5.4 EPOs, Targets and Indicators for Soils & Geology

EPOs	Targets	Indicators
SG1: To protect the IGH sites as identified by the GSI in the Mayo County Development Plan 2008-2014	Target SG1: No RE ² developments to adversely impact on IGH sites	Indicator SG1: Number of RE developments which would be considered to have significant adverse impacts including direct or indirect impacts on IGH sites
SG2: To protect areas which are at risk of flooding, or areas which may be at risk of exacerbating flooding in another area	Target SG2: No RE development in areas which may cause a significant risk of flooding or which may exacerbate a risk of flooding in another location	Indicator SG2: Number of RE developments in areas which have a direct or indirect significant impact on flooding, or number of developments which may be linked indirectly to causing flooding in another area
SG3: To identify and protect areas which may be deemed as at significant risk of landslides	Target SG3: No RE development in areas which may be considered at risk to landslides	Indicator SG3: Number of RE developments in areas which may be considered to be prone or at risk from landslides or soil creep
SG4: To identify and protect areas which may be at risk of significant erosion	Target SG4: No RE development in areas considered at significant risk to erosion	Indicator SG4: Number of RE developments in an area identified as a high erosion prone area, or an area at significant risk to erosion

¹ Environment fact sheet: soil protection – a new policy for the EU, European Commission 2007.

² RE: Renewable Energy

5.5 Water: EPOs, Targets and Indicators

The Water Framework Directive (WFD 2000/60/EC) was adopted in 2000 and transposed into Irish legislation by the EU (Water Policy) Regulations, 2003 (SI 722 of 2003). The WFD, which encompassed a number of earlier Directives, sets a framework for the comprehensive management of water resources in the European Community. The fundamental objective of the Directive aims at maintaining “high status” of waters where it exists, preventing any deterioration in the existing status of waters and achieving at least “good status” in relation to all waters by 2015. Good status refers to the biological and chemical characteristics which demonstrate only minor differences compared to the natural or ‘reference’ state. The essence of the WFD was a new approach to water quality management which focuses on both quality and quantitative status consistent with a healthy ecosystem, contrary to previous legislation, the focus of which was on standards and emission limits for physical and chemical parameters only. Besides protecting and enhancing water quality and aquatic ecosystems, the Directive is also intended to promote the sustainable use of high quality water resources.

The WFD provides for water management on the basis of River Basin Districts (RBDs). The Western River Basin District Management Plan 2010 was adopted in July 2010.

Waters are also protected under the EU Urban Waste Water Directive (91/271/EEC) which aims to protect surface inland waters by regulating collection and treatment of urban waste water and discharge of certain bio-degradable industrial waste. The principal objective of the RES in Mayo with regard to water quality and freshwater ecological elements and effluents is to determine the most economical method of energy production with as minimal impact on the aquatic environment as possibly feasible while producing as small a volume of ‘good quality’ effluent as possible.

Ireland’s marine conservation policy is strongly influenced by the EU and international conventions such as the OSPAR Convention 1992, ratified by Ireland in 1997; the purpose of which is to encourage international co-operation to protect the marine environment of the North-East Atlantic. Convention signatories are required to take steps to prevent and eliminate marine pollution and to protect the maritime areas, thereby safeguarding human health and conserving marine ecosystems. Key protection for marine species and habitats comes from the designation of the Natura 2000 network under the Habitats and Birds Directives. The Wildlife (and Amendment) Acts afford protection to a range of species outside of designated sites. In addition, marine species and habitats are indirectly afforded some level of protection through pollution control measures associated with designated Shellfish Production Areas, Bathing Water Regulations and Water Quality Objectives Regulations (which relate to all waters). Two key targets of the National Biodiversity Plan 2010-2015 are (a) to make substantial progress towards ‘good ecological status’ of marine waters by 2015 and further substantial progress made by 2020; and (b) for fish stock levels to be maintained or restored to levels that can produce maximum sustainable yield, where possible no later than 2015.

The aim of the Shellfish Waters Directive is to protect or improve shellfish waters in order to support shellfish life and growth. The Directive requires Member States to designate waters that need protection in order to support shellfish life and growth.

Groundwater quality and quantity must be protected under the requirements of the WFD (2000/60/EC) and the Groundwater Directives (80/68/EEC) and (2006/118/EEC). They establish clear Environmental Quality Objectives, Groundwater quality standards and threshold values for classification of groundwater protection against pollution and deterioration.

The EPA (2005) has set interim guideline values for both total coliforms (0 counts per 100ml) and faecal coliforms (0 counts per 100ml) in groundwater which is used for drinking water. These values are the same as the values set by the ECs (Drinking Water) Regulations, 2000 and trigger values set by the GSI (1999)²⁷. Faecal coliforms are micro-organisms which are found in human and animal faeces and are a useful indicator of the likely level of pathogens in wastewater.

Environmental Report
Draft Renewable Energy Strategy for County Mayo

The following EPO's, targets and indicators have been developed for Water having regard to the environmental baseline and the objectives of the strategic actions described above:

Table 5.5 EPOs, Targets and Indicators for Water

EPOs	Targets	Indicators
Freshwater & Ecology		
W1: To prevent deterioration of surface water bodies of good or high status	Target W1: No deterioration in surface water bodies of good and high status	Indicator W1: Quality elements for ecological status (biological, hydro-morphological, chemical & physico-chemical elements)
W2: To restore surface water bodies of less than good (good ecological potential/chemical status) to at least good status by 2015	Target W2: Improvement of moderate, poor and bad status water bodies to at least good status by 2015	Indicator W2: Quality elements for ecological status
W3: To control and improve the quality of diffuse and point source discharges	Target W3: Minimal deterioration in surface water quality due to diffuse or point source discharges	Indicator W3i: Chemical, physico-chemical & ecological status of the surface water catchment & immediately upstream of point and discharges Indicator W3ii: No/minimal exceedance in other relevant legislation
W4: To conserve, protect & enhance indigenous freshwater ecological elements & prevent disturbance from habitat destruction / modification, competition from invasive species and threats from listed flora	Target W4: No negative impacts on indigenous freshwater ecological elements due to habitat destruction or modification, and prevention of invasive species	Indicator W4: Quality elements for ecological status, populations of bio-indicators and keystone taxa lost or disturbed from registered Protected Sites (Article 8 of S.I. 722 of 2003), Natura 2000 Sites
W5: To treat all effluents to a quality consistent with the aim of preventing further deterioration of receiving waters and with a view to achieving good status by 2015	Target W5: To maintain good and high status and improve moderate, poor and bad to good status in Mayo water bodies by 2015	Indicator W5i: Chemical, physico-chemical and ecological status of the surface water catchment and immediately upstream of point and discharges. Indicator W5ii: no / minimal exceedance in other relevant legislation

Table 5.5 continued –

EPOs	Targets	Indicators
Marine Waters		
ME1: Conserve the diversity of habitats & protected species, including all sites of special biodiversity importance	Target ME1: No loss of Annex 1 Habitats or Annex II species from RE projects. No reduction in the diversity of floral & faunal species in designated sites from RE projects	Indicator ME1: Percentage loss of specific habitat or species within designated sites. Species composition of habitats within designated sites
ME2: Maintain range and distribution of cetaceans (whales & dolphins) and Seals	Target ME2: No significant adverse impacts on distribution & movement of cetaceans species. No loss of breeding grounds for grey & harbour seals	Indicator ME2: Percentage loss of populations of grey & harbour seals. Reduced use of area by cetaceans due to disturbance from activities associated with the RES
ME3: Maintain and improve where possible, water quality in marine and estuarine waters including quality of bathing and shellfish waters	<p>Target ME3i: Achieve ‘Good Status’ as a minimum but strive to achieve ‘High Status’ where possible under the Water Framework Directive by 2015. No significant change in hydro-morphological elements or general conditions from implementation of RES technologies</p> <p>Target ME3ii: Achieve and sustain concentrations near background values for naturally occurring substances or close to zero for man-made substances. No change in ecological quality ratios or change in species composition from hazardous substances.</p> <p>Target ME3iii: Compliance with Bathing and Shellfish Water Regulations</p>	<p>Indicator ME3 i: Trophic Status,³ Biological Status, hydro-morphological quality, and water quality parameters</p> <p>Indicator ME3 ii: Environmental concentrations in marine sediments and biota and biological impacts, Ecological Quality Ratios</p>
ME4: Protect fish communities.	Target ME4: No loss of fish spawning or nursery habitat from RE projects undertaken as part of the RES. Maintain existing water quality levels	Indicator ME4: More than 30% of fish should be longer than 40cm. Loss of spawning & nursery habitat, pollution of waters, physical disturbance
Groundwater		
G1: To prevent pollution and contamination of ground water	<p>Target G1i: No change in Groundwater Quality Standards associated with RE Developments</p> <p>Target G1ii: Compliance with Groundwater Quality Standards & EC Environmental Objectives (Groundwater) Regulations 2010</p>	<p>Indicator G1i: Changes in Groundwater Quality Standards from construction of RES Developments</p> <p>Indicator G1ii: Water status by 2015 WFD (2000/60/EC)</p>

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³ ATSEBI

5.6 Air and Climatic Factors: EPOs, Targets and Indicators

The primary objective for air quality in County Mayo is to ensure compliance with the Clean Air For Europe (CAFÉ) Directive (2008/50/EC) published in May 2008. Protecting the valuable asset of good air quality in the region is of the utmost importance; in particular, ensuring that adverse air quality does not impact on the most vulnerable of the population whether their vulnerability is due to occupation, age, existing health conditions or other factors. Measures should be adopted to control air-polluting emissions from both stationary and transport sources by consideration of the EPOs set out below (Air Quality).

The Environmental Noise Directive 2002/49/EC provides for a common approach intended to avoid, prevent or reduce the harmful effects of environmental noise. The main target is integrated noise management. Ireland's legal obligations under the Kyoto Protocol and targets established under the Climate Change Strategy underpin the EPOs relating to Climatic factors.

Table 5.6 EPOs, Targets and Indicators for Air and Climatic Factors

EPOs	Targets	Indicators
Air Quality		
AR1: Maintain & improve air quality status in line with appropriate policies & legislative requirements	Target AR1: Ensure monitoring results are maintained within the appropriate emission limit values	Indicator AR1: Air monitoring data to indicate compliance with appropriate policies and legislative requirements
AR2: To minimise increases in travel related air pollutants & GHG emissions	Target AR2: An increase in the percentage of population travelling to work or school by public transport or non-mechanical means	Indicator AR2: Percentage of population within the RES area travelling to work/ school by public transport or non mechanical means.
AR3: To promote energy conservation initiatives	Target AR3: Increase the number of energy efficient buildings	Indicator AR3: Number of BER certificates issued for County
Noise		
N1: To avoid, prevent or reduce on a prioritised basis exposure to the negative effects of environmental noise associated with renewable energy developments	Target N1i: To protect the quality of the future noise environment by acoustical planning	Indicator N1i: The production of a revised Noise Action Plan when required by legislation Indicator N1ii: Number of noise related complaints received in relation to RE developments Indicator N1iii: Number of planning permissions granted and associated compliance requirements for RE developments
Climate		
CF1: To ensure that County Mayo maximises its contribution to the national decrease in GHG emissions	Target CF1: That by the year 2020 a minimum of 40% of the electricity requirement of the County is produced from RE	Indicator CF1: The amount of the reduction in GHG emissions attributable to additional RE projects permitted in Co. Mayo
CF2: To ensure that projects designed to increase electricity production from RE resources in Co. Mayo are carried out in an environmentally sensitive manner so as to protect the existing environment	Target CF2: That by the year 2020 a minimum of 40% of the electricity requirement of the County is produced from renewable energy sources	Indicator CF2: The additional amount of MW produced from renewable energy in County Mayo
Flood Issues		
F1: To prevent development on lands which pose – or are likely to pose in the future – a significant flood risk	Target F1: Minimise developments granted permission on lands which pose – or likely to pose in the future- a significant flood risk	Indicator: F1: Number of developments granted permission on land which pose – or are likely to pose in the future – a significant flood risk

5.7 Material Assets: EPOs, Targets and Indicators

It is considered that the relevant material assets likely to be impacted by developments arising from implementation of the RES include the County’s roads and transportation network (including piers and harbours), its energy infrastructure, waste infrastructure, water supply and waste water infrastructure and its commercial forests.

Regarding waste management, the current plan ‘Replacement Waste Management Plan for the Connaught Region 2006-2011’ details the regions integrated waste management approach and policies with specific targets to be achieved by 2013. The targets are derived from the EU waste Hierarchy. In relation to waste water infrastructure, the treatment of wastewater is governed by the Urban Waste Water Treatment Directive (91/271/EEC) (amended by Directive 98/15/EEC) transposed into Irish law by the Urban Waste Water Treatment Regulations 2001 (SI 254 of 2001). The Directive aims to protect the environment from the adverse effects of the wastewater discharges by ensuring that wastewater is appropriately treated before it is discharged to the environment.

Also, it is noted that the treatment of wastewater is relevant to the WFD which requires all public bodies, including Mayo County Council, to coordinate their policies and operations so as to maintain the good status of water bodies which are currently unpolluted and to bring polluted water bodies up to good status by 2015. The policy of Mayo County Council is to improve and extend Water Services in the County.

Table 5.7 EPOs, Targets and Indicators for Material Assets

EPOs	Targets	Indicators
Roads & Transport Infrastructure		
R1: To protect County Mayo’s Road Network	Target R1i: Developments to be located off National Roads Target R1ii: No developments to be developed, which would involve deliveries having to travel long distances on local roads	Indicator R1i: Number of developments located close to the National Road Network Indicator R1ii: Number of developments which require traffic to travel long distances along Local Roads
IWAK		
AP1: To prevent any interference with the safety and efficiency of aircraft operations in the vicinity of Ireland West Airport Knock (IWAK)	Target AP1i: Renewable energy projects do not impact on the safety and efficiency of aircraft operations in the vicinity of IWAK Target AP1ii: Renewable energy projects do not limit the future expansion and growth of IWAK as an economic driver for the Region	Indicator AP1i: Number of Renewable Energy Projects proposed or permitted within the IWAK Exclusion zone Indicator AP1ii: Cumulative number of Renewable Energy Projects permitted within the IWAK exclusion zone
Piers & Harbours		
P1: To ensure the upgrading of the piers & harbours is carried out in an environmentally sensitive manner so as to protect the existing environment	Target P1i: No improvement to any pier, harbour or landing place to be carried out which would have an adverse impact on the existing environment of environmentally designated areas Target P1ii: No improvement to any pier, harbour or landing place to be carried out which would have an adverse impact on the existing environment of non- environmentally designated areas Target P1iii: No improvement to be carried out on any pier, harbour or landing place listed in the RPS which would have an adverse impact on that structure	Indicator P1i: Number of piers, harbours or landing places where improvements have been carried out which had an adverse impact on the existing environment of environmentally designated areas Indicator P1ii: Number of piers, harbours or landing places where improvements have been carried out which had an adverse impact on the existing environment of non- environmentally designated areas Indicator P1iii: No. of piers, harbours or landing places listed in the Record of Protected Structures where improvements have been carried out which had an adverse impact on that structure

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 5.7 continued –		
EPOs	Targets	Indicators
Energy		
E1 To ensure new energy infrastructure, including renewable energy infrastructure, is connected to the national grid in a sustainable manner	<p>Target E1i: No new energy developments or connections to the national grid to be conspicuously located within vulnerable or sensitive landscapes or environmental designated areas</p> <p>Target E1ii: No new energy developments or connections to the national grid to adversely impact upon vulnerable or sensitive landscape features or environmentally designated areas</p> <p>Target E1iii: No new energy developments or connections to the nation grid to cause loss of sensitive or vulnerable landscape features or environmentally designated areas</p>	<p>Indicator E1i: Number of conspicuous energy developments adversely impacting upon vulnerable or sensitive landscape features or environmental designated areas</p> <p>Indicator E1ii: Number of energy developments adversely impacting upon vulnerable or sensitive landscape features or environmentally designated areas</p> <p>Indicator E1iii: Number of sensitive or vulnerable landscape features lost; or adverse effects to, or loss of, protected habitats and species as a result of new energy developments including access to the national grid</p>
Waste Infrastructure		
WM1: Reduce waste arisings through an integrated approach including education & awareness	Target WM1: 48% recycled; 33% energy recovery; and 19% landfilled. Attitude change	Indicator WM1: Reduced tonnage of waste collected with increased number of customers
WM2: Maximise recycling and recovery	Target WM2: Target: 48% recycled; 33% energy recovery; and 19% landfilled	Indicator WM2: Increase in the percentage of customers receiving a refuse collection service and decrease in proportion of waste arisings being landfilled and increase in recovery and recycling tonnages
WM3: Divert biowaste from landfill and reduce landfill emissions	Target WM3: Reduction in greenhouse gasses through diversion of bio-waste from landfill	Indicator WM3: Number of customers with brown bin collection service
WM4: Ensure that all waste activity is regulated and that waste is treated in accordance with the highest environmental standards without causing environmental pollution	Target WM4: All waste activity is regulated	Indicator WM4: Reduction in enforcement action required
Waste Water Infrastructure		
WW1: Proposed Renewable Energy Development not to negatively impact on existing Waste Water Treatment Plants	Target WW1: Maintain effluent standard as per Urban Waste Treatment Regulations 2001, Surface Water Regulations 2009 and the Waste Water Discharge Licence for the WWTP	Indicator WW1: Change in effluent standard being emitted from the Waste Water Treatment Plant

Table 5.7 continued –

Drinking Water (EPO)	Targets	Indicators
DW1: Prevent deterioration of the status of water bodies with regard to quality & quantity and improve water body status for rivers, lakes, and groundwaters to at least good status as appropriate to the WFD, providing good sources of abstraction for drinking water	Target DW1i: No deterioration in status of waters and restoration to good status of water currently at moderate, poor or bad status Target DW1ii: Meeting the demands of the Drinking Water Regulations, 2007 Target DW1iii: Progressively reduce chemical pollution in waters Target DW1iv: Limit pollution inputs to surface waters/groundwater and prevent deterioration	Indicator DW1i: Trophic Status and Faecal Coliform count per 100ml of Groundwater. Indicator DW1ii: Drinking Water Annual Report (EPA) Indicator DW1iii: Interim Water status in 2011 report. Indicator DW1iv; Long Term Indicator: Water status in 2015 report
Mayo Forest Estate		
MF1: To promote the potential of forestry to enhance Mayo’s biological and landscape diversity and to provide aesthetic and amenity benefits while at the same time protecting our heritage and environment and providing economic benefit to local communities	Target MF1: Promotion of a sustainable forest resource in Mayo that enhances the quality of the environment	Indicator MF1i: Percentage of the land area of the County covered in mixed forest with a balance of deciduous and coniferous plantations Indicator MF1ii: No deterioration of the environment resulting from afforestation

5.8 Cultural Heritage: EPOs, Targets and Indicators

5.8.1 Archaeological Heritage

The Record of Monument and Places lists and protects monuments and places in County Mayo under Section 12 of the National Monuments (Amendment) Act, 1994. In addition, any impacts on National Monuments and sites that are subject to Preservation Orders, require the consent of the Minister of the DoEHLG under Section 14 of the National Monuments Act 1930, as amended by Section 5 of the National Monuments (Amendment Act) 2004.

The RES is subject to a number of high level National and International archaeological protection policies and objectives. The European Convention on the Protection of the Archaeological Heritage provides the basic policy framework for protection of the archaeological heritage. The 1992 European Convention on the Protection of the Archaeological Heritage (the Valletta Convention) was ratified by Ireland in 1997. The aim of the Convention is to ‘*protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study*’ (Article 1). The Convention provides the basic framework for policy on the protection of the archaeological heritage. Ireland is party to the UNESCO (United Nations Educational Scientific and Cultural Organisation) Convention concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention). The Ceide Fields Archaeological Complex in North Mayo is on the tentative list for designation as a UNESCO World Heritage Site. The Minister for the Environment, Heritage and Local Government has a specific role at central government level in the protection of the archaeological heritage through the National Monuments Acts 1930-2004, Heritage Act 1995. In addition, it is the policy of the Council under the MCDP 2008-2014 to “*Protect the archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State, and National Monuments that are the subject of Preservation Orders, and to safeguard the integrity of the archaeological sites in their setting.*”

5.8.2 Architectural Heritage

Mayo is a County steeped in a wealth of architectural heritage that spans many centuries as indicated in the baseline study of this environmental component. Apart from National Legislation such as the National Monuments Act 1930-2004 and the Planning Acts, which aim to preserve and protect the architectural heritage, there are also European and International Legal Frameworks to be consulted in relation to architectural heritage including the Venice Charter 1964; Washington Charter 1987, Burra Charter 1979/ 1981/ 1988; Nara Document on Authenticity 1994; and the Granada Convention for the Protection of Architectural Heritage of Europe (1985).

The following EPOs, targets and indicators have been established in relation to the Cultural Heritage of the County based on the above strategic actions.

Table 5.8 EPO, Targets and Indicators for Cultural Heritage

EPOs	Targets	Indicators
Archaeological Heritage		
CH1: To protect the archaeological heritage identified in the RMP, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders and to safeguard the integrity of the archaeological sites in their setting	Target CH1: No renewable energy developments carried out over the lifespan of the RES which result in the full/partial loss of the archaeological heritage identified in the RMP, National Monuments in the ownership or guardianship of the State & National Monuments that are the subject of Preservation Orders; and no renewable energy developments which result in the full/partial loss of the integrity of archaeological sites in their setting	Indicator CH1: Number of renewable energy developments carried out over the lifespan of the RES which result in the full/partial loss of the archaeological heritage identified in the RMP, National Monuments in the ownership/guardianship of the State & National Monuments that are the subject of Preservation Orders. The integrity of archaeological sites in their setting can also be impacted upon by new developments
CH2: To promote and support the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG	Target CH2: No renewable energy developments carried out over the lifespan of the RES which result in the full/partial loss of support and promotion of the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG	Indicator CH2: Number of renewable energy developments carried out over the lifespan of the RES which result in the full/partial loss of the promotion and support of the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG
Architectural Heritage		
AH1: To ensure the protection of the architectural heritage of County Mayo with regard to Protected Structures and Architectural Conservation Areas and other elements as described in Section 4.8.3 (Baseline) in accordance with statutory requirements and guidelines	Target AH1: To prohibit renewable energy developments that result in any adverse impacts or the loss of the architectural heritage	Indicator AH1: Number of Protected Structures and Architectural Conservation Areas and other elements of the architectural heritage as described in Section 4.8.3 which are adversely impacted on as a result of renewable energy developments
AH2: To ensure the protection of heritage bridges where they may be vulnerable due to construction traffic as a result of any renewable energy development	Target AH2: To prohibit renewable energy developments that would result in the damage to or loss of heritage bridges identified in the Heritage Bridge Inventory	Indicator AH2: Number of heritage bridges damaged or lost as a result of renewable energy developments

5.9 Landscape: EPOs, Targets and Indicators

5.9.1 Sensitive Landscapes & Vulnerable Features

Ireland signed and ratified the European Landscape Convention in 2002 with the Convention coming into force in Ireland in 2004. The aims of the Convention are to conserve and maintain the significant or characteristic features of a landscape, justified by its heritage value derived from its natural configuration and/or from human activity; to harmonise changes in the landscape which are brought about by social, economic and environmental processes; and to enhance landscapes.

Sensitive landscapes in County Mayo have been identified within the environmental baseline description. Vulnerable features which have been identified include the coastline, skylines, river banks and lake shorelines.

Table 5.9 EPOs, Targets and Indicators for Landscape

EPO	Targets	Indicators
L1: To protect County Mayo’s sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes	<p>Target L1i: No developments to be conspicuously located within or on sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes.</p> <p>Target L1ii: No developments to adversely impact upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes</p> <p>Target L1iii: No loss of sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes</p>	<p>Indicator L1i: Number of conspicuous developments adversely impacting upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes</p> <p>Indicator L1ii: Number of developments adversely impacting upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes</p> <p>Indicator L1iii: Number of sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes lost</p>
L2: To protect the visual amenity of all other landscapes of County Mayo	Target L2: Developments shall be sited and designed so as not to interfere with the visual amenity of the landscape of County Mayo	Indicator L2: Number of developments interfering with the visual amenity of the landscape of County Mayo

Section 6 Alternative Scenarios

6.1 Introduction

Article 5 of the SEA Directive requires the Environmental Report to assess the likely significant environmental effects of implementing a plan and “reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme”. Five alternative scenarios for the sustainable development of renewable energy in the County were devised. Each Scenario was then assessed in terms of its planning impacts and environmental impacts on the various environmental components (Population and Human Health, Biodiversity, Flora and Fauna, Soils and Geology, Water, Material Assets, Cultural Heritage and Landscape). Each Scenario was then evaluated against the EPOs.

As part of the initial scoping process and to facilitate the preparation of alternative scenarios, an examination of the different types of renewable energy with potential for development in the context of a RES for the County was undertaken. Arising from this process, the advantages and disadvantages associated with different types of renewable energy production were identified.

In order to set the context for the evaluation of the different alternatives and the more detailed assessment of the preferred scenario, this section summarises the advantages and disadvantages of certain forms of renewable energy production. It also outlines environmental issues that can potentially be associated with various forms of renewable energy development (unless mitigated) in relation to biodiversity, flora and fauna; water; soils and geology and landscape – all of which individually and as a result of interaction between them – have implications for other environmental components including population and human health and material assets.

6.2 Advantages and Disadvantages of Renewable Energy Production

Mayo has been identified as one of the best counties in Ireland in terms of on-shore winds. According to the Irish Wind Energy Association (IWEA), while it may be technically possible to install enough wind turbines in Ireland to meet the future annual total electricity demand of Ireland, given the current technological limitations this would be highly unlikely. This is because Ireland is a relatively small meteorological area and there are times when generation is extremely low due to very low wind speeds and similarly periods when generation exceeds demand.

A possible solution to this problem would be to integrate the national grid with a much larger grid such as Europe where electricity could be imported in times of shortage and exported in times of surplus. An East West Interconnector connecting Ireland to Wales commenced this year and it is expected to transmit power from 2012. However, the IWEA suggest that the most likely long term sustainable solution to Ireland’s electrical needs would be the contribution provided by other renewable energies such as wave, tidal and bio-mass in addition to wind energy¹.

In this context the types, characteristics and positives and negatives of each renewable energy source considered appropriate for County Mayo are summarised in Table 6.1 below. An expanded description is included in the draft RES and Appendix 4.

Table 6.1 Summary of Advantages and Disadvantages of Renewable Energy Production	
Advantages of Wind Energy	Disadvantages of Wind Energy
<ul style="list-style-type: none"> • Produces little or no water/air pollution • Landowners receive an income while land can have other uses • Relatively cheap to build • Energy used to construct a turbine is generated by the turbine in three months of its operation • Turbines have a relatively long life of 20-25 years 	<ul style="list-style-type: none"> • Constant wind is required • Significant visual impact over a large area • Impacts on bird life • Electromagnetic interference • Require a lot of land
Advantages of Ocean Energy	Disadvantages of Ocean Energy
<ul style="list-style-type: none"> • Abundant, clean, and safe • Tides are very reliable • Visual aspects reduced compared to onshore development. 	<ul style="list-style-type: none"> • Not commercially viable at present • Shipping and navigation could be disrupted • Impacts on marine life • Coastline topography can cause difficulties for landing electrical cables • Limited power production at present
Advantages of Hydroelectricity	Disadvantages of Hydroelectricity
<ul style="list-style-type: none"> • Eliminates the cost of fuel • Easily stored in reservoirs • Offers recreational benefits like boating, fishing, walking route etc. after construction • Low operating costs • Long life 	<ul style="list-style-type: none"> • Can have a significant environmental impact such as disruption of aquatic ecosystems and bird life • Noise impacts during construction • Can be used only where there is a water supply • Dislocation of people living where reservoir planned • Catastrophic failure of the dam wall (rare) • Release of significant amounts of CO₂ at construction stage
Advantages of Bio-energy	Disadvantages of Bio-energy
<ul style="list-style-type: none"> • Abundant and renewable • Can be used to burn waste products 	<ul style="list-style-type: none"> • Large amounts of land required to harvest plants • Burning biomass can result in air pollution • May not be cost effective
Advantages of Solar power	Disadvantages of Solar power
<ul style="list-style-type: none"> • No water or air pollution Passive practices can be relatively inexpensive 	<ul style="list-style-type: none"> • Reliability depends on sunlight • Some forms are not really cost effective at present • Storage and back-up are necessary
Advantages of Geothermal	Disadvantages of Geothermal
<ul style="list-style-type: none"> • Low running costs • Little or no pollution (if gases contained) 	<ul style="list-style-type: none"> • Possible seismic events and subsidence • Possible toxic chemical run-off • Exploration and drilling are expensive

6.3 Environmental Considerations relating to RE Developments

6.3.1 Biodiversity, Flora and Fauna

Mayo has extensive areas of protected sites, which are designated for the protection of various habitats and species, and which could potentially be negatively impacted by renewable energy developments. On the other hand, the ecological resources of the County are at risk from the use of current traditional energy sources, from pollution and greenhouse gas emissions, including the associated impacts of climate change on biodiversity.

RE Type	Environmental Considerations relating to Biodiversity, Flora and Fauna
Wind	Wind energy developments have the potential to impact significantly on habitats and species, especially on the functioning of intact peatland systems. Fragmentation of blanket bogs caused by these developments can adversely impact on the wildlife, hydrology and physical characteristics of peatland ecosystems. The laying of turbine foundations causes drying out and compaction of peat accompanied by habitat destruction. The associated necessary infrastructure (roads, power lines etc.) can cause further damage. Construction impacts may be irreversible; peatlands are fragile hydrological systems that are difficult to restore once disturbed. Wind turbines can negatively affect the fauna and birds in their surroundings. This is due not only to an increase in the number of turbines, but in the continuous improvement in turbine design (e.g. larger blades and increased rotating speeds). Other associated negative impacts do not affect birds directly, (including visual and sound impact and habitat loss), but could have a greater impact than direct mortality. Wind farms also have a detrimental impact on bats, through collision with turbine blades, loss of foraging/commuting habitats and disorientation due to ultrasound emissions by wind turbines. The cumulative effect of wind farms on the landscape and habitats must be considered, with a need to protect sensitive landscapes and habitats. In addition, development of wind turbines often necessitates clearfelling of forestry, which can have a detrimental impact on sensitive aquatic habitats, through run-off and increased levels of silt and nutrients. Ecological networks can also be adversely impacted upon by the development of infrastructure, such as roads which result in habitat fragmentation or by development which results in the removal of hedgerows or which occur along coastal edges or on the edges of inland surface waters.
Ocean Energy	Ocean energy developments would have a limited impact on terrestrial ecology. These developments may result in changes in wave regimes and an impact on the coastline, on inshore habitats and shoreline sediments due to current/sediment changes. Ecological networks or habitats can also be adversely impacted upon by the development of associated infrastructure which would occur along coastal edges.
Bio-energy	Bioenergy has the potential to impact on biodiversity in a number of ways. Biofuel crops, particularly using non-native species, must be introduced with an understanding of possible risks to the environment. Introducing some plant species as biofuel sources may be safe, but ecological risks must be assessed before introducing biofuel crops. The conversion of land to grow biomass crops could lead to a loss of natural habitat. The ecological implications of clearfelling existing forestry must also be considered.
Hydro	The large reservoirs required for the operation of hydroelectric power stations can result in habitat loss through flooding of land that may have served as wildlife habitat, and displacement of species. It can also result in habitat fragmentation of surrounding areas.
Micro Generating RE	Micro renewable energy sources, including solar, have the potential to impact on protected species and could also impact on habitats. In particular, the potential impact to bats and their roosts arising from works to buildings and roofs must be considered. There are also concerns that birds and bats could collide with rotating blades of Micro wind turbines or be displaced from nesting and foraging areas.

6.3.2 Soils and Geology

RE Type	Environmental Considerations relating to Soils and Geology
Wind	Most of the County, especially the west, is covered with peat. Blanket Bog is considered to be shallower than raised bogs, but the blanket bogs of Mayo are considered to be the deepest in the country. Wind turbine construction on areas of peat has serious issues. Firstly, the removal and storage of excess peat, fragmentation and drainage of peat areas leads to carbon dioxide release. Peat is a natural carbon sink, but emits methane gas through anaerobic decomposition, these normally balance each other out, but disturbed peat will emit higher levels of carbon dioxide. Secondly as peat is a natural water storage facility, construction of large areas of wind farms can alter the water table, resulting in runoff and flooding in adjoining areas. Thirdly, there is a strong link between peat and landslide events. Construction of wind turbines on areas prone to landslides could exacerbate this problem.
Offshore Wind	Conditions necessary for off-shore wind farms include seabed slope of not greater than 5% and total water depth not greater than 35m (IWEA). Foundation types vary depending on the seabed sediments, water depth and current conditions, (GSI seabed survey). (See also Wave).
Biomass	Biomass is energy created from living or recently living organic matter (thus excluding any material formed as part of a geological process – gas, coal and oil). Wood, waste (eg organic waste) and forest residues can all be considered biomass. Biomass energy could have a considerable effect on the soils of County Mayo, by clearing existing forestry and planting land not previously used for forestry. Care will have to be taken to assess the suitability of sites for forestry, due to runoffs and slope stability when clearing.
Hydro	Generally County Mayo is not considered to have rivers with significant flow to harness for hydroelectric energy developments. However, there are proposals to investigate the possibility of constructing pumped storage hydro-electricity energy storage facilities using seawater in Mayo. With this system water is pumped from the sea to a second higher altitude reservoir. As the water has to be pumped, alternative methods of energy are usually associated with the pumped storage hydroelectric energy. A large proportion of the coastline is dominated by peat soils. The environmental considerations addressed in wind (above) would apply.
Wave	There is a proposal to build a National Wave Energy Test Site at Annagh Head, Belmullet. The major influences on wave energy are: sea depth, current conditions, and seabed sediments. Annagh Head was selected due to its suitability on a number of these parameters along with its accessibility to the shore. Wave Energy devices will have to be anchored to the seabed either by mooring lines or directly to the seabed in the case of Near Shore devices. There will be 3 test sites – Near Shore, Mid Water and Deep Water. It is proposed to operate the National Wave Energy Test Site for a period of 20 years to develop a good understanding of wave energy devices, with testing for the first device beginning in 2012. As wave energy developments include a mass in the water, this will to a certain extent have an effect on currents which—depending on the number and proximity to shores, could influence erosion patterns.
Geothermal	Historically linked to areas with tectonic activity, geothermal energy is the extraction of power from heat stored in the earth. Radioactive decay of minerals from volcanic activity and solar energy absorbed at the earth's surface. Granite is a particularly good rock type for geothermal energy extraction and Mayo has large band of Granite located to the north east of Castlebar in the vicinity of Foxford, with other significant areas near Louisburgh and on the southern end of the Mullet Peninsula. Domestic energy uses shallow wells, but industrial energy needs much deeper drilling which is costly, but there tends to be an increase in seismic events and subsidence, also there is a possibility of toxic chemical run-off in a non-closed system, where the water extracted from the drilled wells will have a higher level of Mercury, Arsenic, Boron etc due to the mineral make up of the rock. Geothermal energy is a non-variable source of energy but there is a time expectancy on geothermal wells of 20-30 years.

6.3.3 Freshwater

Renewable Energy Type	Environmental Considerations relating to Freshwater
Wind farms	Once developed, wind farms are not regarded as problematic from the viewpoint of water pollution and effluent production. Research shows that there is no water pollution from wind energy and water usage is virtually zero in climates where rainfall contributes to cleaning of turbines. Another consideration of wind energy on peat soils is the nutrient-binding or nutrient adsorption capacity of peat. When / if there are landslide events, high concentrations of eutrophication-promoting nutrients can also enter water bodies, in addition to a potential increase in suspended solids concentration when peat alone is considered when displaced into surface water bodies.
Biomass energy production	Biomass energy production may contribute to problems in water pollution and for freshwater ecological elements in that the growth of new crop types usually require land preparation, possible application and re-application of fertilisers and the consequential re-assignment of existing lands currently employed for other uses. Use of forestry in renewable energy, if unmitigated, may have potential adverse impacts on freshwater quality and consequently on ecological elements of the freshwater aquatic environment arising from fertiliser application, deforestation, reforestation; and changes to pH.
Solar Power	The consideration of solar power as a RE source in Mayo is likely to have minimal impacts on the freshwater environment.
Ocean energy	Tidal energy works on the basis of harnessing the kinetic energy of moving marine water using barrages or dams. While not directly involving fresh water quality, this type of energy can have indirect negative implications on freshwater ecological elements, as tidal energy affects the flow, salinity and hydrology of estuarine waters, and hence the fresh water or transitional waters may also be influenced. Anadromous taxa such as salmon (<i>Salmo salmo</i>) and sea trout (<i>S. trutta</i>) may be severely impacted in the absence of appropriate mitigation.
Hydro-electric power	Hydro-electric power and its associated dams can impact severely on the aquatic environment. From its physico-chemical modifications on water temperature, oxygen and increased siltation, gains in phosphorus and nitrogen concentrations are also very likely. Again, similar to tidal energy, the spawning cycle of fish life can be seriously impacted and 'fish ladders' or alternative constructed pathways for spawning fish are not always successful.
Geothermal	The potential for power production from geothermal sources in Mayo is limited. The Sustainable Energy Authority of Ireland (SEAI) examined potential sites in Ireland, including Mayo in 2004 and described the use of heat from the earth's core by accessing heat energy through existing fault lines or by drilling through the earth's crust. Impacts from either operation could be potentially detrimental to aquatic taxa by increases in siltation and release of sediment- and soil-bound nutrients to water bodies.

6.3.4 Marine Waters

Potential key impacts of renewable energy developments on marine ecology relate primarily to marine-based technologies. Land-based renewable energy developments will impact indirectly on marine ecology and water quality through reducing impacts of climate change on marine ecology. The development of renewable energy resources, should this reduce the reliance on oil and gas exploration, will have positive impacts by reducing the significant potential for marine pollution from offshore oil and gas development. Potential impacts on marine ecology from marine renewable energy development include:

Environmental Consideration relating to Marine Ecology	
Marine Habitats & Species	<p>Key potential impacts of off-shore renewable energy projects on marine habitats & species include:</p> <ul style="list-style-type: none"> • Increased suspended solids/turbidity from seabed disturbance during installation & cable trenching; • Smothering from seabed disturbance during device installation and cable trenching; • Accidental contamination from device failures and collisions; • Changes in tidal flow & wave regime due to device presence & operation¹ ; • Substratum loss, caused by attaching devices to the seabed. <p>Marine species & habitats vary in their sensitivity to the above impacts, for example maerl beds (Annex 1 habitat Large shallow inlets and bays) are highly sensitive to increases in suspended solids levels, while reefs and tidal rapids (another Annex I species under the Habitats Directive). Certain marine renewable energy structures could potentially benefit certain species and habitats through provision of new micro-habitats (e.g. reef structure) and providing shelter for fish and invertebrates.</p>
Marine Mammals	<p>Key potential impacts of off-shore renewable energy projects on marine habitats & species include:</p> <ul style="list-style-type: none"> • Physical disturbance during device installation; • Noise during installation (particularly piling) and from device operation; • Risk of collision with operating devices during feeding/travel; • Accidental contamination from device failures, vessel collisions and storm damage; • Barriers to movement due to avoidance reactions to noise and risk of collision. <p>All marine mammals are highly sensitive to underwater noise due to sonar disruption and possible physiological effects.</p>
Water Quality & Pollution	<p>Key potential effects on water quality include disturbance of contaminated sediments during device installation or risk of contamination from renewable energy devices or equipment used during their installation and maintenance.</p>
Bathing & Shellfish Waters & Fish Communities	<p>Key potential impacts of off-shore renewable energy projects on fish and shellfish include:</p> <ul style="list-style-type: none"> • Smothering from seabed disturbance during installation of devices and cables – particularly larger species such as basking sharks; • Noise during installation (particularly piling) and from device operation; • Risk of collision with devices; • Accidental contamination from device failures and collisions; • Habitat exclusion, due to presence of devices; • Substratum loss, caused by attaching devices to the seabed. <p>Shellfish & benthic fish species (e.g. herring, sand-eel) are highly sensitive to smothering, accidental contamination & substratum loss. Cod & herring are sensitive to underwater noise pulses; it has been suggested that they can detect loud noise at distances of up to tens of kilometres. All fish & shellfish are sensitive to habitat exclusion. The significance of the effect depends on the position of the device within the water column. Impacts on fish & shellfish are dependent on the extent of in-shore & off-shore developments & the location of these installations, particularly in relation to spawning grounds & key habitats. Conversely, renewable energy installations in the marine environment can potentially benefit fish and shellfish through no-fishing zones in areas where renewable energy (be it wave or wind) installations would be sited.</p>

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¹ Marine habitats and species assemblages are very strongly influenced by wave exposure and tidal ranges

6.3.5 Landscape

Environmental Consideration relating to Landscape

County Mayo possesses huge wind and wave resources, cited as one of the best in the world. As Ireland strives to become a 'Smart Economy' more detailed guidance is required in relation to the siting of renewable energy developments in the County with consideration given to the protection of the visual amenity of the landscapes in the County, along with the protection of sensitive landscapes; vulnerable landscapes; and listed highly scenic views, scenic views, scenic viewing points and scenic routes.

Vulnerable landscapes have been identified in the Landscape Appraisal for County Mayo and include the coastline, banks of rivers, shorelines of all lakes, skylines of upland areas and all headlands and promontories. In areas designated as 'vulnerable', any developments in these areas must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings. Particular attention should be given to preserve the character and distinctiveness of these areas when viewed from scenic routes and the environs of archaeological and historic sites.

Sensitive landscapes include areas such as peat bogs, beaches, estuaries, forests, water courses/bodies and natural grassland. In areas designated as 'sensitive', developments will have inherent limitations by having very high standards of site selection, siting layout, selection of materials and finishes along with ecological, archaeological, water quality and noise evaluations.

Listed highly scenic views, scenic views, scenic viewing points and scenic routes are set out on Map 10 in the Mayo County Development Plan 2008-2014. It is a policy of the Council that development does not adversely interfere with such views and prospects.

6.4 The Alternatives

6.4.1 Reasons for selecting the Alternatives Considered

Five potential Alternative Renewable Energy Strategy Scenarios were considered in the preparation of the draft RES namely;

Scenario 1: Do nothing scenario – Retain Current Wind Energy Strategy and Mayo County Development Plan Renewable Energy Policies and Objectives

Scenario 2: Ad-hoc Planning for Renewable Energy Development

Scenario 3: Offshore Renewable Energy Development Only

Scenario 4: Strategically Planned Off-shore and On-shore Renewable Energy Development

Scenario 5: Renewable Energy Development along the Mayo Coastline Only

These scenarios were drawn up taking into consideration national renewable energy targets, the Regional Planning Guidelines for the West Region 2010-2022 (RPGs), the Mayo County Development Plan 2008-2014, existing and consented renewable energy development in the County and the renewable energy resources available in the County. Ireland's overall target is to achieve 20% of energy from renewable sources by 2020.

The Regional Planning Guidelines for the West Region indicate that there is potential to produce renewable energy from wind and wood sources in the short term, and wave energy in the long term. This is supported by a number of policies and objectives. The Council recognises its role in fulfilling the commitments made at national level and has included a number of policies and objectives in the MCDP 2008-2014 for renewable energy production.

Mayo currently has renewable energy related activity; both at macro and micro levels, but renewable energy production is mainly produced from wind energy in the form of wind farms. Mayo has a number of natural resources which could be harnessed to provide renewable energy. The County has been identified as one of the best located counties in Ireland in terms of on-shore and off-shore winds and ocean (wave and tidal) energy. There is also potential from biomass (wood) and biogas (using agricultural and municipal wastes) resources.

6.4.2 Description of the Alternatives

Scenario 1: Do nothing scenario – Retain Current Wind Energy Strategy and Mayo County Development Plan Renewable Energy Policies and Objectives

This scenario would retain the existing Wind Energy Strategy 2008 and renewable energy policies and objectives in the Mayo County Development Plan 2008-2014 to guide the planning and development of wind farm and renewable energy developments in the County. Developments for wind farms will not be permitted in the west of the County, are open to consideration in parts of central Mayo, generally permitted in the east of the County, and encouraged in Belderg, Ballycastle, Porturlin, Eskeragh, Bellacorrick, Sheskin, Doogary and Louisburgh. The production of energy from renewable resources in particular biomass, forestry, wind, solar power, tidal, hydro, wave and geothermal will be encouraged, along with achieving specified targets.

Scenario 2: Ad-hoc Planning for Renewable Energy Development

This scenario would see applications for renewable energy developments in the County being addressed on a case-by-case basis without an overall strategic framework to guide renewable energy developments.

Scenario 3: Offshore Renewable Energy Development only

This scenario would guide renewable energy developments to the offshore areas of the County, including the islands off the western coastline, as a means of achieving renewable energy targets. The main form of renewable energy would be in the form of off-shore wind farms and developments using wave and tidal energy. All associated infrastructure such as cables, substations, connections to the national grid and relevant pier upgrades would occur on the main land.

Scenario 4: Strategically Planned Off-shore and On-shore Renewable Energy Development

This scenario would direct renewable energy developments to on-shore and off-shore areas in and around the County in a planned manner taking into account the natural environment, cultural heritage, wind speeds and existing and planned infrastructure, as a means of achieving renewable energy targets. Priority areas for renewable development would be identified. All forms of renewable energy development would be considered (e.g. wind, ocean, solar, geo thermal, bio mass, biogas, and biofuel) including micro renewables.

Scenario 5: Renewable Energy Development along the Mayo coastline only

Given the high wind energy speeds along the coastline, this scenario would allow for renewable energy developments, mainly in the form of wind farms and ocean renewables, along the entire Mayo coastline.

6.5 Evaluation of Scenarios

6.5.1 Assessment of Scenario 1 (S1): Do nothing scenario – Retain Current Wind Energy Strategy and Mayo County Development Plan RE Policies and Objectives

This scenario would retain the existing WES and renewable energy policies and objectives in the MCDP 2008-2014 to guide the planning and development of wind farm and renewable energy developments in the County. Developments for wind farms will not be permitted in the west of the County, open to consideration in parts of central Mayo, generally permitted in the east of the County, and encouraged in Belderg, Ballycastle, Porturlin, Eskeragh, Bellacorrick, Sheskin, Doogary and Louisburgh. The production of energy from renewable resources in particular biomass, forestry, wind, solar power, tidal, hydro, wave and geothermal will be encouraged, along with achieving specified targets.

Planning Impacts of Scenario 1

The WES 2008 and MCDP 2008-2014 have incorporated policies and objectives to generally recognise and facilitate all types of renewable energy development in a sustainable manner. Whilst the general content of the existing WES is still relevant, it is too general in identifying suitable sites, leading to uncertainty and a lack of clarity for the wind industry. MCDP does not address renewable energy sources, other than wind, in any spatial sense, and is lacking in any clear direction with regard to these other sources. Therefore, it is considered that the existing wind energy strategy needs to be broadened to take into consideration all forms of renewable energy developments, the sustainable development of which could ensure a continuous supply of electricity to serve the needs of the County and to export into the grid system.

Environmental Impacts of Scenario 1 (S1)

Biodiversity, Flora and Fauna (S1)

In view of the Kyoto agreement, National Climate Change Strategy and White Paper on Renewable Energy, a continued or increased reliance on fossil fuels is not an option. If renewable energy developments, in all its forms, are not guided by an overall strategy for the County, the ecological sensitivities of the County would not be adequately taken into account when such developments are proposed. There would be no framework in place to guide developments of renewable energy sources to appropriate locations in the County. In addition, the anomalous policies which currently pertain to wind farm developments would continue. The current policies could lead to habitats and species coming under threat. Many of the habitats and features outlined above have been afforded a level of protection under European designations or Development Plan policy. However, without strengthened policy in relation to renewable energy, some habitats may come under threat in the future from development.

Population and Human Health (S1)

The WES and MDCP incorporate policies and objectives to support the National Climate Change Strategy and to encourage renewable energy development. This can be seen as a positive step towards the improvement of human health through reduction of GHG emissions. However there is no guidance as to where renewable energy developments should be located. This could have adverse consequences for population and human health arising from impacts on water quality, reduction of biodiversity which sustains all life forms including humans; settlement patterns as people may choose not to live in close proximity to renewable energy developments; and impacts on human health from cumulative impacts such as shadow flicker, noise or other nuisance generated from renewable energy developments.

Soils and Geology (S1)

Scenario 1 would continue to guide the planning and development of wind farm and renewable energy resources in areas as outlined in the WES and CDP, both of which were adopted in 2008. Since then, more research information into renewable energies has become available; also more data is on hand within Mayo County Council and other agencies. The Western River Basin District Project has encouraged the sharing of verified data between agencies, which enables planning authorities to make more informed plans and strategies. Scenario 1 may no longer be relevant having regard to the above as other renewable energy sources were not directly addressed in either the WES or the MDCP.

Freshwater (S1)

This scenario which generally encourages wind farms in the northwest and some western locations, in addition to general permission in the east of the County and the general prohibition of developments in west Mayo may be, in one respect, advantageous for the western water bodies, which are, by-and-large, *not at risk* and *probably not at risk* of not meeting the principal objective of the WFD by 2015.

Marine/Coastal Waters (S1)

Current renewable energy policies concentrate predominantly on land-based activities and land-based wind energy developments although Objective P/TI-RE2 encourages the production of energy from tidal, hydro and wave sources. Objective O/TI-G1 supports realization of the Corrib Gas Field find and any other gas find in the County either on or offshore.

Policies supporting increased use of renewable energies will reduce future impacts of climate change on Mayo's marine ecosystems. However, supporting further gas exploration may lead to negative impacts on marine ecology and water quality.

Groundwater (S1)

The soils and geology of County Mayo create conditions which mean that there are probably significant risks of pollution to groundwater throughout the south-eastern portion of the County. This means that proposed renewable energy developments in the environs of Ballinrobe, Claremorris and Ballyhaunis would need to be very carefully prepared and scrutinised in order to anticipate and avoid impacts.

Air Quality and Climatic Factors (S1)

Air Quality (S1)

Without a strategic plan the impacts of renewable energy projects will depend on a number of variables such as the location of renewable energy projects, the type and scale of projects, and planning and environmental controls for such developments. This option may lead to the development of isolated projects in remote parts of the County resulting in an increase in transport requirements and therefore an increase in air emissions. Air quality could be compromised due to a continued reliance on fossil fuels for heat and power requirements, hence the continued direct and indirect emissions from fossil fuel combustion and the extraction of fossil fuels. Issues associated with climate change such as flooding, drought, biodiversity distribution and sea level rise would continue to incur social and economic impacts in the County. Air monitoring data may indicate a rise in emission limit values due to non-strategic planning in relation to sustainable transport initiatives. Air pollution has knock-on effects on human health especially on sensitive groups within the population and within the ecosystem. Under this Scenario, the impact of individual developments would not be assessed as to their overall effectiveness. However, this option has the capacity to be mitigated by technological developments, as well as legislative and policy controls.

Noise (S1)

This scenario has the capacity to potentially conflict with the objective to avoid, prevent and reduce, on a prioritised basis, exposure to unacceptable levels of environmental noise. In general, ambient noise levels are quiet low in the region given its predominant rural context. However the development of various renewable energy projects may affect ambient noise levels due to inappropriate location near sensitive noise receptors, this aspect may be mitigated by technological developments and legislative control measures.

Climatic Factors (S1)

The WES and MCDP have incorporated policies and objectives to generally recognise and facilitate all types of renewable energy development in a sustainable manner. The current WES is too general in identifying suitable sites leading to uncertainty and a lack of clarity for the wind industry. MCDP does not address renewable energy sources, other than wind, in any spatial sense, and is lacking in any clear direction with regard to these other sources. The impact of this scenario on climate change would be a failure to develop the renewable energy sources to the optimal extent, and militate against Mayo's contribution to the national targets for the reduction of greenhouse gases.

Flooding (S1)

Under this Scenario proposed sites must still comply with the provisions of the DoEHLG/OPW publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'. Sites identified for renewable energy development must still support the provision of adequate surface water drainage infrastructure, promote the use of a sustainable drainage system (SUDS) approach and techniques and manage flood risk through the protection of natural drainage systems, the appropriate location and design of different types of development and the incorporation of flood risk assessments and works where necessary.

Material Assets (S1)

Roads and Transport

The WES and MCDP would continue to guide the planning and development of wind farm development and other renewable energy resources in the County. While National and strategically important Regional roads are protected under the MCDP, protection of local roads needs to be addressed for renewable energy developments. This can lead to potential conflicts with the status of Environmental Protection Objectives.

Piers and Harbours (S1)

The WES and MCDP have incorporated policies and objectives to generally recognise and facilitate appropriate development in a sustainable manner, including piers and harbours. MCDP sets out a list of piers and harbours to be improved. Scenario 1 will see a continuation of that priority list.

IWAK (S1)

National legislation incorporated into MCDP provides for an exclusion zone around IWAK, which would result in all renewable energy projects located within this zone being assessed in relation to the efficiency and safety of aircraft operations. The lack of a renewable energy strategy could result in the cumulative effects of such projects not being adequately assessed, resulting in interference with aircraft safety and unachievable measures to address this situation such as re-orientation of runways or the possible closure of the airport.

Waste Infrastructure (S1)

Scenario 1 is not prescriptive in terms of type or location of renewable energy development (other than exclusion of wind farms in the west). Provision of new infrastructure will generate waste arisings during construction. The type of project selected will determine the nature and quantity of waste arisings during the operational phase. An off-shore wind farm would have significantly less waste arisings than terrestrial bio-fuel production and treatment. Consideration would have to be given to construction waste arisings at planning stage to avoid delay during construction in seeking waste authorisation. Currently there are a limited number of Waste facilities in the County authorised to accept soil and stone, many of which are due to expire in the coming months. There is very limited capacity for the appropriate treatment of peat. There is no facility for the processing of waste concrete, bricks etc.

Waste Water Infrastructure (S1)

The WES should have no impact on existing Waste Water Treatment Plants; however, it does not include other types of renewable energy developments which may impact on Waste Water Treatment Plants and which are assessed on a case by case basis through the planning system.

Energy Infrastructure (S1)

A continuation of the current Scenario is likely to have significant implications in relation to the provision/upgrading of energy infrastructure in the future due to incompatibility with existing or permitted uses. This may also lead to increased costs in providing energy infrastructure.

Drinking Water (S1)

Renewable energy developments would continue to be assessed with regard to all relevant statutory requirements. However, this Scenario could lead to less awareness of the possible impacts on drinking sources from renewable energy developments.

Mayo Forest Estate (S1)

If renewable energy developments are not guided by an overall strategy for the County, the potential of forestry to mitigate climate change will not be fully realised. Although forests can mitigate climate change, they are themselves vulnerable to the impacts of climate change, and this must be considered when planning the management of future forests. Development of wind turbines often necessitates clearfelling of forestry. The absence of a renewable energy strategy could lead to proposals for wind energy developments that would require clearfelling of forestry in areas that may be sensitive to runoff and water pollution.

Cultural Heritage

Archaeological Heritage (S1)

Under Scenario 1 renewable energy developments would not be strategically planned. The archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders will be impacted upon. The integrity of the archaeological sites in their setting will be impacted upon.

Due to current objectives in the MCDP, developments for wind farms in the Belderg/Ballycastle area would have a serious impact on the Ceide Fields Archaeological Complex (an area on the tentative list for designation as a UNESCO World Heritage Site).

Architectural Heritage (S1)

The current MCDP contains policies and objectives to preserve the built heritage. Under Scenario 1, planning applications would continue to be assessed on an individual basis and would be subject to relevant statutory requirements and guidelines in place for the protection of the architectural heritage.

Landscape (S1)

The WES and MCDP have incorporated policies and objectives to recognise and facilitate appropriate development in a manner that has regard to the character and sensitivity of the landscape as outlined in the Landscape Appraisal of County Mayo and listed scenic views and scenic routes identified on Map 10 of the MCDP. However, there is a conflicting objective in the MCDP which encourages wind energy developments in vulnerable coastal landscapes, in particular Belderg, Ballycastle, Porturlin and Louisburgh. This conflicting objective needs to be rectified in order to protect these vulnerable and sensitive landscapes identified in the Landscape Appraisal for County Mayo.

6.5.2 Assessment of Scenario 2 (S2): Ad-hoc planning for Renewable Energy Development

This scenario would see applications for renewable energy developments in the County being addressed on a case-by-case basis without an overall strategic framework to guide renewable energy developments in the County.

Planning Impacts of Scenario 2 (S2)

This scenario would see applications for renewable energy developments dealt with on a case by case basis, with no overall strategy or framework to guide development to particular areas of the County. This non-strategic approach would not allow for a cumulative assessment of the impacts of renewable energy development and hence environmental impacts could not be adequately assessed and mitigated against. The impacts associated with ancillary works required, such as access roads, soil removal, quarrying, storage areas and grid infrastructure would be significant and likely to extend over greater areas of the County. This scenario would be likely to lead to less certainty of planning permission being received and would prolong the planning process.

Environmental Impacts of Scenario 2 (S2)

Biodiversity, Flora and Fauna (S2)

Many of the habitats and features outlined in this report are afforded a level of protection under European designations or Development Plan policy. However, without strengthened policy in relation to renewable energy, some habitats, ecological networks etc. may come under threat in the future from ad hoc development.

Population and Human Health (S2)

Such an approach would not be strategic and therefore would not consider the cumulative impacts of renewable energy developments, including the associated ancillary works and infrastructure required, on human settlements in the County and human health in general.

Soils and Geology (S2)

Under this Scenario, no areas are designated as suitable for particular types of renewable energy and applications would be assessed independently of each other. Applications for wind energy developments in an area which may be more suited to geothermal energy, may be granted permission which could affect a later application for geothermal energy development; therefore the County may not achieve its full renewable energy potential. Also developments may have a number of associated applications, so that a relatively small windfarm may develop into a larger windfarm, which would have different implications for soils and geology.

Freshwater (S2)

This scenario would assess renewable energy developments on a case-by-case basis, examining specific locations and associated risk factors. There is no overall strategic framework to guide the developments but legislatively, screening and possibly appropriate assessments will be necessary for each proposed project or plan. Renewable energy developments will continue to be assessed on a case by case basis, having regard to potential impacts on individual water bodies and their associated ecological elements

whilst ensuring compliance with relevant statutory requirements and protection of water quality and ecological elements.

The absence of an overall strategic framework may incite a more subjective examination of proposals and expertise of personnel will also differ, as will, consequentially, the outcome. For example, bias might guide personnel towards the protection of freshwater pearl mussel (*Margaritifera margaritifera*) catchments, while another may focus on developing mitigating measures to improve water body status based on fish fauna and physico-chemical objectives *only*; all legislative objectives should and must be considered for all developments and from the viewpoint of the protection of freshwaters and their aquatic elements, the primary aim of the WFD is the ‘umbrella aim’ which encompasses all water protection goals or aims. Objectives for achieving the primary aim of the WFD in Mayo must be achievable, measurable, specific, realistic and relevant and the absence of an overall strategy may result in skewed objectives with resulting deterioration of water quality status and/or the impairment of aquatic habitats.

Marine/Coastal Waters (S2)

Ad-hoc planning for renewable energy developments is the least preferred option as it does not constitute sustainable development and may lead to excessive development in certain locations and will not facilitate optimal development of renewable energy sources in the most suitable locations, with the lowest impact on the environment.

Groundwater (S2)

The soils and geology of County Mayo create conditions which mean that there are probably significant risks of pollution to groundwater throughout the south-eastern portion of the County. This means that proposed renewable energy developments in the environs of Ballinrobe, Claremorris and Ballyhaunis would need to be very carefully prepared and scrutinised in order to anticipate and avoid impacts. Cumulative impacts through a planned strategy would be considered important.

Air Quality (S2)

The development of renewable energy projects on a case by case basis without consideration of the most strategic sites may lead to the development of isolated projects. This would entail increased transport requirements and lead to the inappropriate use of natural resources resulting in articulated traffic emissions. The impacts of renewable energy projects without a strategic plan will depend on a number of variables. Air quality in Mayo could be compromised due to a continued reliance on fossil fuels for heat and power requirements, hence the continued direct and indirect emissions from fossil fuel combustion and the extraction of fossil fuels. Missed opportunities could occur in terms of the use of combined heat and power (CHP) plants and district heating networks if they are not considered on a Countywide scale. Issues associated with climate change such as flooding, drought, biodiversity distribution and sea level rise would continue to incur social and economic impacts in the County. Air monitoring data may indicate a rise in emission limit values due to non strategic planning in relation to sustainable transport initiatives. The development of projects on an “Ad hoc” basis may mean that the impact of individual developments could not be assessed as to their overall effectiveness. However such negative impacts could be mitigated by technological developments and compliance requirements with legislative and policy controls.

Noise (S2)

The ad hoc development of renewable energy projects could also conflict with the objective to avoid, prevent and reduce, on a prioritised basis, exposure to unacceptable levels of environmental noise. The development of renewable energy projects on a case by case basis, without consideration of the most appropriate sites, may lead to an increase in ambient noise levels. However such negative impacts could be mitigated by technological developments and legislative control measures.

Climatic Factors (S2)

An ad-hoc approach to renewable energy developments would result in a high degree of uncertainty among renewable energy developers as to whether the Council regards the development appropriate for any particular location. An ad-hoc approach would probably result in a reluctance of renewable energy developers to put forward proposals, resulting in delay in the development of renewable energy in the County and consequent failure of the County to contribute in a meaningful way to the reduction of greenhouse gases required to address climate change.

Flooding (S2)

Under this scenario, proposal must still comply with the provisions of the DoEHLG/OPW publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'. Also, development sites will still be required to support the provision of adequate surface water drainage infrastructure, promote the use of a sustainable drainage system (SuDS) approach and techniques and manage flood risk through the protection of natural drainage systems, the appropriate location and design of different types of development and the incorporation of flood risk assessments and works where necessary.

Material Assets (S2)

Roads (S2)

The ad-hoc approach allows for potential renewable energy initiatives to be located anywhere in the County. Planning applications would be received for renewable energy developments in all parts of the County. Cumulative effects on road infrastructure may not be considered adequately. This could lead to probable conflicts with the status of Environmental Protection Objectives.

Piers and Harbours (S2)

An ad-hoc approach to renewable energy developments would result in a mis-match of resources where piers and harbours are concerned since there could be no correlation between improvements to piers and harbours which would benefit any particular renewable energy development. Such an approach would not be strategic in nature and would not lead to efficiencies in the use of resources.

IWAK (S2)

National legislation incorporated into the MCDP provides for an exclusion zone around IWAK, which would result in all renewable energy projects located within this zone being assessed in relation to the efficiency and safety of aircraft operations. The lack of a renewable energy strategy could result in the cumulative effects of such projects not being adequately assessed, resulting in interference with aircraft safety and unachievable measures to address this situation such as re-orientation of runways or the possible closure of the airport.

Waste Infrastructure (S2)

Scenario 2 does not dictate the type or location of development. The type of infrastructure developed will determine the nature and quantity of waste arisings both during the construction and operational phase. Consideration will have to be given to construction wastes early on in the project due to the limited capacity in the County. It will be necessary to ensure that all the necessary waste infrastructure is in place otherwise significant delays may be incurred. The limited amount of construction waste facilities and imminent expiry of many of these would mean that no particular area has the advantage over another by having the necessary infrastructure in place to deal with construction waste arisings at present.

Waste Water Infrastructure (S2)

In this scenario the location of renewable energy sites will be located ad-hoc throughout the County. Renewable energy developments located in towns and villages will be assessed through the planning system on a case by case basis to determine what impacts if any the developments will have on the Waste Water Treatment Plant.

Energy Infrastructure (S2)

Such an ad-hoc approach would not be strategic in nature and would not consider the cumulative impacts of renewable energy developments and connections to the national grid, including the associated ancillary works and infrastructure required, in a planned and sustainable manner which may lead to delays and increased costs in the provision of energy infrastructure where proposed in close proximity to incompatible existing or permitted developments.

Drinking Water Infrastructure (S2)

Such an approach would not be strategic in nature and would not consider the cumulative impacts of renewable energy developments, including the associated ancillary works and infrastructure, on drinking

water quality in the County. Ad-hoc planning would be likely to cause conflict with EPOs which would result in mitigation measures being difficult to implement.

Mayo Forest Estate (S2)

Scenario 2 would see applications for renewable energy developments dealt with on a case by case basis, with no overall strategy or framework to guide development. The potential of forestry to mitigate climate change would not be adequately realised or integrated into an overall framework for the County. Development of wind turbines often necessitates clearfelling of forestry; the absence of a renewable energy strategy could lead to proposals for wind energy developments in areas that would require clearfelling of forestry which may be sensitive to runoff and water pollution.

Cultural Heritage (S2)

Archaeological Heritage (S2)

Under this Scenario, there is no overall strategic framework to assess the impacts of renewable energy developments on the archaeological heritage. The archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders will be impacted upon. The integrity of the archaeological sites in their setting will be impacted upon.

Architectural Heritage (S2)

Ad hoc planning would result in a lack of guidance on suitable locations for renewable developments and as such would be likely to cause conflict with EPOs for the architectural heritage as identified in the baseline study.

Landscape (S2)

Such an approach would not be strategic in nature and would not consider the cumulative impacts of renewable energy development, including the associated ancillary works and infrastructure required, on vulnerable or sensitive landscapes identified in the Landscape Appraisal for County Mayo or the listed views and scenic routes identified in MCDP or on the visual amenity of landscapes in the County.

6.5.3 Assessment of Scenario 3 (S3): Offshore Renewable Energy Development Only

This scenario would guide renewable energy developments to the offshore areas of the County, including the islands off the western coastline, as a means of achieving renewable energy targets. The main type of renewable energy would be in the form of off-shore wind farms and developments using wave and tidal energy. All associated infrastructure such as cables, substations, connections to the national grid, and relevant pier upgrades would occur on the main land.

Planning Impacts of Scenario 3 (S3)

The Mayo coastline has wave power levels that are among the highest in the world. Wave energy is still at an early stage of development, but in the long term it has as much potential as a renewable energy resource as onshore wind. Tidal power (tidal range and tidal stream) could also make a valuable contribution to the electricity system. However technologies in off-shore renewable energy development have yet to become commercially viable and researchers and developers must overcome the challenge of developing low cost, highly reliable, integrated systems. Therefore it is unlikely that the County could achieve significant renewable energy production from off-shore renewable energy developments alone within the timeframe envisaged for the RES. In addition, off- shore developments are outside the direct remit of Mayo County Council as the Council only deals with developments above the high water mark.

Environmental Impacts of Scenario 3 (S3)

Biodiversity, Flora and Fauna (S3)

In this scenario, renewable energy developments would be guided to offshore areas, including the islands. All associated infrastructure would occur on the mainland. Many of the offshore islands are designated for nature conservation, along with much of the coastline. This scenario has the potential to put the delicate ecological balance of the islands/coastline at risk. The location of infrastructure for these

renewable energy sources would have to be assessed for its impacts on habitat and species as protected under EU and National legislation.

Population and Human Health (S3)

This scenario may assist in the general well being of population and human health by reducing greenhouses gases and emissions through the provision of renewable energy developments. In addition, the majority of the islands off the Mayo coast are uninhabited and those that are populated consist of very low populations, providing for larger areas to construct renewable energy developments having little or no nuisance effects on a small proportion of the population of Mayo. However there is some uncertainty as to the effects this scenario would have on marine biodiversity which may be required to sustain human health.

Soils and Geology (S3)

Since 1999, the GSI have undertaken the Irish National Seabed Survey (INSS) mapping project. As part of this project the GSI have mapped the majority of the Irish continental marine area around Ireland. Although this survey is invaluable, it is concentrated mainly on deep waters. The successor to the INSS project, INFOMAR concentrates mainly on nearshore surveys. It is through the INFOMAR survey that many new seabed features are being discovered and mapped. Due to the level of knowledge of both the offshore environment and the renewable energy systems for this environment, this scenario on its own is not ideal at this time.

Freshwater (S3)

Scenario 3 would appear to have the least disturbing impacts on freshwater species and habitats following construction of the initial infrastructure stage. However, the issue of associated infrastructure such as cables, substations and pier upgrades etc. could potentially impact on the cSACs and pSPAs, designated for freshwater elements, which are located adjacent to the Mayo coastline. Candidate SACs such as Broadhaven Bay, Doogort Machair / Lough Doo and Cross Lough all include freshwater elements which are large designated areas, albeit located on mainland Mayo, but areas where infrastructural support would be potentially constructed, suggesting potential negative impacts to these notable regions.

Tidal energy has great potential for the west of Ireland, but the construction of barrages and dams and the control of water movements could have serious impacts on the physico-chemical and biological elements of the transitional and consequently fresh waters of Mayo, not least by probable alteration of water salinity thermal conditions, but also more importantly on the migration of fish species, those with both anadromous and catadromous spawning habits. Fecundity of *Salmo salar* and *Petromyzon marinus* may be severely impacted by physical barriers preventing migration of these taxa, while other less notable biological elements, including macrophytes, macroinvertebrates and phytobenthos could be influenced by habitat and water quality changes. It should be recognised that the Moy Complex cSAC with the River Moy and its tributaries constitute one of the most important salmon fisheries in Europe, while sea trout rivers in Mayo are also very prominent and require protection.

Marine/Coastal Waters (S3)

As this Scenario focuses on offshore technologies including wind farms and wave and tidal energy, impacts will be concentrated on offshore habitats and species. This option is less favourable than Scenario 4 below.

Groundwater (S3)

Renewable energy developments on the Islands would be required to ensure that adequate precautions are taken to prevent pollution to groundwater.

Air Quality (S3)

The offshore development of renewable energy projects is associated with being beneficial to air quality and climate change due to the production of carbon and emission free energy during the operation phase. However, it is acknowledged that there is a carbon and emission cost associated with the manufacture, construction, maintenance and decommissioning stages of renewable energy projects. The overall balance varies from project to project depending on distance from manufacturing point, installation and maintenance support ports, turbine and foundation design. Hence at a strategic level it is not possible to carry out a lifecycle carbon assessment.

The offshore development of renewable energy projects is likely to have a positive effect on air quality. It has been assumed that there is a positive benefit over the lifetime of each project and that, in comparison to other sources, renewable energy projects have one of the lowest air quality impacts and carbon footprints.

Noise (S3)

The development of offshore renewable energy projects could involve a short term increase in ambient noise levels during construction due to increased traffic levels. However the offshore option is most likely to have a positive effect on ambient noise levels if the site and equipment is appropriately selected so as not to impact on the nearest noise sensitive receptor.

Climate Factors (S3)

This scenario would result in an imbalance in the development of renewable resources. Such an approach would ignore the potential of other renewable energy resources, whether on-land wind, biomass or biogas. The development of wave power technology is still in the developmental phase and even now it will be some time before it is sufficiently developed to produce major volumes of electricity. Furthermore indications are that the off-shore may not favour fixed wind turbine installations and floating wind turbines are untried technology in Irish waters. A scenario of totally off-shore renewable energy development only, would delay the development of renewable energy in the County and consequent failure of the County to contribute in a meaningful way to the reduction of greenhouse gases required to address climate change.

Flood Issues (S3)

In this scenario (off-shore) it is important to consider the consequences of climate change which is projected to impact on sea levels. There may be changes in the nature and pattern of rainfall events and weather patterns generally. Whilst the exact impacts of change are not known, it is widely agreed that climate change will result in higher risk of flooding both inland and at coastal locations through the raising of sea levels and the occurrence of more intense rainfall events. This is of particular relevance in the West Region which receives higher levels of rainfall than other parts of the country.

Development on the Islands would be required to comply with the provisions of the DoEHLG/OPW publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'.

Material Assets (S3)

Roads (S3)

Transportation of materials for construction of renewable development at sea or on the islands may require use of narrow local roads to access piers both on the mainland and the islands. Existing roads infrastructure may be inadequate for this purpose. This could lead to probable conflicts with the status of Environmental Protection Objectives.

Piers and Harbours (S3)

This scenario could lead to a need for major improvements to piers and harbours over and above those currently planned and in locations where the current level of usage is small. Given that all the piers and harbours are located along coastline designated as 'Vulnerable' or 'Sensitive' in the Landscape Appraisal for County Mayo and a number of them are also located in sites protected by EU, national or local legislation, it may be difficult and costly improving piers and harbours to the scale required for a renewable energy strategy focussed completely on off shore resources.

IWAK (S3)

This scenario would have no impact on the airport as all renewable energy projects would be located off shore which would be a considerable distance from the airport and the airport exclusion zone.

Waste Management Infrastructure (S3)

This scenario (off-shore) would suggest minimal waste arisings during construction and operation phase. There would be some construction wastes generated in terrestrial works related to connection to national

grid, upgrading harbours etc. Consideration would have to be given to how these wastes would be managed during construction.

Waste Water Infrastructure (S3)

Renewable energy development on the Islands proposing to discharge to a Waste Water Treatment Plant, under this Scenario would be assessed through the planning system on a case by case basis to determine what impacts, if any, the development would have on the Waste Water Treatment Plant.

Energy Infrastructure (S3)

Although off shore developments are outside the direct remit of Mayo County Council, renewable energy developments off-shore may have significant impacts on the coastline where ancillary development will be required to connect the energy generated into the national grid. The majority of the coastline is designated as 'Vulnerable' or 'Sensitive' in the Landscape Appraisal for County Mayo and a number of designated environmental sites are also located along the coastline, all of which are protected by EU, national or local legislation, strategies and/or plans. Therefore it may be difficult and costly locating energy infrastructure at these locations.

Drinking Water Infrastructure (S3)

This Scenario focuses on offshore technologies including wind farms and wave and tidal energy impacts. This option is less favourable than Scenario 4.

Mayo Forest Estate (S3)

Wind and wood energy are considered to be two key renewable sources in an Irish context. Government policy foresees major growth in the use of wood for energy generation in the future. A scenario that promotes offshore renewable energy development only, does not take into account the potential of forestry to provide a source of renewable energy in the County

Cultural Heritage (S3)

Archaeological Heritage (S3)

The Islands off the coast of Mayo are very rich in Archaeological Monuments and as a result should be carefully considered as locations for renewable energy developments. The archaeology of the inter-tidal zone and the occurrence of historic wrecks would require detailed assessment. The archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders will be impacted upon. The integrity of the archaeological sites in their setting will be impacted upon.

Architectural Heritage (S3)

As a result of Scenario 3, offshore developments would be outside the remit of Mayo County Council. However, Mayo's coastline is served by a large number of lighthouses, quays, piers and coastguard stations, all of which are part of the architectural heritage and the integrity of these structures may be impacted by such renewable energy developments.

Landscape (S3)

The coastline, beaches, dunes, sands, intertidal flats, estuaries and the majority of the islands along the Mayo coastline are designated as 'Vulnerable' or 'Sensitive' in the Landscape Appraisal for County Mayo. A number of listed views and scenic routes are also located adjacent to the coastline. The coastline generally tends to be highly scenic.

In areas designated as 'vulnerable' any developments must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings. Particular attention is required to preserve the character and distinctiveness of these areas when viewed from scenic routes and the environs of archaeological and historic sites. In areas designated as 'sensitive', developments will have inherent limitations by having very high standards of site selection, siting layout, selection of materials and finishes along with ecological, archaeological, water quality and noise evaluations.

Although off shore developments are outside the direct remit of Mayo County Council, renewable energy developments off-shore may have significant impacts on the coastline where ancillary development will

be required to connect the energy generated into the national grid. In addition, renewable energy developments on the sea may have significant negative visual impacts from the land; thereby affecting the scenic amenity of the coast when viewed from vulnerable and sensitive landscapes and/or listed views and scenic routes. In order to achieve national and local renewable energy targets based on this Scenario, vulnerable and sensitive landscapes, listed views and scenic routes and the visual amenity of the landscape will come under severe threat.

6.5.4 Assessment of Scenario 4 (S4): Strategically Planned Off-shore and On-shore

This scenario would direct renewable energy developments to on-shore and off-shore areas in and around the County in a planned manner taking into account the natural environmental, cultural heritage, wind speeds and existing and planned infrastructure, as a means of achieving renewable energy targets. Priority areas for renewable development developments would be identified. All forms of renewable energy development would be considered (e.g. wind, ocean, solar, geothermal, bio mass, biogas and biofuel) including micro renewables.

Planning Impacts of Scenario 4 (S4)

This scenario integrates existing and planned infrastructure and the principals of sustainable development into the strategy and will help balance the need to increase renewable energy production in the County with protecting and/or enhancing the existing environment. This scenario would allow for greater planning certainty in providing for renewable energy developments in the County. This scenario would also ensure a continuous supply of electricity to serve the County at all times as it would allow for all types of renewable energy to be considered.

Environmental Impacts of Scenario 4

Biodiversity, Flora and Fauna (S4)

This scenario would see strategically planned renewable energy developments guided to the most appropriate locations in the County having regard to all environmental factors including biodiversity, flora and fauna constraints. Protection of habitats and species and ecological networks would be strengthened through policy in the Strategy. Reliance on fossil fuels would decrease which would in turn have a positive impact on climate change and vegetation.

Population and Human Health (S4)

This scenario would be likely to have positive effects on population and human health provided it takes into consideration spatial patterns and residential amenity of population. This scenario would most likely result in achieving renewable energy targets which would assist in reducing greenhouses gas emissions with consequent benefits for populations and human health.

Soils and Geology (S4)

This appears to be the best and most comprehensive scenario, including all information and data from both on-shore and off-shore datasets and evaluating it to create a planned approach to renewable energy development. This allows development of current renewable energy technologies but also creates a provision for advancements in new technologies, i.e. the National Wave Energy Test Site.

Freshwater (S4)

Under Scenario 4, renewable energy developments are directed to on-shore and off-shore areas in a planned manner, taking account of environmental considerations including varying water body status and designated areas based on water quality elements. In terms of water quality and ecological elements, strengthened protection of Mayo's water bodies would be afforded by the strategic approach underpinned by consideration of existing environmental protection objectives relating to water and its ecological elements.

Marine/Coastal Waters (S4)

This is the most preferred option as development of renewable energy projects will be focused in areas deemed most suitable, while areas greatest at risk or most sensitive to development of renewable energy projects will have been identified beforehand (e.g. marine SACs, known fish spawning grounds, shellfish beds).

Groundwater (S4)

In this scenario renewable energy development would be strategically planned and greater precautions taken in the location of developments where groundwater conditions are at risk. It is important to note that the soils and geology of County Mayo create conditions which mean that there are probably significant risks of pollution to groundwater throughout the south-eastern portion of the County. This means that proposed renewable energy developments in the environs of Ballinrobe, Claremorris and Ballyhaunis will need to be very carefully prepared and scrutinised in order to anticipate and avoid impacts. Renewable energy development Off-shore and On-shore must ensure that adequate precautions are taken to prevent pollution to groundwater.

Air Quality (S4)

Strategic planning for renewable energy development is considered the most favourable option in terms of protecting air quality. It would enable the appropriate and efficient use of renewable natural resources on a countywide basis reducing the demand for and combustion of fossil fuels and subsequent air emissions. This option will cater for a reduction in the direct and indirect emissions from fossil fuel combustion and the extraction of fossil fuels. It should also allow for infrastructural opportunities such as combined heat and power (CHP) plants and district heating networks to be considered on a countywide scale.

Strategic planning for renewable energy projects should take into account transport requirements and lead to a reduction in associated emissions. The increased and efficient use of renewable energy would also have positive impacts in terms of climate change, addressing social and economic issues. In addition this option will positively contribute to the very good standard of air quality in the region and provide a basis to assess the impact of individual developments as to their overall effectiveness.

Noise (S4)

Strategically planned renewable energy developments are likely to positively contribute to the objective of avoiding, preventing and reducing, on a prioritised basis, exposure to unacceptable levels of environmental noise in the County. The development of renewable energy projects on a strategic basis should provide for the most appropriate use of sites taking in to consideration noise sensitive receptors. Therefore this scenario is likely to improve the status of ambient noise levels.

Climatic Change (S4)

The scenario of strategically planned off-shore and on-shore renewable energy development represents the best scenario for County Mayo to address climate change. The development of on-land renewable resources would allow the County to use proven technologies (wind, biomass and biogas) to increase its proportion of renewable energy in the overall electricity demand in the short term while development of off-shore technologies will increase the contribution of renewable energy in Mayo in the medium to long term. Strategically planned off-shore and on-shore renewable energy development would give greater direction and certainty to renewable energy developers, thus would result in a more favourable “roll out” of projects resulting in the country meeting its commitment to reduce greenhouse gas emissions. This Scenario would be the preferred scenario in terms of Climate Change.

Flooding (S4)

This scenario would direct renewable energy developments to on-shore and off-shore areas in and around the County where flooding issues can be avoided or mitigated. A precautionary approach could be adopted and the key guiding principles followed such as:

- Avoidance of development in areas at risk of flooding by not permitting development in flood risk areas unless fully justified and capability exists to manage risk without impacting elsewhere;
- Application of a sequential approach to flood risk management based on;
 - Avoidance
 - Reduction
 - Mitigation of flood riskin assessing the suitability of location for development;
- The incorporation of flood risk assessment into the process of making decisions on planning applications and planning appeals.

In terms of flooding issues, this would be the preferred scenario.

Material Assets (S4)

Roads (S4)

The strategically planned Scenario 4 approach allows for potential renewable energy initiatives to be located at strategically located points close to good transport systems in the County, such as suitable roads and rails, piers and airports. Planning applications would only be considered if the renewable energy developments are located in the strategic locations identified in the Strategy. Consideration of the road infrastructure would be taken into consideration in the location of proposed sites. This is likely to improve the status of the Environmental Protection Objectives. Mitigation measures are likely to be provided.

Piers and Harbours

The scenario would be the best scenario for the improvement of piers and harbours as it would be planned in a strategic manner taking into consideration all environmental and planning considerations when considering priority areas for renewable energy developments and associated ancillary works and infrastructure. This would allow for coordination between the improvement of piers and harbours and renewable energy development. The scale of improvement to piers and harbours to facilitate planned off-shore and on-shore renewable energy development would not be as great as scenario 3 and would have minimal impact on the environment.

IWAK (S4)

This scenario would result in a planned approach to the development of renewable energy projects within the County and would take the airport and safety issues into consideration when projects are at a design stage. It would also facilitate the assessment of the cumulative impacts of any such projects on the safety of aircraft.

Waste Management Infrastructure (S4)

Scenario 4 allows for all forms of renewable energy to be considered. Locations and types of infrastructure will be pre-determined to some extent. A strategically planned approach could enable provision of waste infrastructure in advance of the projects. Depending on technology selected, wastes produced in the County could be managed in-County eg thermal treatment of municipal wastes, anaerobic digestion of organic wastes etc. This scenario could encourage the production of bio-fuels such as miscanthus. The production of bio-fuels in County will generate production wastes and the ash residue will require appropriate treatment.

Waste Water Infrastructure (S4)

In this scenario renewable energy development would be strategically planned throughout the County and any development proposing to discharge effluent to a public sewer will be assessed accordingly through the planning system.

Energy Infrastructure (S4)

The scenario would be the best scenario for the provision of energy infrastructure as it would be planned in a strategic manner taking into consideration all environmental and planning considerations when considering priority areas for renewable energy developments and associated ancillary works and infrastructure. This would allow for a degree of certainty in the provision of energy infrastructure.

Drinking Water Infrastructure (S4)

This is the most preferred option as development of renewable energy projects will be focused in areas deemed most suitable, while areas greatest at risk or most sensitive to development of renewable energy projects will have been identified beforehand (e.g. sources of abstraction; lakes, rivers, groundwaters). This scenario would allow for provision to be made to mitigate or improve the status of the EPOs.

Mayo Forest Estate (S4)

A renewable energy strategy will *inter alia* maximize the potential of forestry to mitigate climate change and maximize the contribution forestry can make as a renewable energy resource, while at the same time ensuring protection of the environment. Wood energy and biomass would be considered as an important renewable source of energy for the County and form part of an integrated strategy. Such a strategy would

put a framework in place to ensure that forestry developments are managed to provide a renewable energy resource, have the optimum positive impact on climate change mitigation, while ensuring protection of the environment.

Cultural Heritage (S4)

Archaeological Heritage (S4)

Renewable energy developments are guided to on-shore and off-shore areas in and around the County in a planned manner. The archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders will be impacted upon. The integrity of the archaeological sites in their setting will be impacted upon.

Architectural Heritage (S4)

This scenario would see strategically planned renewable energy developments guided to the most appropriate locations in the County having regard to all environmental factors including architectural heritage. Under Scenario 4, renewable energy developments would be guided in a more strategic manner.

Landscape (S4)

The scenario would be the best scenario as it would take into consideration all types of landscapes identified in the Landscape Appraisal for County Mayo when considering priority areas for renewable energy developments and associated ancillary works and infrastructure. However, care will be required in the selection of particular areas for particular developments in order to preserve sensitive landscapes and vulnerable landscape features, listed views, scenic routes and the visual amenity of the landscape.

6.5.5 Assessment of Scenario 5: Renewable Energy Development along the Mayo Coastline only

Given the high wind energy speeds along the coastline, this scenario would allow for renewable energy developments, mainly in the form of wind farms and ocean renewables, along the entire Mayo coastline.

Planning Impacts of Scenario 5 (S5)

The Mayo coastline is considered one of the County's most valuable assets in terms of its scenic quality and tourism attraction. This scenario would impact directly on the scenic quality of the coastline which it is a policy of the Council to preserve. Applying the principles of sustainable development in siting renewable energy developments along the coastline would result in very limited areas, if any, being deemed suitable for renewable energy developments. Taking this, along with planning issues identified in Scenario 1 and 3 (i.e. reduced likelihood of continuous supply of electricity and ocean renewables not commercially viable at present) into consideration, it is unlikely that the County could achieve significant renewable energy production or assist in reaching national targets within the timeframe envisaged for the RES.

Environmental Impacts of Scenario 5 (S5)

Biodiversity, Flora and Fauna (S5)

This scenario is neither feasible nor desirable. Much of Mayo's coastline is protected under EU and National legislation and renewable energy developments concentrated on the coastline, along with associated infrastructure could have a significant negative impact on coastal biodiversity.

Population and Human Health (S5)

The impacts of this scenario on population and human health are uncertain. The impacts depend on the attitudes and tolerance of coastal communities towards renewable energy developments.

Soils and Geology (S5)

A large number of IGH sites, SACs and NHA's are positioned all along the Mayo coastline. The EPOs established for the SEA process seek to protect these sites and to protect areas which may be prone to erosion. This Scenario would conflict with these EPOs.

Freshwater (S5)

Mayo has one of the longest coastlines in Ireland and its location off the western shoreline should allow the tapping of vast volumes of kinetic energy in the form of wind and ocean energy. In terms of freshwater quality and ecological elements, the preferred option would be wind energy for its simplicity, minimal water pollution potential and absence of effluents. On the contrary, while ocean energy produces relatively small volumes of water pollution and also produces minimal effluent, its impact on freshwater ecological elements would be potentially quite substantial. Specifically, the Moy has a reputation as one of the best salmon rivers in Europe and as stated previously, wave or ocean energy has enormous potential but also has the capability of interfering with physical, chemical and biological elements of freshwater habitats, many of which are designated cSAC and pSPAs and located along the Mayo coastline. The two Freshwater Pearl Mussel catchments in Mayo are on the Newport River and Bundorragha both of which have direct access to the sea; this scenario would therefore potentially impact on these catchments, which have been designated as at moderate status; this is due to their 'not at favourable conservation status' and the necessity to achieve 'favourable conservation status' for *Margaritifera margaritifera* or *M. durrovensis* (the latter not found in Mayo).

Marine/Coastal Waters (S5)

The Mayo coastline is very rich for species and habitats and is very sensitive to development/pollution. Focusing renewable energy developments along the coastline will maximise any negative impacts of renewable energies on the marine environment. This option is the least favourable option for marine ecology after Scenario 2 (ad-hoc planning).

Groundwater (S5)

The soils and geology of County Mayo create conditions which mean that there are probably significant risks of pollution to groundwater throughout the south-eastern portion of the County. This means that proposed renewable energy developments in the environs of Ballinrobe, Claremorris and Ballyhaunis will require to be very carefully prepared and scrutinised in order to anticipate and avoid impacts. Renewable energy development along the coastline must ensure that adequate precautions are taken to prevent pollution to groundwater.

Air Quality (S5)

The coastline development of renewable energy projects can be beneficial to air quality and climate change due to the production of carbon and emission *free* energy during the operation phase. Meteorologically, very high wind speeds in such areas assist pollutant dispersion, if any. However, it is acknowledged that there is a carbon and emission cost associated with the manufacture, construction, maintenance and decommissioning stages of renewable energy projects. The overall balance varies from project to project depending on distance from manufacturing point, installation and maintenance support ports, turbine and foundation design. Hence at a strategic level it is not possible to carry out a lifecycle carbon assessment.

The development of renewable energy projects along the coastline is likely to have a positive effect on air quality. It has been assumed that there is a positive benefit over the lifetime of each project and that, in comparison to other sources, renewable energy projects have one of the lowest air quality impacts and carbon footprints⁽¹⁾.

Noise (S5)

The development of renewable energy projects on the coastline will involve a short term increase in ambient noise levels during construction due to increased traffic levels. However the concentration of renewable energy developments on the coastline may potentially conflict with the objective to avoid, prevent and reduce on a prioritised basis exposure to unacceptable levels of environmental noise as the concentration of developments could increase overall ambient levels. This aspect could be addressed by technological developments and legislative control measures.

Climatic Factors (S5)

The scenario would result in renewable developments (a) being located distant from their actual resource in the case of biomass and biogas where the raw materials would be transported by road and (b) ignoring suitable inland sites for wind turbines. Such a scenario would not result in the reduction of greenhouse gases to the same extent since the transport of raw materials in the case of biomass and biogas will actually generate more CO₂ and the avoidance of inland sites for wind generation will reduce the potential amount of electricity from renewable sources. Under this scenario the rate of greenhouse gas reduction will be less than optimal and the impact on climate change will also be less than optimal.

Flooding (S5)

As for Scenario 3, it is important to consider the consequences of climate change which is projected to impact on sea levels. There may be changes in the nature and pattern of rainfall events and weather patterns generally. Whilst the exact impacts of change are not known, it is widely agreed that climate change will result in higher risk of flooding both inland and at coastal locations through the raising of sea levels and the occurrence of more intense rainfall events which is of particular relevance in the West Region which receives higher levels of rainfall than other parts of the country.

Material Assets (S5)

Roads (S5)

This Scenario allows for potential renewable energy initiatives to be located along the coastline (including island coastlines). Transportation of materials for construction of renewable development at sea or on the islands may require use of narrow local roads to access piers, both on the mainland and the islands. Existing roads infrastructure may be inadequate for this purpose. This could lead to probable conflicts with the status of Environmental Protection Objectives.

Piers and Harbours (S5)

The location of all renewable energy development on the coastline would have a similar impact on piers and harbours as Scenario 3, particularly as the road network is made up of narrow County roads.

IWAK (S5)

This scenario would have no impact on the airport as all renewable energy projects would be located on the coastline of Mayo which would be a considerable distance from the airport and the airport exclusion zone.

Waste Management Infrastructure (S5)

Limiting development to coastal regions would suggest wind and ocean energy developments will occur which, once established, would not generate significant arisings due to the assumption that there would be a limited work force, mostly relating to maintenance and monitoring. It is not clear if this Scenario excludes other technologies such as bio-mass. Whatever technology is chosen, particular attention at planning stage must be given to waste management and provision of necessary waste infrastructure.

Energy Infrastructure (S5)

The majority of the coastline is designated as 'Vulnerable' or 'Sensitive' in the Landscape Appraisal for County Mayo and number of designated environmental sites are also located along the coastline, all of which are protected by EU, national or local legislation, strategies and/or plans. Therefore it may be difficult and costly locating energy infrastructure at these locations.

Drinking Water Infrastructure (S5)

The drinking water sources are scattered throughout the County, however some sources are located along the coastline. Proposals would require to be subject to HDA to consider every aspect of the development stage of proposed projects and impacts on water quality. This scenario would conflict with EPOs and would be difficult to mitigate.

Mayo Forest Estate (S5)

Wind and wood energy are considered to be two key renewable sources in an Irish context. Government policy foresees major growth in the use of wood for energy generation in the future. This scenario does not take into account the potential of forestry to provide a source of renewable energy in the County and its integration into a County renewable energy strategy.

Cultural Heritage (Archaeological) (S5)

Under Scenario 5, renewable energy developments would be located along the entire Mayo coastline. The archaeological heritage identified in the Record of Monuments and Places, National Monuments in the ownership or guardianship of the State and National Monuments that are subject to Preservation Orders will be impacted upon. The integrity of the archaeological sites in their setting will be impacted upon. The coastline of Mayo is dotted with Promontory Forts and will be impacted upon.

Cultural Heritage(Architectural) (S5)

This scenario would see renewable energy developments guided to the Mayo coastline which might result in negative impacts on the settings of the County’s fine maritime heritage which includes a large number of lighthouses, quays, piers and coastguard stations. Scenario 5 would conflict with EPOs and would be difficult to mitigate.

Landscape (S5)

The Mayo coastline is designated as ‘vulnerable’ in the Landscape Appraisal for County Mayo, and the beaches, dunes, sands, estuaries and intertidal flats are designated as ‘sensitive’ in the Landscape Appraisal. In areas designated as ‘vulnerable’, any developments must be shown not to impinge in any significant way upon its character, integrity or uniformity when viewed from the surroundings. Particular attention should be given to preserve the character and distinctiveness of these areas when viewed from scenic routes and scenic viewing points and the environs of archaeological and historic sites. In areas designated as ‘sensitive’, developments will have inherent limitations by having very high standards of site selection, siting, layout, selection of materials and finishes along with ecological, archaeological, water quality and noise evaluations. In order to achieve national and local renewable energy targets using this Scenario, vulnerable and sensitive landscapes, listed views and scenic routes and the visual amenity of the landscape will come under severe threat.

6.6 Evaluation of Alternative Scenarios against EPOs

6.6.1 Methodology

The methodology used in evaluating the different Alternative Scenarios and in identifying the preferred Scenario is based on the same methodology used in the SEA of the MCDP 2008-2014. The purpose of the evaluation is to determine the merits of the five Alternative Scenarios described above. The objective of this process is to understand whether each of the alternatives are likely to improve, conflict with or have a neutral interaction with the environment of the County together with the degree of certainty/uncertainty of that interaction – see criteria set out below in Table 6.2.

The Environmental Protections Objectives (discussed in Section 5) are set out in Table 6.3. These are then arrayed against the five Alternative Scenarios to identify which interactions – if any – are likely/unlikely to cause impacts on specific components of the environment.

Table 6.2 Criteria for Appraising the Effects of the RES on EPOs

Likely to Improve status of SEOs	Probable Conflict with status of SEOs- unlikely to be mitigated	Potential Conflict with status of SEOs- likely to be mitigated by measures under Section 8	<u>Uncertain</u> interaction with status of SEOs	<u>Neutral</u> Interaction with status of SEOs	<u>No Likely</u> interaction with status of SEOs
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Table 6.3 Environmental Protection Objectives

EPO Code	Environmental Protection Objectives
Biodiversity, Flora and Fauna	
B1	Conserve and enhance the diversity of protected habitats and species
B2	Protect, conserve and enhance habitats, species and areas of national or international importance and promote the sustainable management of ecological networks
Population and Human Health	
PH1	To protect human health from hazardous nuisances arising from exposure to incompatible land uses
Soils and Geology	
SG1	To protect the IGH sites as identified by the GSI in the MCDP 2008-2014
SG2:	To protect areas which are at risk of flooding, or areas which may be at risk of exacerbating flooding in another area
SG3	To identify and protect areas which may be deemed as at significant risk of landslides
SG4	To identify and protect areas which may be at risk of significant erosion
Water (Freshwater)	
W1	To prevent deterioration of surface water bodies of good or high status
W2	To restore surface water bodies of less than good (good ecological potential / chemical status) to at least good status by 2015
W3	To control and improve the quality of diffuse and point source discharges
W4:	To conserve, protect and enhance indigenous freshwater ecological elements and prevent disturbance from habitat destruction / modification, competition from invasive species and threats from listed flora
W5:	To treat all effluents to a quality consistent with the aim of preventing further deterioration of the receiving waters & with a view to achieving good status by 2015
Water (Marine Environment)	
ME1	Conserve the diversity of habitats and protected species, including all sites of special biodiversity importance
ME2	Maintain range and distribution of cetaceans (whales & dolphins) and Seals
ME3	Maintain and improve where possible, water quality in marine and estuarine waters including quality of bathing and shellfish waters
ME4	Protect fish communities
Groundwater	
G1	To prevent pollution and contamination of ground water
Air & Climatic Factors	
Air	
AR1	Maintain and improve air quality status in line with appropriate policies and legislative requirements
AR2	To minimise increases in travel related air pollutants and greenhouse gas emissions
AR3	To promote energy conservation initiatives
N1 (Noise)	To avoid, prevent or reduce on a prioritised basis exposure to the negative effects of environmental noise associated with renewable energy developments

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Climate	
CF1	To ensure that Co. Mayo maximises its contribution to the national decrease in greenhouse gas emissions
CF2	To ensure that projects designed to increase electricity production from renewable resources in County Mayo are carried out in an environmentally sensitive manner so as to protect the existing environment
Flooding	
F1	To prevent development on lands which pose – or are likely to pose in the future – a significant flood risk
Material Assets	
R1 (Roads & Transport)	To protect County Mayo’s Road Network
AP1 (IWAK)	To prevent any interference with the safety and efficiency of aircraft operations in the vicinity of Ireland West Airport Knock (IWAK)
P1 (Piers & Harbours)	To ensure that the upgrading of the piers & harbours is carried out in an environmentally sensitive manner so as to protect the existing environment
WM1 (Waste Infrastructure)	Reduce waste arisings through an integrated approach including education & awareness
WM2	Maximise recycling and recovery
WM3	Divert biowaste from landfill and reduce landfill emissions
WM4	Ensure that all waste activity is regulated and that waste is treated in accordance with the highest environmental standards without causing environmental pollution
E1 (Energy Infrastructure)	To ensure new energy infrastructure, including renewable energy infrastructure, is connected to the national grid in a sustainable manner
WW1 (Waste Water)	Proposed Renewable Energy Development not to negatively impact on existing Waste Water Treatment Plants
DW1 (Drinking Water)	Prevent deterioration of the status of water bodies with regard to quality & quantity and improve water body status for rivers, lakes, and groundwaters to at least good status as appropriate to the WFD, providing good sources of abstraction for drinking water
MF1 Mayo Forest Estate)	To promote the potential of forestry to enhance Mayo’s biological and landscape diversity and to provide aesthetic and amenity benefits while at the same time protecting our heritage and environment and providing economic benefit to local communities
Cultural Heritage	
Archaeology	
CH1	To protect the archaeological heritage identified in the RMP; National Monuments in the ownership or guardianship of the State; and National Monuments that are subject of Preservation Orders; and to safeguard the integrity of the archaeological sites in their setting
CH2	To promote and support the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG
Architectural Heritage	
AH1	To ensure the protection of the architectural heritage of County Mayo with regard to Protected, Architectural Conservation Areas and other elements as described in Section 4.8.3 (Baseline) in accordance with statutory requirements and guidelines
AH2	To ensure the protection of heritage bridges where they may be vulnerable due to construction traffic as a result of any renewable energy development
Landscape	
L1	To protect County Mayo’s sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes
L2	To protect the visual amenity of all other landscapes of County Mayo

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Scenarios	Likely to Improve status of SEOs	Probable Conflict with status of SEOs- unlikely to be mitigated	Potential Conflict with status of SEOs- likely to be mitigated by measures under Section 8	Uncertain interaction with status of SEOs	Neutral Interaction with status of SEOs	No Likely interaction with status of SEOs
Scenario 1: Retain Current WES & RE Policies & Objectives in MCDP	CF1 WM4,	W1, W2, W4, ME3, DW1, MF1, CH2,	B1, B2, PH1, SG1, SG2,W3, W5, G1, ARI, AR2, AR3, N1, CF2 AP1 E1, R1, CH1, CH2, AH1, AH2, L1, L2	SG3, SG4, ME1, ME2, ME4, WM1, WM2, WM3, WW1	F1,	SG1, SG2, P1
Scenario 2: Ad-hoc	CF1 WM4	B1, B2, SG3, SG4, ME1, ME2, ME3, ME4, E1, R1, DW1, MF1, AH1, AH2, L1,	PH1, SG1, SG2, W1, W2, W3, W4, W5, G1, ARI, AR2, N1, F1 CF2 AP1, CH1, CH2,	AR3, WM1, WM2, WM3, WW1 L1 L2		P1
Scenario 3: Offshore	AR1, AR3, N1, CF1 AP1	B1, B2, SG3, SG4, W1, W2, W4, ME4, R1, P1 E1, MF1, CH1, CH2, L1, L2	SG1, W3, W5, ME1, ME3, WM1, WM2, WM3, AH1, AH2,	PH1, SG2 ME2, G1, WW1 DW1	AR2	CF2 F1,
Scenario 4: Strategically Planned Off-shore & On-shore	B1, B2, SG1, SG2, SG3, SG4, ME1, ME3, G1, AR1, AR2, AR3, N1, CF1 F1, E1, R1, WM1, WM2, WM3, WM4, WW1 MF1, AH1,		PH1, W1, W2, W3, W4, W5,DW1 P1 AP1 CH1 CH2 AH2, L1 L2	ME2, ME4,		CF2
Scenario 5: Coastline	AR1, AR3, CF1 WM4 AP1	B1, B2, SG4, W1, W2, W4, ME1, ME2, ME3, ME4, CF2 E1, R1, P1 MF1 CH1, CH2, AH1, AH2, L1, L2	PH1, SG1, SG3, W3, W5, N1, WM1, WM2, WM3,	SG2 G1 DW1	AR2	F1, WW1
EPO Codes: B1-B2= Biodiversity, Flora & Fauna; PH1= Population & Human Health; SG1-4 = Soils & Geology; W1-5=:Freshwater ; ME1-4 = Marine Water; G1 = Groundwater; AR1-3= Air Quality; N1= Noise; CF1-2 = Climatic Factors; F1 = Flooding; R1= Roads & Transport; AP1= IWAK; P1= Piers & Harbours; WM1-4 = Waste Management Infrastructure; WW1-4= Waste Water Infrastructure; E1= Energy Infrastructure; DW1= Drinking Water Infrastructure; MF1= Mayo Forest Estate; CH1-2= Archaeological Heritage; AH1-2= Architectural Heritage; L1-L2= Landscape						

6.6.2 Preferred Scenario

On the basis of the above analysis, **Scenario 4: Strategically Planned Off-shore and On-shore Renewable Energy Development** emerges as the most environmentally sustainable of the five alternatives considered. Although Table 6.4 indicates that there is potential for conflict with the EPOs under this Scenario in respect of Population and Human health; Freshwater; Material Assets including Drinking Water Infrastructure, Piers and Harbours and IWAK; Cultural Heritage; and Landscape; such conflicts are likely to be mitigated by measures put in place to mitigate such conflicts. Scenario 4 also emerges as the alternative most likely to improve the status of the EPOs particularly those relating to Biodiversity, Flora and Fauna, Marine waters and ecology, Soils and Geology, Material Assets such as Waste Management Infrastructure and Mayo Forest Estate; and the Architectural heritage of the County.

Having regard to planning considerations, Scenario 4 is also the option that emerges as the alternative that balances environmental protection with economic and social development. Therefore, Scenario 4 is the option that forms the basis of the Draft RES. The detailed policies and objectives of the Draft RES are evaluated in the Evaluation Matrix in Section 7 in order to identify potential areas of conflict between the RES and the EPOs established during the SEA process.

Section 7 Evaluation of the Draft RES Policies and Objectives

7.1 Outline of Renewable Energy Strategy

Having established the environmental baseline, the main environmental problems and the interrelationship between the different environmental components; in order to identify where the most sensitive areas within and adjacent to the County occur, environmental factors, as described in the baseline were mapped using GIS.

This overlay mapping was used to identify areas with the least environmental/planning constraints. This enabled the identification of areas suitable for different types of renewable energy development and with the least potential for conflict with the EPOs.

This process was linked to the Habitat Directive Assessment which was carried out on the draft RES and which also informed the preparation of the RES.

The areas identified as suitable for particular renewable energy developments are outlined in the Maps which accompany the RES, (Maps 1 and 2 are attached to the rear of this report) and/or as outlined in the summary text below.

Map 1 classifies potential areas for on-shore wind energy development and four classifications are identified:

On-shore Wind Energy

1. Priority areas; areas which have secured planning permission and where on-shore wind farms can be developed immediately.
2. Tier 1 (Large); areas in which the potential for large wind farms is greatest
3. Tier 1 (Cluster); areas identified as being most suitable for smaller clusters of wind turbines (up to three turbines)
4. Tier 2; areas which may be considered for wind farms or small clusters of wind turbines but where the visual impact will be the principle planning consideration.

Off-shore Wind Energy

The main bodies responsible for the development of this resource are the SEAI, the Marine Institute and the Department of Communications, Marine and Natural Resources. However, much of the associated infrastructure would come within the remit of Mayo County Council and would be located on environmentally designated coastline.

Ocean Energy

This form of energy is not expected to contribute significantly to Ireland's electricity supply before 2020. However, off-shore conditions along certain parts of the Mayo coastline are suitable for research and development and SEAI and associated partners propose to build a National Wave Energy Site at Annagh Head, Belmullet.

Hydropower

The scope of medium to large hydro-electrical schemes in the County is likely to be limited due to the characteristics of the rivers and lakes. Sites for pumped storage hydro-electricity using seawater are currently being investigated throughout Ireland, including Mayo. It is recommended that hydropower energy/storage developments avoid Mayo's environmentally sensitive coastline much of which is designated as proposed NHAs. The planning requirements relating to small scale hydro-electric developments are also outlined.

Bio-energy

Due to the nature and scale of biomass and bio-energy developments, proposals will be considered on a case by case basis. Combined heat and power (CHP) plants will be encouraged where it can be demonstrated that such development will not have a negative impact on the surrounding area. CHP plants which export power to the grid will also be considered on a case by case basis. In general, sites will be considered in all areas of low planning constraints taking into account factors such as transportation of biomass 'fuel', residential amenity, access to the national grid, visual amenity and protection of the environment.

Solar and Solar Thermal Energy

This shall be encouraged throughout the County. Proposals will be required to demonstrate that they will not have an adverse effect on protected species and their habitats (e.g. bats) and on protected structures.

Geothermal

Mayo has a large band of granite located near Foxford with other significant areas near Louisburgh; and at the south end of the Mullet peninsula. It is not expected that this technology will be exploited during the lifetime of the RES. However, the Council will support any proposed geothermal research and exploration in these areas.

Micro-renewables

New low carbon development, through use of energy efficient micro generating renewable energy systems and construction methods, will be encouraged throughout the County.

Research and Development

The Council will support and encourage the development of a Sustainable Energy Park at a suitable location such as Belmullet for the display of working examples of sustainable energy and for educational and research related purposes. Third level educational courses in GMIT, related to renewable energy research and development will also be encouraged by the Council.

Notwithstanding the potential areas identified in the RES, all proposed developments will be assessed on the principles of proper planning and sustainable development, ensuring minimal adverse impact, including flooding, and taking full account of the presence of and requirement to protect Natura 2000 sites and proposed NHAs. Projects will be subject to HDA where considered appropriate.

7.2 Evaluation of Policies and Objectives – Methodology

This section evaluates the policies and objectives of the draft RES against the Environmental Protection Objectives which were established in Section 5. The interactions between the EPOs and the Policies and Objectives of the draft RES determine the environmental effects of implementing the Strategy. These effects include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects.

The process of evaluation of the detailed policies and objectives enables the likely significant effects of implementing the RES to be identified and also for mitigation measures to be incorporated into the RES where appropriate to address potential adverse impacts.

SEA is an iterative process, therefore some of the policies or objectives evaluated in the matrix below may be subject to amendment/deletion or new policies or objectives may be added at different stages of the SEA and Strategy making process. Any such changes are recorded in Section 8, Table 8.1.

Note that with regard to the RES measures evaluated under the criteria as having an **Uncertain interaction with the status of EPOs**, the interaction, and environmental impacts, if any, which the implementation of the RES measures would have, would be determined by the nature and extent of development arising from these measures, and site specific environmental factors. These impacts may be assessed as part of an Environmental Impact Assessment or Habitat Directive Assessment of a particular project and/or by the development management process.

The uncertainties can be avoided by the development management process only granting planning permission for individual projects, which do not conflict with the status of the EPOs. Provided these measures and measures included in the RES and recommended in this SEA (which all comply with higher tier Plans) are adhered to, conflicts would be likely to be avoided.

Evaluation of Policies and Objectives in the Draft Renewable Energy Strategy against Environmental Protection Objectives (EPOs)

Policies / Objectives of the Draft Renewable Energy Strategy	Likely to Improve status of EPOs	Probable Conflict with status of EPOs- unlikely to be mitigated	Potential Conflict with status of EPOs- likely to be mitigated by measures outlined in this SEA	Uncertain interaction with status of EPOs	Neutral Interaction with status of EPOs	No Likely interaction with status of EPOs
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<p>Policy 1 Climate Change</p> <p>It is the policy of the Council to support the National Climate Change Strategy 2007-2012</p>	ME1 ME2 ME3 ME4 G1 WM4 E1 AR1 AR2 AR3 N1 CF1 F1 WW1 DW1		B1 B2 SG2 SG3 SG4 W1 W2 W3 W4 W5 CF2 CF1 R1 WM1 MF1 CH1 CH2 AH1 AH2	WM2 WM3 L1 L2	SG1	PH1 P1 AP1
<p>Objective 1.1</p> <p>It is an objective of the Council to assist in achieving national targets for reducing greenhouse gas emissions associated with energy production by encouraging and promoting the reduction in energy consumption and by encouraging renewable energy developments at appropriate locations within the County, having regard to relevant planning guidance and the principles of proper planning and sustainable development and through the implementation of this draft Strategy.</p>	SG1 SG2 SG3 SG4 ME1 ME2 ME3 ME4 AR1 AR2 AR3 N1 CF1 F1 G1 R1 WM4 WW1 E1		B1 B2 PH1 W1 W2 W3 W4 W5 WM1 DW1 MF1 CH1 CH2 AH1 AH2 L1 L2	WM2 WM3		PH1 CF2 P1 AP1
<p>Objective 1.2</p> <p>It is an objective of the Council to encourage renewable energy production from wind, wave, tide, biomass, biofuel, biogas, solar power, tidal, hydro and geothermal sources in the County, particularly at locations set out in the Maps accompanying this draft Strategy and having regard to principles of proper planning and sustainable development.</p>	SG1 SG2 SG3 SG4 G1 ME3 AR1 AR2 AR3 N1 CF1 R1 WM4		B1 B2 PH1 W1 W2 W3 W4 W5 ME1 ME2 ME4 AP1 F1 WM1 WW1 E1 DW1 MF1 CH1 CH2 AH1 AH2 L1 L2	WM2 WM3	P1	CF2
<p>Objective 1.3</p> <p>It is an objective of the Council to assist in achieving the target that a minimum of 20% of the County’s overall energy requirements and 40% of the County’s electricity requirements will be provided from renewable sources by 2020 by implementing this Strategy.</p>	ME1 ME3 AR1 AR2 CF1 WM4		B1 B2 PH1 W1 W2 W3 W4 W5 CF2 R1 WM1 DW1 MF1 CH1 CH2 AH1 AH2 L1 L2	ME2 ME4 AR3 N1 WM2 WM3	SG1 SG2 SG3 SG4	G1 F1 P1 AP1 WW1 E1

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Objective 1.4 It is an objective of the Council to encourage energy efficiency, low energy design and integration of renewable energy techniques into new and existing developments.	AR1 AR2 AR3 CF1 WM4		B1 B2 SG2 SG3 SG4 W1 W2 W3 W4 W5 N1 R1 WM1 DW1	CF2 WM2 WM3 AH1 AH2	SG1 MF1	PH1 ME1 ME2 ME3 ME4 G1 F1 P1 AP1 WW1 E1 CH1 CH2 L1 L2
Objective 1.5 It is an objective of the Council to continue to ensure energy efficiency, low energy design and integration of renewable energy techniques into the Council's own operations, construction programmes and running of vehicle stock.	B1 B2 W1 W2 W3 W4, W5 AR1 AR2 AR3 CF1 WM4		N1 R1 WM1 DW1	WM2 WM3 AH1 AH2 L1 L2	SG1 SG2 SG3 SG4 MF1	PH1 ME1 ME2 ME3 ME4 G1 CF2 F1 P1 AP1 WW1 E1 CH1 CH2
Policy 2 The Natural Environment It is the policy of the Council to ensure that a balance between the provision of renewable energy developments and the preservation and conservation of the natural and built environment is maintained.	SG1 SG2 SG3 SG4 AR1 AR2 AR3 N1 R1 DW1		B1 B2 PH1 W1 W2 W3 W4 W5 CF1 P1 AP1 E1 MF1 CH1 CH2 AH1 AH2 L1 L2	ME1 ME2 ME3 ME4 WM1	CF2 WM2 WM3 WM4	G1 F1 WW1
Objective 2.1 It is an objective of the Council to ensure full compliance with European and National legislation in relation to renewable energy production and protection of the environment.	B1 B2 PH1 SG1 SG2 SG3 SG4 W1, W2, W3, W4, W5 G1 AR1 AR2 AR3 N1 F1 R1 P1 WM1 WM2 WM3 WM4 WW1 E1 MF1 CH1 CH2 AH1 AH2 L1 L2		CF1 DW1		ME1 ME2 ME3 ME4	CF2 AP1

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Objective 2.2 It is an objective of the Council to follow a sustainable plan led approach to renewable energy development within County Mayo through the implementation of this draft Strategy, in particular guiding renewable energy developments to preferred locations as set out in Section 6.4.	SG1 SG2 SG3 SG4 W1 W2 W3 W4 W5 ME1 ME2 ME3 ME4 G1 AR1 AR2 AR3 N1 CF1 F1 WM4 WW1 DW1 MF1		B1 B2 PH1 R1 AP1 WM1 E1 CH1 CH2 AH1 AH2 L1 L2	WM2 WM3	P1	CF2
Objective 2.3 It is an objective of the Council to ensure that renewable energy developments do not interfere with, or impinge on the visual amenity of, existing rights of way, public walking and cycling routes, scenic routes and scenic views and vulnerable or sensitive landscapes in the County.	SG1 SG2 SG3 SG4 W1, W2, W3 W4, W5 N1 R1 E1 DW1 CH1 CH2 AH1 AH2 L1 L2		B1 B2 PH1 CF1 P1 MF1	AP1 WM1	AR1 AR2 AR3 WM2 WM3 WM4	ME1 ME2 ME3 ME4 G1 CF2 F1 WW1
Policy 3 Strategic Infrastructure It is the policy of the Council to encourage and assist in the provision of strategic infrastructure at appropriate locations to facilitate the provision and exporting of renewable energy.	AR3 N1 CF1 R1 WM4 WW1 DW1		B1 B2 PH1 SG1 SG2 SG3 SG4 W1 W2 W3 W4 W5 ME1 ME2 ME3 ME4 G1 CF2 F1 AP1 WM1 E1 MF1 CH1 CH2 AH1 AH2 L1 L2	WM2 WM3	AR1 AR2	P1
Objective 3.1 It is an objective of the Council to actively pursue the upgrading of the national grid and for the provision of a 400kV line in Mayo with the Minister, The Commission for Energy Regulation and EirGrid.	AR3 CF1		B1 B2 PH1 W1 W2 W3 W4 W5 N1 R1 AP1 E1 DW1 MF1 CH1 CH2 AH1 AH2	SG1 SG2 SG3 SG4 CF2	AR1 AR2 WM1 WM2 WM3 WM4	ME1 ME2 ME3 ME4 G1 F1 P1 WW1 L1 L2

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Objective 3.2 It is an objective of the Council to advise Eirgrid that, primary consideration should be given to following the existing 110kv and 38kv lines in the County or their established way leaves when selecting route options for any new 220kV or 400kV transmission line.	AR3 CF1 WM4		B1 B2 PH1 W1 W2 W3 W4 W5 N1 R1 AP1 WM1 E1 DW1 MF1 CH1 CH2 AH1 AH2	SG1 SG2 SG3 SG4 L1 L2	AR1 AR2 CF2 WM2 WM3	ME1 ME2 ME3 ME4 G1 F1 WW1 P1
Policy 4 Community Benefit It is the policy of the Council to require that renewable energy developments are carried out in a manner that promotes economic and social benefits for the community of Mayo as a whole	SG1 SG2 SG3 SG4 AR1 AR2 AR3 N1 CF1 R1 DW1		B1 B2 PH1 MF1 CH1 CH2 AH1 AH2	WM1 WM2 WM3 WM4 L1 L2	P1	W1 W2 W3 W4 W5 ME1 ME2 ME3 ME4 G1 CF2 F1 AP1 WW1 E1
Objective 4.1 It is an objective of the Council to ensure that the advantages presented by renewable energy development outweigh the disadvantages for the majority of the community residing in the area of any proposed renewable energy development and for the wider environment, when assessing planning applications for renewable energy development.	AR1 AR2 AR3 N1 R1 DW1		B1 B2 PH1 SG1 SG2 SG3 SG4 MF1 CH1 CH2 AH1 AH2	WM1 WM2 WM3 WM4 E1 L1 L2	W1 W2 W3 W4 W5	ME1 ME2 ME3 ME4 G1 CF1 CF2 F1 P1 AP1 WW1
Objective 4.2 It is an objective of the Council to encourage community based renewable energy developments in the County having regard to the principles of proper planning and sustainable development	SG1 SG2 SG3 SG4 AR1 AR2 AR3 F1 R1 WW1		B1 B2 PH1 W1 W2 W3 W4 W5 AP1 MF1 CH1 CH2 AH1 AH2 L1 L2	WM1 WM2 WM3 WM4	N1 DW1	ME1 ME2 ME3 ME4 G1 CF1 CF2 P1 E1

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Objective 4.3 It is an objective of the Council to facilitate reducing fuel poverty in the County.	SG1 SG2 SG3 SG4 AR1 AR2 AR3 N1 R1		B1 B2 AP1 MF1	CH1 CH2 AH1 AH2	WM1 WM2 WM3 WM4	PH1 W2 W2 W3 W4 W5 ME1 ME2 ME3 ME4 G1 CF1 CF2 F1 P1 WW1 E1 DW1 L1 L2
Policy 5 Research & Development It is the policy of the Council to facilitate renewable energy research and development within the County	SG1 SG2 SG3 SG4 AR1 AR2 AR3 N1 CF1 R1 WM2 WM3 WM4		B1 B2 PH1 CF2 WM1 E1 DW1 MF1 L1 L2	W1 W2 W3 W4 W5 ME1 ME2 ME4 CH1 CH2 AH1 AH2		ME3 G1 P1 AP1 F1 WW1
Objective 5.1 It is an objective of the Council to support and encourage the development of a Sustainable Energy Park at a suitable location in the County, for the display of working examples of sustainable energy sources, the creation of public awareness regarding the benefits and advantages of renewable energy, and the provision of educational, training, research and development facilities relating to renewable energy and the sustainable development of renewable energy.	SG1 SG2 SG3 SG4 AR1 AR2 AR3 CF1 WM2 WM3 WM4		B1 B2 PH1 W1 W2 W3 W4 W5 CF2 R1 AP1 WM1 DW1 MF1 CH1 CH2 AH1 AH2 L1 L2	N1		ME1 ME2 ME3 ME4 G1 F1 P1 WW1 E1
Objective 5.2 It is an objective of the Council to facilitate marine renewable energy research at suitable locations along the Mayo coastline.	SG1 SG2 SG3 CF1 WM4		B1 B2 PH1 SG4 W1 W2 W3 W4 W5 ME1 ME3 G1 CF2 R1 P1 WM1 E1 DW1 MF1 CH1, CH2, AH1 AH2	ME2 ME4 AR2 N1 WM2 WM3 L1 L2	AR1 AR3	F1 AP1 WW1

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Section 8 Mitigation Measures

8.1 Introduction

Mitigation is a measure to avoid/prevent, minimise/reduce or as fully as possible offset/compensate for any significant adverse effects on the environment as a result of implementing a plan. Mitigation involves ameliorating significant negative effects. Where there are significant negative effects, consideration is given in the first instance to preventing such effects or, where this is not possible for stated reasons, to lessening or offsetting those effects. Mitigation measures can be roughly divided into those that: *avoid* effects; *reduce* the magnitude or extent, probability and/or severity of effect; *repair* effects after they have occurred, and; *compensate* for effects, balancing out negative impacts with other positive ones.

In addition to the mitigation measures detailed below, additional more detailed mitigation measures are also likely to be required through development management (i.e. the planning application stage of a development and/or by Environmental Impact Assessments and Habitat Directive Assessment of individual projects).

The mitigation measures will assist in the development management process and could assist in assessing planning applications for renewable energy developments. In turn these mitigation measures can be useful to potential applicants as they provide guidance on the key environmental issues to be addressed.

8.2 SEA Recommendation

It is recommended that the mitigation measures detailed under Section 8.3 be integrated into and adopted as part of the Renewable Energy Strategy.

The wording of measures contained hereafter constitute an undertaking as per the most relevant equivalent Irish Guidelines on best practice. Accordingly mitigation measures contained hereafter should be incorporated in their entirety or should be omitted. The degree of undertaking should remain as that the measure 'shall' or 'will' be implemented. The substitution of these words with the words 'should', 'ought' or 'may' is not in accordance with best practice and should be avoided.

8.3 Mitigation Measures

8.3.1 Biodiversity and Flora and Fauna

- All proposed renewable energy developments with the potential to impact on Natura 2000 or Ramsar Sites will be subject to Habitat Directive Assessment under Article 6(3) and 6(4) of the Habitats Directive.
- Applications for renewable energy developments must be accompanied by an Ecological Impact Assessment and Hydrological Impact Assessment, where appropriate, to assess impacts on protected sites including Natural Heritage Areas, proposed Natural Heritage Areas and also Local Biodiversity Areas, including in-combination effects. The EIA must address impacts associated with construction, operation and decommissioning stages of the proposed project. Where adverse significant effects are identified, the EIA must also include, a full and detailed description of the proposed mitigation measures to be undertaken to avoid, reduce or remedy those effects. Assessment of the likely effectiveness of mitigation measures must also be included.
- Any EIA prepared for proposed renewable energy developments must examine and provide a robust assessment of the proposal including lands in the immediate and surrounding environment and the short, medium and long-term effects/impact of the proposal on flora, fauna and geology – e.g. loss of and damage to habitats and plant and animal species.

- Proposals for renewable energy developments shall identify all ecological factors on the site, including ecological corridors, and be accompanied by pre-construction ecological surveys, carried out at the appropriate time of year. Full details on the habitats impacted by proposed renewable energy developments shall be provided both in terms of detailed descriptions of species recorded and the location and extent of habitats on accompanying maps. The presence of rare and protected species must be identified.
- The EIA project team shall consult with the NPWS, IFI and the National Biological Records Centre, and other relevant bodies to ensure that the EIA 'baseline' contains up-to-date information.
- All proposals for renewable energy developments shall include a robust Environmental Management Plan as part of the EIA, which must include *inter alia* details of a work plan describing the responsibilities and authorities involved in the implementation of mitigation measures and monitoring requirements.
- There is potential for the spread or introduction of invasive species from construction activities and where large movements of earth are required for developments. Detailed soil management measures must be specified to avoid the spread or introduction of invasive species.
- To ensure potential impacts to bats and birds arising as a result of the construction and operation of turbines/windfarms are avoided and reduced, surveyors contracted to undertake survey work shall have relevant expertise and experience, which is deemed acceptable to the NPWS. Construction works should be designed and timed so as not to disturb breeding birds and mammals.
- Proposals for renewable energy development on cutaway peatlands shall take into consideration any rehabilitation plans which have been prepared for these sites.

8.3.2 Population and Human Health

Development proposals for renewable energy developments will be required to demonstrate that the proposed development will not seriously injure the amenities or cause emission nuisance to residential properties, places of worship, health buildings or schools within 500m of the proposed development.

8.3.3 Soils and Geology

In order to achieve the EPOs relating to Soil and Geology during the phases associated with any renewable energy development including site preparation and excavation, construction and development, energy production, and decommissioning phases (where relevant) the following appropriate mitigation measures must be addressed;

- Regarding IGH sites identified by the GSI and listed in the SEA and MCDP 2008-14; these areas shall be avoided, and in cases where there could be an adverse effect, a comprehensive study of the area along with liaison with the GSI is required (SG1).
- In areas of peat, minimal removal of vegetation shall take place to reduce areas of bare peat/soil, and minimal disturbance of peat, which will help prevent alteration to the water table and surface run-off. (SG2)
- Landslide susceptibility and slope stability risk assessments shall be carried out by suitably qualified persons in conjunction with the GSI (SG3).
- Surface excavations should result in the surface vegetation being removed in sods which can be stored and replaced at a later stage to ensure rapid re-vegetation and help reduce erosion (SG4).

- In addition, all EIA / EIS shall include the impacts of all phases of the renewable energy development being considered, carried out by suitably qualified personnel in consultation with the GSI where appropriate.
- Applications for marine related renewable energy research will include effects of marine renewable energy development on coastal erosion. Currently this type of research is in its infancy nationally; therefore the effects of this type of development will have to be researched.

8.3.4 Water Protection

Freshwater

While many of the objectives and policies included in the RES may potentially conflict with the status of EPOs relating to freshwater quality and ecological elements, these are likely to be mitigated by measures described in the SEA of the RES as the preparation process of the RES was integrated with the SEA process.

In order to achieve the EPOs relating to freshwater and its ecological elements, in addition to the appropriate treatment of all effluents produced during site preparation including excavation works, the energy production stage and decommissioning stages (if required) the following appropriate mitigation measures have been addressed in the Draft RES;

- Wind energy – *the development will not compromise the conservation objectives of any designated sites in the wider area (Bangor Erris, Bellacorrick and certain parts of south east Mayo);*
- Ocean Energy – *the developer will be required to ensure that the proposed development will not have a negative impact on fish spawning grounds and migration routes, access to fishing grounds and water quality during any installation and maintenance;*
- Hydropower – *any proposals for hydropower generation sites will be required to address issues such as fish passage, fish protection / grating and retention of natural watercourse levels and water quality.*
- Biomass, biogas and biofuel – *Care will have to be taken to assess the suitability of sites for forestry, due to runoff and slope stability when clearing. Any developments proposed using biofuel to generate electricity shall be selected, prepared and managed in accordance with the Department of Marine and Natural Resources Code of Best Forest Practise – Ireland (2000), relevant Department of Agriculture, Fisheries and Food guidance and requirements of the European Communities (Good Agricultural Practise for Protection of Water) Regulations, 2009.*

In addition, the aims of the RES include measures to protect the natural and built heritage of the County by ensuring that all policies and objectives must comply with the principles of proper planning and sustainable development including minimal adverse environmental impacts and taking full account of the presence and requirement to protect all Natura 2000 sites, including habitats and species. Projects will be subject to Habitats Directive Assessment where considered appropriate, following a preliminary screening assessment. Interaction between EPOs developed for freshwater quality and ecological elements is foreseen with those relating to effluent treatment and the provision of appropriate infrastructure for the optimal treatment of point discharges from renewable energy projects.

Marine Waters

- Regarding Cetaceans (marine mammals), marine-based renewable energy developments shall be assessed on a case-by-case basis to identify proximity to key migration routes, nursery or breeding areas for whales, dolphins and seal species. These areas shall be avoided where possible and suitable mitigation measures undertaken to reduce and avoid noise, vibration and collision impacts where possible. These mitigation measures shall be established in consultation with the NPWS and Irish Whale and Dolphin Group (IWDG).

- Regarding Water Quality Protection, appropriate mitigation shall be undertaken during the construction and operation of marine-based renewable energy installations to ensure development does not breach the water quality objectives of receiving waters.
- Regarding Fishery & Shellfish Protection, the siting of marine renewable energy projects shall avoid known important fish spawning grounds where possible and appropriate mitigation undertaken to reduce impacts on fishing grounds, migration routes and important fishing grounds. Conversely, renewable energy installations in the marine environment can potentially benefit fish and shellfish through no-fishing zones in areas where renewable energy (wave or wind) installations would be sited.
- Assessment of the impacts of individual marine based renewable energy project proposals must carefully assess the potential impacts on fish and cetacean migration routes. Known migration routes for key species shall be avoided when locating renewable energy projects. Impacts from noise and disturbance, particularly during the construction phase, and from noise and potential collision impacts during the operation of renewable technologies must also be assessed on a project by project basis. Monitoring is likely to be required to assess the operational impacts on species, particularly for projects with higher potential for collision, and also that generate the greatest noise.

Groundwater

- Karst groundwater (the water in a karst aquifer) is a major water resource in many regions. Karst aquifers have specific hydraulic and hydrogeologic characteristics that render them highly vulnerable to pollution from human activities. Karst groundwater becomes polluted more easily and in shorter time periods than water in non-karstic aquifers. Thus, arising from the karstified nature of an aquifer, additional precautionary measures shall be implemented to ensure that groundwater quality will not be negatively impacted on.
- Mitigation measures shall relate to the preservation of the existing subterranean drainage regime and the protection of groundwater.

8.3.5 Air Quality and Climatic Factors

Noise

Prior to the development of renewable energy projects or the integration of renewable energy projects and energy efficiency technologies into existing developments, assessments shall consider the potential impacts at noise sensitive locations. Noise sensitive locations shall be considered during all phases of renewable energy and energy efficiency projects. Impacts from noise during the construction and operation phases of renewable energy projects shall be considered to avoid, prevent and reduce, on a prioritised basis, exposure to unacceptable levels of environmental noise. This objective can be achieved by ensuring that appropriate mitigation measures are addressed. It is assumed that EIA/HDA projects will incorporate and address mitigation measures. However, factors that are particularly pertinent to noise control are outlined below:

- (i) The scale, nature and location of energy efficiency and renewable energy projects should influence the consideration **of traffic management plans** to address impacts at noise sensitive locations during construction and operational phases of renewable energy developments or integration projects. The construction of wind farms, marine related energy projects and hydro energy projects require increased traffic volumes particularly during construction, while traffic volumes to biomass sites generally require increase traffic volumes in an area during construction and operational phases both in terms of the energy generating site and the product source location. Given the low background noise levels in rural areas, mitigation measures such as traffic management plans, road gradients, and road surfaces should be considered.
- (ii) Due regard shall be taken of the parameters outlined in the Noise Action Plan for County Mayo and Noise Regulations 2006

- (ii) The upgrading of the National Transmission Network should involve the submission of an assessment on potential noise emissions from substations and the transmission lines.
- (iii) For Wind Energy developments due regard should be taken of noise assessment, mitigation and thresholds outlined in the Planning Guidelines for Wind Energy Developments for Planning Authorities 2006.
- (iv) Building regulations PART E should be considered to control noise at sensitive receptor locations to provide for reasonable resistance to both air borne and impact sound.

It should be noted that:

- In the case of domestic applications, the Planning and Development Regulations 2007 S.I. 35 2007 require that noise from wind turbines must not exceed 43 dB(A) during normal operations or in excess of 5 dB(A) above background levels, whichever is greater as measured from the nearest neighbouring inhabited dwelling and
- The Planning and Development Regulations 2008 S.I. 08 2008 require that renewable energy technologies do not exceed 43 dB(A) during normal operations as measured from the nearest party boundary.

Climatic Factors

- Development proposals for renewable energy development shall be required to demonstrate that they comply with reduction in Greenhouse Gas Emissions CO₂ in accordance with National Climate Change Strategy 2007 – 2010.
- Development proposals for renewable energy developments shall be required to demonstrate that the proposed improvements can be carried out in a sustainable manner such as not to create any adverse impact on the environmentally designated site.
- Developers shall provide a systematic assessment of the carbon balance of the development during construction, operation and decommissioning, demonstrating how this balance has been maximised. This assessment shall consider using local products, minimise area of disturbance, use excavated material for infill where possible, avoid contamination, avoid triggering erosion by wind or water, avoid desiccation of peat through direct or indirect changes to drainage, and avoid loss of carbon sinks and carbon release by disturbance to peat.

Flooding

- Renewable Energy development sites must comply with the provisions of the DoEHLG/OPW publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'. Sites will be required to avoid areas of flood risk and where there is a strategic case for allowing development in such areas, these proposals will be subject to the **'justification and sequential tests'** in the Flood Risk Management Guidelines and assessed to ensure that flood risk can be reduced and mitigated as appropriate.
- Sites identified for renewable energy development will support the provision of adequate surface water drainage infrastructure, promote the use of a sustainable drainage system (SUDS) approach and techniques and manage flood risk through the protection of natural drainage systems, the appropriate location and design of different types of development and the incorporation of flood risk assessments and works where necessary.
- Development in areas at risk of flooding, particularly floodplains, shall be avoided by not permitting development in flood risk areas unless it is fully justified that there are wider sustainability grounds for appropriate development; unless the flood risk can be managed to an acceptable level without increasing flood risk elsewhere; and, where possible, it reduces flood risk overall.

- A sequential approach to flood risk management based on avoidance, reduction and then mitigation of flood risk as the overall framework for assessing the location of new development in the development planning processes shall be adopted.
- Flood risk assessments shall accompany planning applications and these assessments shall be incorporated into the process of making decisions on planning applications and planning appeals.
- The requirements of ‘The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009’ shall be adhered to.

8.3.6 Material Assets

Roads and Transport

- Traffic management plans shall be submitted with applications to address impacts on residents in relation to construction activities.
- Where the construction of new roads is required to construct/service renewable energy developments, adequate and appropriate drainage measures will be required.
- The carrying capacity, operational efficiency, safety and national investments in national roads shall be protected in relation to the implementation of the RES and EIAs may be required to demonstrate same.
- There will be a clear presumption in favour of protection of the national road network and direct access onto national roads outside the 50kph speed limit will be restricted.

General mitigation measures which will be required for renewable energy developments are as follows:

- (1) Road widening and road strengthening
- (2) Realignment of existing road network
- (3) Access visibility improvements
- (4) Drainage improvements and maintenance
- (5) Contributions for Road improvements where necessary
- (6) Structural analysis of roads and bridges, before and after heavy loads of materials have traversed same.

Piers and Harbours

- Development proposals for improvements to piers, harbours and landing places shall be required to demonstrate that the proposed improvements can be carried out in a sustainable manner such as not to create any adverse impact on the environmentally designated sites.

IWAK

- The developers of any project related to the RES within the airport exclusion zone shall consult with the Airport Authority and the Irish Aviation Authority to ensure that the proposal does not compromise aircraft safety.

Waste Infrastructure

- All developments will generate waste arisings. If the arisings are managed correctly they can assist in achieving targets set out in the Connaught Waste Management Plan. The RES may generate the introduction of technologies, which will provide valuable recovery infrastructure. It is envisaged that the Sustainable Development Park will have working examples of all technologies. This will provide a valuable resource for managing the organic fraction of Municipal Solid Waste. Waste oils could be collected to produce bio fuels in the vicinity of the proposed Park.
- Planning conditions to ensure that waste management plans for construction and operational phases are submitted and that waste management is considered in a realistic way must be imposed. Waste facilities for dealing with the waste arisings must be identified or put in place if they are not available. It is most likely that the necessary facilities are not in place in all areas to deal with the likely volume of construction and demolition (C&D) waste arisings. Proceeding to construction stage in the absence of

these facilities will lead to delay in construction. C&D waste is best managed in close proximity to works. Ensuring that planning permission is contingent on authorised waste facilities being identified will ensure that all activity is authorised in accordance with the Waste Management Act 1996 to 2010. Other wastes generated can be managed through authorised waste collectors. Waste management plans should include details of waste arisings and specific details on how these will be managed. Best Practice Guidelines on the preparation of waste management plans for construction and demolition projects 2006 should be used.

Energy Infrastructure

- Development proposals for renewable energy development shall be required to demonstrate that connection to the national grid can be carried out in a sustainable manner.

Waste Water Infrastructure

- All renewable energy developments will be assessed on a case by case basis. Trade effluent discharging to a public sewer is required to have a discharge licence from the Local Authority. Some renewable energy developments may be required to have their own on-site treatment facilities to treat their effluent to an acceptable standard before discharging to the public sewerage system.

Drinking Water Infrastructure

The following will be required in order to achieve the EPOs relating to drinking water sources and to protect existing and potential water resources, in accordance with the EU/WFD, River Basin Management Plans, Groundwater Protection Scheme and source protection plans for public water supplies:

- Buffer zones shall be designated around sources of drinking water abstraction
- Appropriate perimeter controls shall be established at the edge of development sites to retain runoff from sites e.g. silt traps
- Minimal removal of vegetation shall take place to reduce areas of bare peat/soil, which will help prevent alteration to the water table and surface run-off. Limitations of heavy machinery and the storage of materials to avoid soil compaction
- Assess the suitability of sites - risk assess; slope stability, runoff e.g. landslide susceptibility
- In addition, all EIA / EIS shall include impacts of all phases of the development being considered.

8.3.7 Cultural Heritage

Archaeological Heritage

- Where the RES impacts on the Zone of Archaeological Potential of a site included in the RMP; National Monuments in the ownership or guardianship of the State; and National Monuments that are subject of Preservation Orders or their setting in the landscape, an Archaeological Assessment shall be carried out. In addition, any developments that are extensive in terms of area (1/2 hectare or more) or length (1 kilometre or more) and developments that require an Environmental Impact Statement shall also be subject to archaeological assessment.
- Where the RES has the potential to impinge upon the integrity of significant cultural landscape resources, the developer shall commission an Archaeological Assessment of the potential landscape and visual impacts.
- Archaeological Assessment involves a desk top study and a site visit and may also require one and/or all of the following:
 - a) Geophysical and/or other invasive surveys (including architectural survey)
 - b) Licensed pre-development testing
 - c) Licensed archaeological excavation
 - d) Archaeological monitoring of ground works.

- The Archaeological Assessment shall establish the extent of archaeological material associated with the monument or site and the potential impacts (if any) on the monument or site. The assessment shall also define the buffer area or area contiguous with the monument which will preserve the setting and visual amenity of the site.
- All archaeological monuments included in the RMP, any sites and features of historical and archaeological interest and any subsurface archaeological features that may be discovered during the course of infrastructural/development works shall be preserved *in-situ* or by record.

The stated policy of the DoEHLG with regard to the preservation in-situ of archaeological remains is:

“There should always be a presumption in favour of avoiding development impacts on the archaeological heritage. Preservation in-situ must always be the first option to be considered rather than preservation by record in order to allow development to proceed, and preservation in-situ must also be presumed to be the preferred option.” (Framework and Principles for the Protection of the Archaeological Heritage, Duchas The Heritage Service, 1999).

Architectural Heritage

- In order to ensure the protection of the architectural heritage, renewable energy proposals will be required to demonstrate that they are sensitively sited and designed, are compatible with the special character of any protected structure and ACA and are appropriate in terms of proposed scale, mass, height, density, layout and materials. In this regard, planning proposals must be accompanied by an appropriate Architectural Heritage Impact Assessment, undertaken by a certified conservation professional detailing the impacts of the relevant development upon the special interest and character of the ACA, Protected Structure, and/or its setting. The planning authority must be consulted in order to determine whether there is a need for such an assessment. Reference should be made to Architectural Heritage Protection Guidelines for Planning Authorities.
- Prohibit the demolition of a Protected Structure except where an exceptional need for such demolition has been clearly established.
- Ensure that the route for construction traffic in relation to any proposal does not cause damage to heritage infrastructure such as heritage bridges.

Landscape

The SEA assessment indicated that there is potential for conflict with the status of EPOs L1 and L2 which relate to the protection of the landscape including views and scenic routes. However, it is considered that conflicts are likely to be mitigated by measures outlined in this SEA Report.

It is noted that a number of visually sensitive/vulnerable areas and which include listed views, scenic routes and viewing points (Map 10 Mayo County Development Plan) are included on Map 1 in the Tier 2 classification which may be considered for wind farms or small clusters of wind turbines.

In view of the highly sensitive characteristics of these scenic areas and the potential for wind farm development to have significant visual impacts over large areas, the appropriate mitigation measure in certain cases would be avoidance of renewable energy development in such areas if – following detailed visual analysis of individual proposals and cumulative effects, it is evident that the proposed development would have adverse effects on such landscapes and views.

This principle could also apply to other areas outside the Tier 2 classification, however, these areas (in general) are not as sensitive visually and other mitigation measures relating to siting and design etc would be appropriate.

Therefore the following mitigation measures will be applied:

1. In Tier 2 areas, where it is demonstrated by detailed visual analysis that any particular renewable energy development will have an adverse impact on any sensitive landscape, vulnerable landscape, listed highly scenic views, scenic views, scenic viewing points or scenic routes, mitigation shall be by avoidance of development in such areas.

2. Renewable energy developments shall be sited and designed to minimise visual impacts on the surrounding area.

8.5 Incorporation of Mitigation Measures into the Renewable Energy Strategy

The assessment of the policies and objectives of the draft RES against the EPOs indicated that whilst several (see evaluation matrix) policies and objectives are likely to Improve the status of the EPOs, there is also potential for conflict with the EPOs; however these are likely to be mitigated by measures outlined in the SEA.

Table 8.1 shows and records the changes to policies and objectives arising from the incorporation of mitigation measures into the Strategy. Changes are shown in green text together with an explanatory comment of how the change was initiated.

Other text changes to the draft RES arising from inter-action with the SEA process are highlighted in green text in the draft Strategy itself.

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 8.1 Record of Text amendments to Policies and Objectives arising from Assessment against EPOs			
Policy/Objective	Change to Policy/Objective	Comment	Relevant Environmental Component
Policy 1 Climate Change			
Objective 1.1	n/a	No change	n/a
Objective 1.2	n/a	No change	n/a
Objective 1.3	n/a	No change	n/a
Objective 1.4	n/a	No change	n/a
Objective 1.5	n/a	No change	n/a
Policy 2 The Natural Environment	n/a	No change	n/a
Objective 2.1	n/a	No change	n/a
Objective 2.2	It is an objective of the Council to follow a sustainable led approach to renewable energy development within County Mayo through the implementation of this Draft Strategy, in particular guiding renewable energy developments to preferred locations as set out in Section 6.4 and requiring all renewable energy developments to comply with standards and mitigation measures outlined in Appendix 2.	Change warranted as a result of Mitigation Measures identified in this Report and which are detailed in Appendix 2 of the Renewable Energy Strategy. This change integrates the mitigation measures into the Strategy by requiring compliance with them as an objective.	Biodiversity, Flora and Fauna, Population and Human Health, Soils and Geology, Water, Air Quality (including noise) and Climatic Factors (including Flooding), Material Assets (Roads and Transportation, Piers and Harbours, IWAK, Waste Infrastructure, Energy, Waste Water Infrastructure, Drinking Water Infrastructure, Cultural Heritage (Archaeological and Architectural), Landscape.

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Policy/Objective	Change to Policy/Objective	Comment	Relevant Environmental Component
Objective 2.3	It is an objective of the Council to ensure that renewable energy developments do not interfere with, damage, remove, or impinge on the visual amenity of, existing rights of way, public walking and cycling routes, scenic routes and scenic views, protected structures, Architectural Conservation Areas, recorded monuments and vulnerable or sensitive landscapes in the County.	Change warranted as a result of Mitigation Measures identified in the Report and consultation with SEA team members	Population and Human Health, Material Assets, Cultural Heritage and Landscape
Objective 2.4	It is an objective of the Council that all proposed renewable developments will be assessed on the principles of proper planning and sustainable development, ensuring minimal adverse environmental impact to biodiversity, flora and fauna; population and human health; soil; water; air and climatic factors; material assets; cultural heritage; and landscape. Full account shall be taken of the presence and requirement to protect all Natura 2000 sites. Projects will be subject to Habitat Directive Assessment where considered appropriate.	New Objective added to strengthen protection of all environmental components.	Biodiversity, Flora and Fauna, Population and Human Health, Soils and Geology, Water, Air Quality (including noise) and Climatic Factors (including Flooding), Material Assets (Roads and Transportation, Piers and Harbours, IWAK, Waste Infrastructure, Energy, Waste Water Infrastructure, Drinking Water Infrastructure, Cultural Heritage (Archaeological and Architectural), Landscape.
Policy 3 Strategic Infrastructure	n/a	No change	n/a
Objective 3.1	n/a	No change	n/a
Objective 3.2	n/a	No change	n/a

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Policy/Objective	Change to Policy/Objective	Comment	Relevant Environmental Component
Policy 4 Community Benefit	n/a	No change	n/a
Objective 4.1	n/a	No change	n/a
Objective 4.2	n/a	No change	n/a
Objective 4.3	It is an objective of the Council to support the concept of community benefit when considering renewable energy developments and to support the concept of reducing fuel poverty in the community in the County	This objective was separated into two objectives (4.3 and 4.4) to separate the concept of community benefit from reducing fuel poverty in the County. This change was not triggered by the SEA.	n/a
Revised Objective 4.3	It is an objective of the Council to require developers to incorporate the concept of community benefit into any renewable energy development proposal	See above comment	n/a
New Objective 4.4	It is an objective of the Council to facilitate reducing fuel poverty in the County	See comment above	n/a
Policy 5 Research & Development	n/a	No change	n/a
Objective 5.1	n/a	No change	n/a
Objective 5.2	n/a	No change	n/a

Section 9 Monitoring Measures

9.1 Introduction

The SEA Directive requires that the significant environmental effects of the implementation of plans and programmes are monitored. This environmental report puts forward proposals for monitoring the implementation of the RES, which are adopted along with the Strategy.

Monitoring enables, at an early stage, the identification of unforeseen adverse effects and the undertaking of appropriate remedial action. In addition to this, monitoring can also play an important role in assessing whether the RES is achieving its environmental objectives and targets - measures which the RES can help work towards - whether these need to be re-examined and whether the proposed mitigation measures are being implemented. The monitoring programme will consist of an assessment of the relevant indicators and targets against the data relating to each environmental component.

9.2 Indicators and Targets

Monitoring is based around the indicators which were chosen earlier in the SEA process for the purpose of measuring changes to the various environmental components. They allow quantitative measures of trends and progress over time relating to the Environmental Protection Objectives used in the evaluation process. Focus will be given to indicators which are relevant to the likely significant environmental effects of implementing the Strategy and existing monitoring arrangements will be used in order to monitor the selected indicators. Each indicator to be monitored is accompanied by targets which are derived from the relevant legislation (see Sections 4 and 5).

Table 9.1 below shows the indicators and targets which have been selected with regard to the monitoring of the Renewable Energy Strategy.

9.3 Sources

Measurements for indicators should come from existing monitoring sources and no new monitoring should be required to take place. Existing monitoring sources exist for each of the indicators and include those maintained by Mayo County Council and the relevant authorities e.g. the Environmental Protection Agency, the National Parks and Wildlife Service and the Central Statistics Office.

The Development Management Process in Mayo County Council will provide passive monitoring of various indicators and targets on an application-by-application basis (i.e. of renewable energy projects). Where significant adverse effects are likely to occur upon, for example, entries to the RMP, entries to the RPS or ecological networks as a result of the undertaking of individual renewable energy projects or multiple individual renewable energy projects, such instances should be identified and recorded and should feed into the monitoring evaluation.

9.4 Reporting and Monitoring

Mayo County Council will be responsible for collating existing relevant monitored data, the preparation of a monitoring report and, if necessary, the carrying out of corrective action. It is recommended that a multi-disciplinary committee of suitably qualified persons (Monitoring Committee) be established within two months of adoption of the RES to oversee the monitoring process, determine the frequency of monitoring and input into the preparation of the Monitoring Report. It is recommended also that the monitoring reporting should go parallel with the review of the RES with a Monitoring Report at least every two years or more frequently if determined by the Monitoring Committee.

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table			
Environmental Component	Targets	Indicators	Source
Biodiversity, Flora and Fauna	Target B1: No loss or degradation of habitat or species	Indicator B1i: No. of sites for Nature Conservation to be adversely affected by the Strategy Indicator B1ii: Changes in population and range of protected species Indicator B1iii: Changes in areas of habitats or populations of flora and fauna	CORINE Mapping, NPWS Records, Planning Register
	Target B2i: Maintenance of favourable conservation status for all habitats and species protected under national and international legislation	Indicator B2i: Area or proportion of total of SACs/SPAs/NHAs damaged or lost as a result of renewable energy developments	
	Target B2ii: No loss of ecological networks	Indicator B2ii: Ecological networks lost as a result of renewable energy developments	
Population and Human Health	Target PH1: No spatial concentration of health problems arising from environmental factors	Indicator PH1: Occurrence of any spatially concentrated deterioration of human health	Health Service Executive Health & Safety Authority EPA
Soils & Geology	Target SG1: No renewable energy (RE) developments to adversely impact on IGH sites	Indicator SG1: Number of RE developments which would be considered to have significant adverse impacts including direct or indirect impacts on IGH sites	Geological Survey of Ireland Irish Geological Heritage Section
	Target SG2: No RE development in areas which may cause a significant risk of flooding or which may exacerbate a risk of flooding in another location	Indicator SG2: Number of RE developments in areas which have a direct or indirect significant impact on flooding, or number of developments which may be linked indirectly to causing flooding in another area	OPW
	Target SG3: No RE development in areas which may be considered at risk to landslides	Indicator SG3: Number of RE developments in areas which may be considered to be prone to or at risk from landslides or soil creep	Geological Survey of Ireland Irish Landslides Working Group
	Target SG4: No RE development in areas considered at risk to erosion		

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table

Environmental Component	Targets	Indicators	Source
Freshwater & Ecology	Target W1: No deterioration in surface water bodies of good and high status	Indicator W1: Quality elements for ecological status (biological, hydro-morphological, chemical & physico-chemical elements)	Western River Basin District Management Plan and additional associated publications (including online publications)
	Target W2: Improvement of moderate, poor and bad status water bodies to at least good status by 2015	Indicator W2: Quality elements for ecological status	
	Target W3: Minimal deterioration in surface water quality due to diffuse or point source discharges	Indicator W3i: Chemical, physico-chemical & ecological status of the surface water catchment & immediately upstream of point and discharges Indicator W3ii: No / minimal exceedance in other relevant legislation	Mayo County Council Environment Section Mayo County Council Section 4 and Section 16 licence register(s)
	Target W4: No negative impacts on indigenous freshwater ecological elements due to habitat destruction or modification, and prevention of invasive species	Indicator W4: Quality elements for ecological status, populations of bio-indicators and keystone taxa lost or disturbed from registered Protected Sites (Article 8 of S.I. 722 of 2003), Natura 2000 Sites	EPA National Parks and Wildlife Service (NPWS)
	Target W5: To maintain good and high status and improve moderate, poor and bad to good status in Mayo water bodies by 2015	Indicator W5i: Chemical, physico-chemical and ecological status of the surface water catchment and immediately upstream of point and discharges. Indicator W5ii: No/minimal exceedance in other relevant legislation	Published research (from peer-reviewed journals)
Marine Waters & Environment	Target ME1: No loss of Annex 1 Habitats or Annex II species from RE projects. No reduction in the diversity of floral & faunal species in designated sites from RE projects.	Indicator ME1: Percentage loss of specific habitat or species within designated sites. Species composition of habitats within designated sites.	NPWS EPA Environment Section
	Target ME2: No significant adverse impacts on distribution & movement of cetaceans species. No loss of breeding grounds for grey & harbour seals.	Indicator ME2: Percentage loss of populations of grey and harbour seal populations. Reduced use of area by cetaceans due to disturbance from activities associated with RES.	Western River Basin District Management Plan and additional associated

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table

Environmental Component	Targets	Indicators	Source
	<p>Target ME3i: Achieve ‘Good Status’ as a minimum but strive to achieve ‘High Status’ where possible under the Water Framework Directive by 2015. No significant change in hydro-morphological elements or general conditions from implementation of RES technologies.</p> <p>Target ME3ii: Achieve and sustain concentrations near background values for naturally occurring substances or close to zero for man-made substances. No change in ecological quality ratios or change in species composition from hazardous substances.</p> <p>Target ME3iii: Compliance with Bathing and Shellfish Water Regulations</p>	<p>Indicator ME3i: Trophic Status,¹ Biological Status, hydro-morphological quality, and water quality parameters</p> <p>Indicator ME3 ii: Environmental concentrations in marine sediments and biota and biological impacts, Ecological Quality Ratios.</p>	<p>publications (including online publications)</p> <p>Marine Institute</p> <p>Mayo County Council Environment Section</p>
	<p>Target ME4: No loss of fish spawning or nursery habitat from RE projects undertaken as part of the RES. Maintain existing water quality levels.</p>	<p>Indicator ME4: More than 30% of fish should be longer than 40cm. Loss of spawning & nursery habitat, pollution of waters, physical disturbance.</p>	
Groundwater	<p>Target G1i: No change in Groundwater Quality Standards associated with RE Developments</p> <p>Target G1ii: Compliance with Groundwater Quality Standards & EC Environmental Objectives (Groundwater) Regulations 2010</p>	<p>Indicator G1i: Changes in Groundwater Quality Standards from construction of RE Developments</p> <p>Indicator G1ii: Water status by 2015 Water Framework Directive (2000/60/EC)</p>	EPA

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¹ ATSEBI

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table

Environmental Component	Targets	Indicators	Source
Air	Target AR1: Ensure monitoring results are maintained within the appropriate emission limit values	Indicator AR1: Air monitoring data to indicate compliance with appropriate policies and legislative requirements	EPA
	Target AR2: An increase in the percentage of the population travelling to work or school by public transport or non-mechanical means	Indicator AR2: Percentage of population within the RES area travelling to work or school by public transport or non mechanical means	
	Target AR3: Increase the number of energy efficient buildings	Indicator AR3: Number of BER certificates issued for the County	
Noise	Target NR1: To protect the quality of the future noise environment by ensuring the incorporation of acoustical planning for renewable energy developments	Indicator NR1i: The production of a revised Noise Action Plan when required by legislative thresholds	
		Indicator NR1ii: The number of noise related complaints received in relation to RE developments	
		Indicator NR1iii: The number of planning permission granted and associated compliance requirements for RE developments	
Climate	Target CF1: That by the year 2020 a minimum of 40% of the electricity requirement of the County is produced from RE sources	Indicator CF1: The amount of the reduction in greenhouse gas emissions attributable to additional renewable energy projects permitted in County Mayo	EPA, SEAI, Local Authority Mayo Energy Agency
	Target CF2: That by the year 2020 a minimum of 40% of the electricity requirement of the County is produced from RE sources	Indicator CF2: The additional amount of MW produced from renewable energy in County Mayo	
Flooding	Target F1: Minimise developments granted permission on lands which pose – or likely to pose in the future- a significant flood risk	Indicator: F1: Number of developments granted permission on land which pose – or are likely to pose in the future – a significant flood risk.	Development Management Process in Mayo County Council. OPW data

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table

Environmental Component	Targets	Indicators	Source
Material Assets: Roads and Transportation	Target R1i: Developments to be located off National Roads	Indicator R1i: Number of developments located close to the National Road Network.	Planning Register, Mayo County Council National Roads Authority
	Target R1ii: No developments to be developed, which would involve deliveries having to travel long distances on local roads.	Indicator R1ii: Number of developments which require traffic to travel long distances along Local Roads.	
	Target AP1i: RE projects do not impact on the safety and efficiency of aircraft operations in the vicinity of IWAK	Indicator AP1i: Number of RE Projects proposed or permitted within the IWAK Exclusion zone	
	Target AP1ii: RE projects do not limit the future expansion and growth of IWAK as an economic driver for the Region.	Indicator AP1ii: Cumulative number of RE Projects permitted within the IWAK exclusion zone.	
	Target P1i: No improvement to any pier, harbour or landing place to be carried out which would have an adverse impact on the existing environment of environmentally designated areas	Indicator P1i: Number of piers, harbours or landing places where improvements have been carried out which had an adverse impact on the existing environment of environmentally designated areas	
	Target P1ii: No improvement to any pier, harbour or landing place to be carried out which would have an adverse impact on the existing environment of non- environmentally designated areas	Indicator P1ii: Number of piers, harbours or landing places where improvements have been carried out which had an adverse impact on the existing environment of non- environmentally designated areas	
	Target P1iii: No improvement to be carried out on any pier, harbour or landing place listed in the RPS which would have an adverse impact on that structure	Indicator P1iii: No. of piers, harbours or landing places listed in the Record of Protected Structures where improvements have been carried out which had an adverse impact on that structure	
Material Assets: Energy	Target E1i: No new energy developments or connections to the national grid to be conspicuously located within vulnerable or sensitive landscapes or environmental designated areas	Indicator E1i: Number of conspicuous energy developments adversely impacting upon vulnerable or sensitive landscape features or environmental designated areas	Planning Register, Mayo County Council CORINE mapping
	Target E1ii: No new energy developments or connections to the nation grid to adversely impact upon vulnerable or sensitive landscape features or environmentally designated areas	Indicator E1ii: Number of energy developments adversely impacting upon vulnerable or sensitive landscape features or environmentally designated areas	

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table			
Environmental Component	Targets	Indicators	Source
	Target E1iii: No new energy developments or connections to the nation grid to cause loss of sensitive or vulnerable landscape features or environmentally designated areas	Indicator E1iii: Number of sensitive or vulnerable landscape features lost or adverse effects to, or loss of, protected habitats and species as a result of new energy developments including access to the national grid	
Material Assets: Waste Infrastructure	Target WM1: 48% recycled; 33% energy recovery; and 19% landfilled. Attitude change.	Indicator WM1: Reduced tonnage of waste collected with increased number of customers	Annual Environmental report submitted by waste collectors to Mayo County Council
	Target WM2: 48% recycled; 33% energy recovery; and 19% landfilled.	Indicator WM2: Increase in the percentage of households receiving a refuse collection service and decrease in proportion of waste arisings being landfilled and increase in recovery and recycling tonnages.	Annual Environmental report submitted by waste collectors to Mayo County Council. Waste management plans.
	Target WM3: Reduction in greenhouse gasses through diversion of bio-waste from landfill.	Indicator WM3: Number of customers with brown bin collection service.	Annual Environmental report submitted by waste collectors to Mayo County Council. EPA data
	Target WM4: All waste activity is regulated	Indicator WM4: Reduction in enforcement action required.	*CRM system. RMCEI report review *Customer relationship management system **Recommended minimum criteria for environmental inspections
Material Assets: Waste Water Infrastructure	Target WW1: Maintain effluent standard as per Urban Waste Treatment Regulations 2001, Surface Water Regulations 2009 and the Waste Water Discharge Licence for the WWTP	Indicator WW1: Change in effluent standard being emitted from the Waste Water Treatment Plant	EPA
Material Assets: Drinking Water	Target DW1i: No deterioration in status of waters and restoration to good status of waters currently at moderate, poor or bad status	Indicator DW1i: Trophic Status and Faecal Coliform count per 100ml of Groundwater	EPA
	Target DW1ii: Meeting the demands of the Drinking Water Regulations, 2007	Indicator DW1ii: Drinking Water Annual Report (EPA)	
	Target DW1iiiL: Progressively reduce chemical pollution in waters.	Indicator DW1iii: Interim Water status in 2011 report.	

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table			
Environmental Component	Targets	Indicators	Source
	DW1iv: Limit pollution inputs to surface waters/groundwater's and prevent deterioration.	DW1iv: Long Term Indicator: Water status in 2015 report	
Material Assets: Mayo Forest Estate	Target MF1: Promotion of a sustainable forest resource in Mayo that enhances the quality of the environment	Indicator MF1i: Percentage of the land area of the County covered in mixed forest with a balance of deciduous and coniferous plantations Indicator MF1ii: No deterioration of the environment resulting from afforestation	National Parks and Wildlife National Biodiversity Centre
Archaeological Heritage	Target CH1: No RE developments carried out over the lifespan of the RES which result in the full/partial loss of the archaeological heritage identified in the RMP, National Monuments in the ownership or guardianship of the State & National Monuments that are the subject of Preservation Orders; and no RE developments which result in the full/partial loss of the integrity of archaeological sites in their setting.	Indicator CH1: Number of RE developments carried out over the lifespan of the RES which result in the full/partial loss of the archaeological heritage identified in the RMP, National Monuments in the ownership/guardianship of the State & National Monuments that are the subject of Preservation Orders. The integrity of archaeological sites in their setting can also be impacted upon by new developments.	Planning Register Mayo Co. Co. The Heritage Service, DoEHLG
	Target CH2: No RE developments carried out over the lifespan of the RES which result in the full/partial loss of support and promotion of the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG	Indicator CH2: Number of RE developments carried out over the lifespan of the RES which result in the full/partial loss of the promotion and support of the concept of Archaeological Landscape in landscapes which contain several Recorded Monuments or very important sites, in co-operation with the DoEHLG	Planning Register Mayo Co. Co. The Heritage Service, DoEHLG
Architectural Heritage	Target AH1: To prohibit the number of renewable energy developments that result in any adverse impacts or the loss of the architectural heritage.	Indicator AH1: Number of PSs ACAs and other elements of the architectural heritage as described in Section 4.8.3 which are adversely impacted on as a result of renewable energy developments.	Planning Register MCC Conservation / Heritage In House advice/DoEHLG

Environmental Report
Draft Renewable Energy Strategy for County Mayo

Table 9.1 Monitoring Table

Environmental Component	Targets	Indicators	Source
	Target AH2: To prohibit renewable energy developments that would result in the damage to or loss of heritage bridges in the Heritage Bridge Inventory	Indicator AH2: Number of heritage bridges damaged or lost as a result of renewable energy developments	Conservation / Heritage In House advice/DoEHLG Heritage Section Heritage Bridge Database
Landscape	Target L1i: No developments to be conspicuously located within or on sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes.	Indicator L1i: Number of conspicuous developments adversely impacting upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes	Planning Register, Mayo County Council CORINE Mapping
	Target L1ii: No developments to adversely impact upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes	Indicator L1ii: Number of developments adversely impacting upon sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes	
	Target L1iii: No loss of sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes	Indicator L1iii: Number of sensitive landscapes, vulnerable landscapes and listed highly scenic views, scenic views, scenic viewing points and scenic routes lost	
	Target L2: Developments shall be sited and designed so as not to interfere with the visual amenity of the landscape of County Mayo	Indicator L2: Number of developments interfering with the visual amenity of the landscape of County Mayo	

Appendices

Appendix 1: Legislative Context

- The Planning and Development Act 2000 (as amended) and Planning & Development Regulations
- EU SEA Directive 2001/42/EC and European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations (S.I. No. 435 of 2004) and the Planning & Development (SEA) Regulations (S.I. No. 436 of 2004).
- The Wildlife Act, 1976 and the Wildlife Amendment Act, 2000
- EU Birds Directive (79/409/EEC) Council Directive 79/409/EEC
- EU Habitats Directive (92/43/EEC)
- The Flora (Protection) Order 1999
- UN Convention of Biological Diversity 1992 (ratified 1996)
- Convention on Wetlands of International Importance (Ramsar Convention 1971)
- The Local Government Water Pollution Acts 1977 as amended
- Water Services Act 2007
- The Directive 2000/60/EC (also known as the Water Framework Directive)
- S.I. No. 9 of 2010 – EC Environmental Objectives (Groundwater) Regulations 2010
- European Communities (Water Policy) Regulations, 2003
- European Communities Environmental Objectives (Surface Waters) Regulations, 2009
- European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations, 2009
- European Communities (Quality of Salmonid Waters) Regulations, 1988
- European Communities (Quality of Shellfish) Regulations 2006
- Urban Waste Water Treatment Regulations, 2001
- Bathing Water Quality Regulations, 2008
- European Communities (Good Agricultural Practise for Protection of Waters) Regulations, 2009
- Waste Water Discharge (Authorisation) Regulations, 2007
- Air Pollution Act 1987 as amended.
- The Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 and the Air Quality Standards Regulations 2002
- Protection of the Environment Act 2003
- Waste Management (Prohibition of waste disposal by burning) Regulations 2009
- Emissions of volatile organic compounds from organic solvents Regulations 2002
- Dangerous Substances Regulations (S.I. No. 12 of 2001)
- Environmental Protection Agency Act 1992
- Environmental Noise Regulations 2006
- The Waste Management (Amendment) Act, 2000 and related Waste Management Regulations
- Waste Management (Use of Sewage Sludge in Agriculture) Regulations 2001
- 1999 EU Directive on the landfill of waste 99/31/EC
- The European Directive on the Assessment and Management of Flood Risks (2007/60/EC of 23 October 2007) (The Floods Directive)
- EIA Directive (85/337/EEC as amended by 97/11/EC and 2003/35/EC) EIA Directive
- (85/337/EEC as amended by 97/11/EC and 2003/35/EC)
- The Heritage Act 1995
- European Convention on Protection of the Archaeological Heritage 1992 (the Valletta Convention)
- Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), European Treaty Series no.121, 1985
- The Venice Charter 1964
- The Washington Charter 1987
- The Burra Charter 1979/ 1981/ 1988
- The Nara Document on Authenticity 1994

- The European Landscape Convention
- Architectural Heritage (National Inventory) and Historic Monuments Act, 1999
- National Cultural Institutions Act 1997
- The National Monuments Acts 1930 to 2004
- The Kyoto Protocol Flexible Mechanisms Regulations 2006 (S.I. 244 of 2006)
- Emissions Trading Directive (2003/87/EC)
- SI 437 of 2004: EC (Greenhouse gas emissions Trading) Regulations 2004
- SI 706 of 2005: EC (Greenhouse gas emissions Trading) Amendment Regulations 2005
- Code of Best Forest Practise – Ireland, published by the Forest Service, Department of Marine and Natural Resources, 2000.

Appendix 2a: Site Synopses of Ramsar Sites in County Mayo

(from Ramsar Convention Secretariat, 2000)

Blacksod Bay and Broadhaven (Ramsar Site No. 844; 683 ha)

This Ramsar Site is a composite of diverse marine and coastal habitats that includes vast dune systems and extensive areas of dune grassland with saltmarshes occurring in sheltered bays and inlets. The grasslands are of considerable botanical importance. The site also includes several brackish lakes important to various species of breeding waders, large numbers of wintering water birds of various species, and internationally important numbers of Brent geese.

Killala Bay/Moy Estuary (Ramsar site No. 843; 1,061 ha)

Located on the border between County Mayo and County Sligo this Ramsar Site consists of an estuary and intertidal bay separated from the sea by a long sandy island. The site includes a well-developed dune system, saltmarsh, sand and shingle beaches backed by sea-cliffs, and extensive sand and mudflats exposed at low tide. The dunes support a rich and diverse flora that includes several rare or threatened plants. The intertidal flats provide important feeding sites for birds. Brent geese overwinter in the bay in internationally important numbers, and regionally or locally important numbers of several species of waterbirds use the site. Human activities include beach activities, salmon fishing and livestock grazing. There is a golf course situated on the dune complex.

Knockmoyle/Sheskin (Ramsar Site No. 372; 1,198 ha)

Also designated as a Nature Reserve, this site is situated north of Bord na Móna works at Bellacorick between Oweniny River on the eastern side and Sheskin Lodge and the ruined settlement of Sheskin on the western side. The site is part of an extensive area of lowland blanket bog with a remarkably dense network of pools and small acidic lakes. The valleys and flushes are floristically rich owing to an absence of burning and grazing. The peat is relatively dry between water bodies and has a well-developed cover. Unusual features include the presence of small stands of downy birch (*Betula pubescens*) and a rare moss species (*Homalothecium nitens*).

Owenboy (Ramsar Site No. 371; 397 ha)

The Owenboy Ramsar Site is part of an extensive area of undulating lowland blanket bog consisting of domes, pool complexes, flushes, spring-fed fens, swallowholes and subterranean and surface streams. The site designated as a Nature Reserve and is part of the Bellacorick Bog Complex cSAC and the Owenduff/Nephin Complex cSAC (Mayo National Park). Vegetation includes *Sphagnum* moss species and many species of sedges and other mosses. The wetter domes and flushes are a feeding site for the internationally protected Greenland Whitefronted Goose (*Anser albifrons flavirostris*).

Owenduff Catchment (Ramsar Site No. 336; 1,382 ha)

Part of the most extensive remaining blanket bog complex in Ireland, the site includes lowland and mountain blanket bog, wet heath and cliffs in the surrounding lowlands. There are several mountain valley lakes and rock basin lakes with many pool complexes. Unimproved grassland and numerous wetland vegetation types occur along watercourses. The site supports a small wintering flock of the internationally protected Greenland Whitefronted Goose (*Anser albifrons flavirostris*).

Appendix 2b: Site Synopses of Statutory Nature Reserves in County Mayo

Owenboy (Nature Reserve No. 59; 397.1ha)

Owenboy Nature Reserve is situated 10 km west of Crossmolina and 10 km east of Bellacorick on the south side of the Ballina/Belmullet Road at Eskeragh Bridge. An extensive bog of intermediate type utilised by the internationally protected Greenland Whitefronted Goose (*Anser albifrons flavirostris*) and

lying in a broad basin. It contains a number of low domes resembling raised bogs and numerous flushes with a rare species of moss. This Nature Reserve is also designated a Ramsar Site (No. 371).

Knockmoyle Sheskin (Nature Reserve No. 60; 1198ha)

Knockmoyle Nature Reserve is situated north of Bord na Móna works at Bellacorick between Oweniny River on the eastern side and Sheskin Lodge and the ruined settlement of Sheskin on the western side. It is made up of an extensive area of lowland blanket bog densely pool-studded and containing interesting flushes. This Nature Reserve is also designated a Ramsar Site (No. 372).

Oldhead Wood (Nature Reserve No. 61:17 ha)

Oldhead Wood Nature Reserve is situated 3 km north-east of Louisburg. This small reserve lies on the east side of two knolls which form a promontory on the southern shore of Clew Bay. It is an example of semi-natural woodland, oak being the dominant species, with birch, rowan, willow and some introduced beech and sycamore.

Appendix 2c: Tree Preservation Orders

- Crofton Park, Ballina Tree Preservation Order 1979
- Rosturk, Mulranny Tree Preservation Order 1980
- Moat, Ballina Tree Preservation Order 1977
- Mallaranny Tree Preservation Order 1993
- Rosbarnagh Tree Preservation Order 1980
- Callow Loughs Tree Preservation Order 1991
- Ballyneggin Tree Preservation Order 1993
- Clogher Turlough, Tree Preservation Order 1993
- Breandrum/Windsor Tree preservation Order 1993

Appendix 2d: Biodiversity Areas identified in the Mayo Forest Management Units

Source: Report published by Coillte

Creagh

Creagh is on the eastern shores of Lough Mask and is partially within the SAC Lough Mask /Carra complex. Most of the site is old woodland with a long history of woodland cover. The wood is now dominated by conifers, however, there are significant native woodland elements present. This area is an important foraging area for the Lesser Horseshoe bat (Annex II species). Creagh is within the 2km foraging zone of the hibernation roost at Creagh house, Ballinrobe, and 2.5km of the maternity roost at Curraghmore, Ballinrobe.

Moorehall

Moorehall is an old woodland site with a long history of woodland cover including parkland and long established plantations. The site is partially within SAC Lough Carra/Mask complex and Lough Carra SPA. Conifers are the main canopy forming species within the property but these are generally mature and have been well thinned for the most part allowing native woodland flora to develop in the understorey. This site is particularly important for the Annex II species Lesser Horseshoe bat and the coach house within the site has been designated as an SAC for this bat species. Bats also roost within the cellars of the old house. Commuting is known to occur between this site and Towerhill.

Towerhill

This biodiversity area is an old woodland site with a long history of woodland cover. Conifers dominate the canopy throughout much of the property; however, where this canopy has been thinned to allow sufficient light levels reach the wood floor, native woodland development occurs. A small area on the western boundary of the site supports broadleaved woodland dominated by beech with significant native woodland elements in the understorey. The Annies River runs through the north eastern edge of the property and feeds Towerhill Lake. Wet woodland also occurs in the riparian zone of this river. Open areas towards the southern boundary of the site supports fen rich grassland with tussocks of the greater tussock sedge *Carex paniculata*.

This site is an important roosting and foraging site for the Lesser Horseshoe Bat, an Annex II species in the EU Habitats Directive. This site, along with others within the surrounding region, (specifically Moorhall), is a particular hotspot for this species with commuting ongoing between sites. There are two nature conservation designations within the site: Towerhill House SAC (Site code 002179) and Towerhill Lake NHA (Site code 550).

Ballykine: Ballykine is a large species-rich old woodland site characterised by small subs with a diversity of planted broadleaf and conifer species. A range of habitat types also occur here including wet woodland and limestone pavement as well as wetlands and the plantation woodlands. The conifer

dominated subs for the most part are mature and well thinned, with sufficient light levels reaching the wood floor, allowing a native woodland understorey to develop. Oak-ash hazel (WN2) woodland is the most appropriate native woodland type for the dry areas of this property. This wood is within the SAC 1774 Lough Carra/Mask Complex. Ballykine is an important foraging area for the Annex II species, Lesser Horseshoe bat. The property is in the 2.5km radius of maternity roosts at two Lesser horseshoe bat SAC sites: 1774, at Ballykine Hs. & 474 Ballymaclancy Cave, as well as in the 2km radius of a hibernation roost at Toberbiroge. The lung wort lichen, *Lobaria pulmonaria*, is an indicator of old woodland sites and was recorded at this site.

Ard na Geeha: This biodiversity area consists of a property on the northern shore of Lough Corrib and is adjacent to other properties such as Ashford and Toberbiroge, forming a significant network of biodiversity areas. This property is partly within the SAC Lough Corrib and SPA of the same name. This property is important for the Lesser Horseshoe Bat as it lies within a 200m zone around two known hibernation sites: (1) SAC Site Code 474 Ballymaglancy Cave and (2) Undesignated site at Toberbiroge. The physical shape of this property provides important connectivity that effectively forms part of the woodland bridge between Loughs. Corrib and Mask. This provides significant area for potential foraging and commuting routes for all bat species as well as wildlife in general. This biodiversity area is characterised by subs with a mixture of planted species (mainly conifer). The subs are mature and for the most part well thinned allowing an understorey of native species to develop. A large proportion of this site is a long established plantation with a significant history of woodland cover. There is a bat roost in the observation hut within the property. The roosting species is likely to be common pipistrelle (pers comm. J.Higgins conservation ranger NPWS).

Ashford: consists of a number of small subs supporting a variety of conifer species. These subs are mostly mature and well thinned allowing a native flora to develop in the understorey. A large proportion of the property is long established plantation with a significant history of woodland cover. This property is directly adjacent to Ard na geeha and Pigeon hole which together create a network of woodlands and a significant wildlife reserve. This property lies within 2.5km radius from a known Lesser horseshoe bat hibernation roost at Ballymaglancy Cave SAC 474 and 600m from another hibernation roost (undesignated) at Toberbiroge, Co. Galway. This species is in Annex II of the EU Habitats Directive. This property also has quite a high amenity value owing to its proximity to Ashford castle and the village of Cong.

Pigeon hole

Pigeon hole property is directly adjacent to Ashford and Toberbiroge properties creating a large biodiversity network of considerable value to wildlife. Conifers are the predominant planted species within the property and include quite a range of species. Subs are generally mature and well thinned creating appropriate conditions that facilitate the development of a native woodland understorey. Within this property there is a large underground cave, called the Pigeon hole. This is one of the spots where the underground river that links Lough Corrib and Lough Mask can be accessed.

This property lies within 2.5km radius from two known Lesser horseshoe bat hibernation roosts: Ballymaglancy Cave SAC 474 and Toberbiroge, Co. Galway (undesigned). The Lesser horseshoe bat is on Annex II of the EU Habitats Directive. A further roost occurs in a cave close to the Pigeon hole cave within the property (pers comm. John Higgins).

Toberbiroge

Toberbiroge forms a network of woodland cover along with the adjacent properties of Ard na Geeha, Pigeon Hole, Clonbur and Ballykine. This biodiversity area is particularly important owing to the location of a number of Lesser horseshoe bat roosts both within, and in the environs of the property. This property lies within the 2.5km zone radius of the maternity roost at Ballykine House (SAC 1774) and within the 2km radius of the hibernation roost at Ballymaglancy house (SAC 474). An undesigned roost also occurs within the property. This species is in Annex II of the EU Habitats Directive. The maintenance of woodland cover is one of the management prescriptions that will maintain this property as a foraging and commuting site for this bat species.

This property consists of a number of subs that are Long Established Plantation with a significant history of woodland cover. Conifers dominate the canopy throughout the property; however, these are well thinned for the most part allowing a species-rich native woodland flora to develop in the understorey. Many of the subs have rocky outcrops and ledges supporting a rich bryophyte flora. Open patches of limestone outcrops supporting orchid rich grassland also occur and add to the diversity of the site. Goats were observed grazing within the wood at time of survey but do not appear to be having serious impacts on the woodland flora.

Rosshill

Rosshill biodiversity area consists predominantly of mature conifer subs. These subs have been thinned and support a native woodland understorey. This property is adjacent to others such as Clonbur, Ballykine, Big and White islands which together form a large biodiversity network of high conservation value. Ross hill is partly within the SAC 1774 Lough Carra/Mask complex and the SPA 62 Lough Mask. Interesting habitats within this biodiversity area include limestone pavement an Annex I priority

habitat, and wetlands associated with the Clonbur River that runs through the property. This property is within the 2.5km radius of the Lesser horseshoe bat maternity roost at Ballykine House and consequently this site is an important roosting and foraging site for the Lesser horseshoe bat, Annex II species in the EU Habitats Directive.

Clonbur

This property is adjacent to others such as Ross hill, Ballykine, Big and White islands which together form a large biodiversity network of high conservation value. Clonbur is partly within the SAC 1774 Lough Carra/Mask complex and the SPA 62 Lough Mask. Interesting habitats within this biodiversity area include limestone pavement an Annex I priority habitat, and wetlands associated with the Clonbur River that runs through the property. Clonbur biodiversity area consists predominantly of mature conifer subs. These subs have been well thinned and support a native woodland understorey. Some of this property has had a long history of woodland cover.

This site is an important roosting and foraging site for the Lesser horseshoe bat, Annex II species in the EU Habitats Directive, and the property is within the 2.5km radius of a maternity roost at Ballykine House (SAC 1774) and 2km of a hibernation roost at Ballymaglancy (SAC 474). Parts of this property together with neighbouring areas of Ballykine and Ross hill have been included in a proposal for LIFE Nature funding for native woodland restoration (LIFE-Nature 2004). As with Ballykine and Rosshill properties this site was under consideration to be designated as a nature reserve (Cross 1982, Speight 1982).

Big & White Islands

Big island and White island are two islands on the southern shore of Lough Mask that are connected to the shore by a narrow causeway. Both islands are within SAC 1774 Lough Carra/Mask Complex and SPA 62 Lough Mask and are old woodland sites with a long history of woodland cover. The main habitat type on both islands is mixed broadleaf/conifer woodland. This woodland type consists of well-thinned conifers with native woodland development in the understorey. Some particularly large trees were recorded on both islands, e.g Beech >1m DBH. Old trees with dead branches are also present and have an important value to invertebrates and wildlife in general. Within both islands there is significant age class diversity as well as species diversity which further increase the conservation value of this biodiversity area. This area is an important foraging and commuting zone for the Lesser Horseshoe bat, an Annex II species in the EU Habitats Directive. This biodiversity area is within 2.5km radius of a Lesser horseshoe bat maternity roosts at Ballykine House. Big island supports a large active Badger sett. A flock of long tailed tits were foraging in the wood at the time of survey. The lungwort lichen, *Lobaria pulmonaria*, is an indicator of old woodland sites and was recorded on both islands. Wet woodland occurs on the shores of the islands

Lislaughtera

This biodiversity area consists of a property on the northern shore of Lough Corrib and is adjacent to other properties such as Ashford and Ard na Geeha, forming a significant network of biodiversity areas. This property is partly within the SAC Lough Corrib and SPA of the same name. This biodiversity area is characterised by subs with a mixture of planted species (mainly conifer). The subs are mature and for the most part well thinned allowing an understorey of native species to develop. A species-rich wet woodland runs through the centre of the property along the line of a stream. A large proportion of this site is a long established plantation with a significant history of woodland cover.

Derrinrush

Derrinrush biodiversity area consists of the main property on the shores of Lough Carra as well as the surrounding islands: Horse, Hare and Hog. All of the subs are old woodland with a history of broadleaf cover since the 1830's O.S. Maps. All of the biodiversity area is within the SAC 1774 Lough Carra/Mask Complex. The main habitat within the property is Oak-ash-hazel woodland. While only the edge of the property supports mature wood the central portion is a young oak plantation and supports significant natural regeneration of native woodland elements. Deer were present at time of survey but do not appear to be causing serious damage to the developing broadleaf woodland.

Tourmakeady

The Peoples Millennium Forest covers much of this biodiversity area. The Glensaul River runs through the property and the riparian zone is well developed in places. A lake with fringing emergent communities and aquatic species also occurs within the biodiversity area.

The site supports a significant amount of old woodland with a long history of woodland cover. Native woodland elements occur throughout the site. Notable species recorded include St Dabeoc's heath *Daboecia cantabrica*.

Signs of badger and pine marten are widespread throughout the site. There was some evidence of browsing but no deer droppings were recorded during the survey. Invasive exotics occur including cherry laurel, rhododendron, *Leycesteria formosa* and Japanese knot weed. Rhododendron and cherry laurel are fairly dense in places.

Knockranny

Knockranny biodiversity area consists of a mixed conifer/broadleaf wood with patches of species-rich native woodland throughout. The Carrowbeg River runs along the south western boundary to the site and supports a well developed riparian zone in places. Most of the subs support a fairly open canopy of mature conifers that facilitate the development of a native woodland understorey. All of this property is old woodland with a history of woodland cover since the 1830s.

Brackloon

This is an old woodland site with a long history of woodland cover. Significant areas of semi-natural Atlantic oak woodlands remain on the edge of the property. This woodland type is analogous to the Annex I habitat 'Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles'. The Owenwee River ruins through the property which slopes towards the river. Exotics including Rhododendron appear to have been very successfully removed from the site. The site is designated as an SAC (site code 471).

Appendix 3: Mayo Local Authorities Noise Action Plan

The only noise source which requires an action plan in County Mayo is road traffic noise. The Mayo LAs Noise Action Plan addresses road traffic noise as required by the Environmental Noise Regulations 2006. The action plan areas include: Castlebar from the N5 between Gortendrunagh townland to the townland of Knockacrogghery on the Westport Road and the N60 from the boundary of Doogary/Carrownurlaur townland east of Castlebar to the junction with the N5 at Gortendrunagh townland (Fig A below). The other action plan area is Ballina and covers the N26 from the Station Road near the Moy Heights road junction, along Kevin Barry Street, to the start of Teeling Street in Ballina (Figure B below). Lands adjacent to these sections of the N21 and N22 are located within the action plan area if noise mapping has indicated that the environmental noise levels may be 55dB Lden or greater.

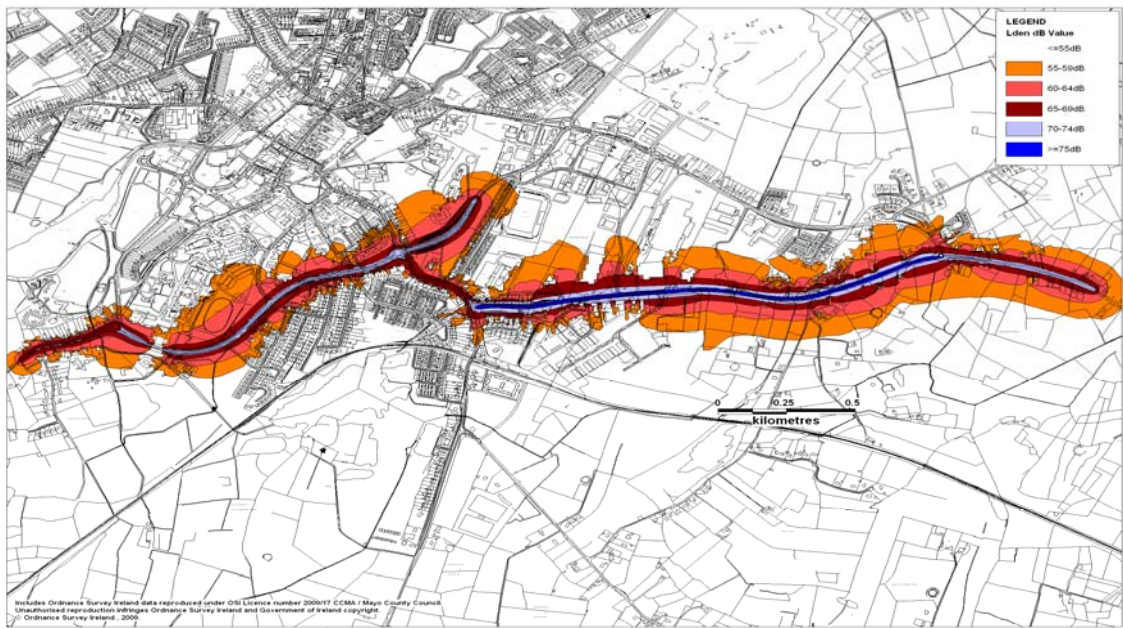


Figure A: Lden dB Values for Castlebar



Fig B: Lden Values for Ballina

Appendix 4: Positives and Negatives of Renewable Energy

Positive and negative effects from renewable developments can arise in a number of direct and indirect ways. As with all development pressures, whether from industry, housing, infrastructure etc., renewable energy schemes will impact on many aspects of local communities and the environment. Some of these effects may be negative, others may be positive. Some of the overall positives and negatives of renewable energy developments are outlined below, while the positives and negatives of each source of renewable energy considered relevant in the context of County Mayo are dealt with in Section 4 of this draft Strategy.

Some Positives Effects of Renewable Energy Production

- **Availability of renewable energy resources**

Fossil fuels are finite sources of energy which are declining, whereas renewable energy sources are generally infinite and for the most can be easily replenished. Renewable energy sources are available globally.

- **Reducing noxious emissions**

Most renewable energy sources do not involve the combustion or burning of fossil fuels or other substances, which result in the release of harmful by-products into the atmosphere. Therefore, renewable energy is generally a clean source of energy and one that offers numerous environmental benefits.

- **Security of energy supply**

Renewable energy sources are readily available and thereby reduce dependency on foreign sources for fuel. This, along with proper management of renewable energy, increases energy security. Renewable energy sources also decentralises electricity supply so that an accident or outage affects a smaller amount of capacity than that at a larger power station.

- **Accessibility to renewable energy sources**

In local terms, many renewable energy sources (e.g. solar energy) can be exploited very easily and conveniently for domestic use by individual home owners.

- **Community and local ownership/involvement**

Community and local ownership/involvement normally involves some kind of profit sharing or share ownership in the development. Community ownership implies universal involvement across the community whereas local ownership may be confined to a smaller group within the community.

- **Community benefit**

Community benefit is a goodwill contribution, from the developer for the benefit of the communities affected by the development where it will have long term effects on the environment. A developer's community benefit contribution should ideally be a nominated sum per annum per MW of installed capacity. Other examples of community benefit include improvements to infrastructure, over and above those which the public sector has a statutory duty to provide; training local people to enable them to enter the renewable energy sector; provide renewable energy technology to the community such as community heat pumps or domestic solar water heating; matching funding for community projects. Other community benefits may include provisions to reduce fuel poverty¹ in the area.

- **Employment Opportunities**

As with all development projects, the provision of renewable energy development projects will generate work in the construction, operation and maintenance of such projects. This can have a positive knock-on effect on the local economy.

185185

¹ Fuel poverty is defined by Boardman (1991) as 'the inability to heat one's home to an adequate (i.e. safe and comfortable) level owing to low household income and poor, energy inefficient housing and also the need to spend greater than 10 per cent of household income on fuel to achieve an acceptable level of comfort and amenity.' Effectiveness of Domestic Energy-Efficient Programmes. Fuel Poverty Action Research Report 1 SEAI & Combat Poverty Agency December 2009

Some Negatives Effects of Renewable Energy Production

- **Natural Energy Flows**

Reliability and consistency of natural energy flows is a significant drawback with respect to renewable energy. Atmospheric conditions and geographical locations make a huge impact on the efficacy of renewable energy sources. Renewable energy production from sources such as wind power and solar power are variable and intermittent. In addition interfering with natural energy flows may have an effect on the environment such as coastal erosion, sediment re-suspension, storm surges, transportation of plankton, nutrients in soil, soil erosion etc. – depending on the type and source of renewable energy production.

- **Cost**

The initial investment or setup cost for renewable energy sources can be significantly high. This may act as a deterrent in people substituting conventional forms of energy to renewable energy sources.

- **Public concerns**

The ‘NIMBY’ (‘not in my back yard’) effect or general concerns regarding renewable energy developments, particularly large developments, can delay or prevent the construction of renewable energy projects.

- **Land requirements**

The amount of land area required, particularly for biomass and biofuel, can be significant. Large amounts of land may be required for harvesting renewable energy resources which could be used for other purposes or left in its natural state.

- **Conservation of Natural and Cultural Heritage and Biodiversity**

Renewable energy technology has its own set of limitations in relation to the natural and built environment, and ecology. Renewable energy developments can lead to negative impacts on habitats, species and natural features. However in order to reduce the potential impact on habitats, species and natural features, worldwide practice is to locate such developments outside designated or environmentally sensitive sites and areas.

- **Neighbour Interactions**

Renewable energy technology can lead to impacts such as noise, odour, signal interference and shadow flicker which can cause a nuisance to neighbouring properties.

- **Aesthetics / Visual Amenity**

Every form of renewable energy has its own set of negative aspects in relation to visual amenity. Many structures are of such a scale that they are visually obtrusive on the landscape/marine environment. In addition the associated network of transmission wires and pylons which are required to connect into the grid can also have a negative visual impact on the visual amenity of the landscape; more often this element of a renewable energy development can have a greater negative visual impact on a larger area of the landscape.

Glossary

Baseline Environment

A description of the current state of the environment of the area of the plan/project or strategy.

Biodiversity and Flora and Fauna

Biodiversity is the variability among living organisms from all sources including *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems' (United Nations Convention on Biological Diversity 1992).

Flora is all of the plants found in a given area.

Fauna is all of the animals found in a given area.

Biotic Index Values (Q Values)

The Biotic Index Values, or Q values, are assigned to rivers in accordance with biological monitoring of surface waters - low Q ratings, as low as Q1, are indicative of low biodiversity and polluted waters, and high Q ratings, as high as Q5, are indicative of high biodiversity and unpolluted waters. Good status as defined by the Water Framework Directive equates to approximately Q4 in the national scheme of biological classification of rivers as set out by the Environmental Protection Agency.

Environmental Problems

Annex I of Directive 2001/42/EC of the European Parliament and of the Council of Ministers, of 27 June 2001, on the assessment of the effects of certain plans and programmes on the environment (the Strategic Environmental Assessment Directive) requires that information is provided on 'any existing environmental problems which are relevant to the plan or programme', thus, helping to ensure that the proposed strategic action does not make existing environmental problems worse.

Environmental problems arise where there is a conflict between current environmental conditions and ideal targets. If environmental problems are identified at the offset they can help focus attention on important issues and geographical areas where environmental effects of the plan or programme may be likely.

Environmental Vectors

Environmental vectors are environmental components, such as air, water or soil, through which contaminants or pollutants, which have the potential to cause harm, can be transported so that they come into contact with human beings.

Habitats Directive Assessment

The requirement (under the Habitats Directive) to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed. The Draft RES for County Mayo was subject to a Habitat Directive Assessment in line with the requirements of Article 6(3) and 6(4) of the EU Habitats Directive (Directive 92/43/EEC).

Mitigate

To make or become less severe or harsh

Mitigation Measures

Mitigation measures are measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse impacts on the environment of implementing a human action, be it a plan, programme or project. Mitigation involves ameliorating significant negative effects. Where there are significant negative effects, consideration should be given in the first instance to preventing such effects or, where this is not possible, to lessening or offsetting those effects. Mitigation measures can be roughly divided into those that: *avoid* effects; *reduce* the magnitude or extent, probability and/or severity of effects; *repair* effects after they have occurred; and, *compensate* for effects, balancing out negative impacts with other positive ones.

Protected Structure

Protected Structure is the term used in the Planning Act of 2000 to define a structure included by a planning authority in its Record of Protected Structures. Such a structure shall not be altered or demolished in whole or part without obtaining planning permission or confirmation from the planning authority that the part of the structure to be altered is not protected.

Recorded Monument

A monument included in the list and marked on the map which comprises the Record of Monuments and Places that is set out County by County under Section 12 of the National Monuments (Amendment) Act, 1994 by the Archaeological Survey of Ireland. The definition includes Zones of Archaeological Potential in towns and all other monuments of archaeological interest which have so far been identified. Any works at or in relation to a recorded monument requires two months notice to the Department of the Environment, Heritage and Local Government under Section 12 of the National Monuments (Amendment) Act, 1994.

Scoping

Scoping is the process of determining what issues are to be addressed, and setting out a methodology in which to address them in a structured manner appropriate to the plan or programme. Scoping is carried out in consultation with the appropriate bodies.

Strategic Actions

Strategic actions include: *Policies*, which may be considered as inspiration and guidance for action and which set the framework for plans and programmes; *Plans*, sets of co-ordinated and timed objectives for the implementation of the policy; and, *Programmes*, sets of projects in a particular area.

Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is the formal, systematic evaluation of the likely significant environmental effects of implementing a plan or programme before a decision is made to adopt it.

Environmental Protection Objective (EPO)

Environmental Protection Objectives (EPOs) are methodological measures which are developed from international, national, regional and County policies which generally govern environmental protection objectives and against which the environmental effects of the RES can be tested. The EPOs are used as standards against which the objectives of the RES can be evaluated in order to help identify areas in which significant adverse impacts are likely to occur, if not mitigated.

List of Abbreviations

APSR's	Areas with Potentially Significant Flood Risk
CSO	Central Statistics Office
DEHLG	Department of the Environment, Heritage and Local Government
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EPO	Environmental Protection Objective
EU	European Union
GHG	Greenhouse Gas
GSI	Geological Survey of Ireland
MBAP	The Mayo Biodiversity Action Plan
MCDP	Mayo County Development Plan
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NSS	National Spatial Strategy
PFRA	Preliminary Flood Risk Assessment
RE	Renewable Energy
RES	Renewable Energy Strategy
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
EPO	Strategic Environmental Objective
SI No.	Statutory Instrument Number
SPA	Special Protection Area
WFD	Water Framework Directive
RBD	River Basin District
WES	Wind Energy Strategy
WRBMP	West River Basin Management Plan
WSIP	Water Services Investment Programme

References

(Note References below are in addition to relevant statutory legislation policy; guidelines and published databases)

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Draft Renewable Energy Strategy for County Mayo

Flood Risk Report

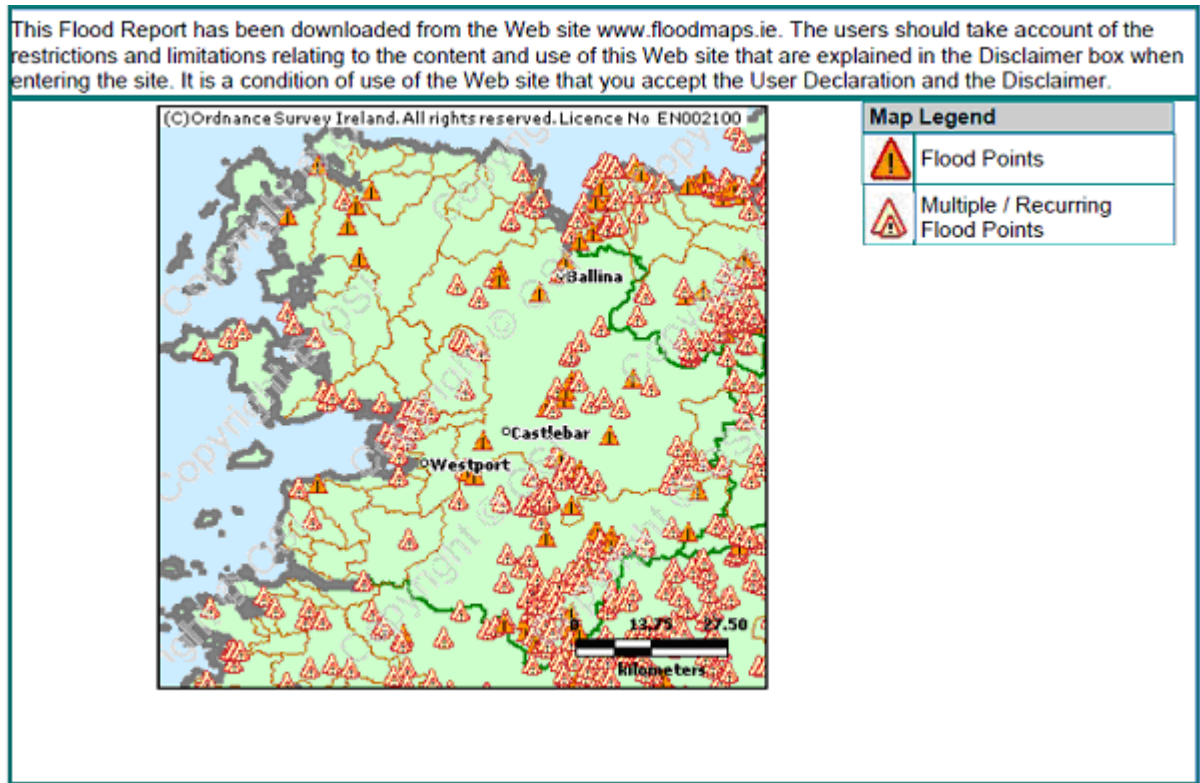


**Mayo County Council
Comhairle Contae Mhaigh Eo**

Flood Risk Report

Flooding Baseline Data

The mapping of historical flood events in County Mayo (sourced from OPW Flood Hazard Mapping www.floodmaps.ie) as shown below and on Figure 1.1 gives a general indication, based on reported past floods, of where flood vulnerable locations are in County Mayo.



On www.floodmaps.ie, the number of flood point locations for County Mayo is 193. This data is based on minutes of meetings held between the OPW and officials of Mayo County Council in 2005/2006. Based on the above information and further discussions in September 2010 (which take account of local improvements carried out since 2005/2006), a number of areas in the County have been identified as prone to flooding. These are set out below together with details of the flood events.

Flood Risk Report
Draft Renewable Energy Strategy for County Mayo

Ballina Area: Details of flood events

1. Road flooding on Howley St./Sligo road during high tides. Road gully's are pumped to the sewers.
2. Road flooding on Bachelors Walk, Ballina town during high tides.
3. Road flooding in Quignamanger area from river Moy during extreme high tides, it is a rare event.
4. Road flooding on Barret St. from river Moy during extreme high tides, it is a rare event.
5. Extensive town flooding in Crossmolina from the Deel river in October 1989. Roads and property flooding.
6. Land flooding west of the R315 from turlough during winter time only, dry during the summer.
7. Road and property flooding at junction in Tonrehowan area from Cloonaghmore river once or twice a year.
8. Road flooding in Ross area during high spring tides once/twice a year.
9. Road flooding in Kilgobban area on R314 once or twice a year due to high tides.
10. Road flooding in Greenpark area on R314 once or twice a year due to high tides.
11. Road flooding on Humbert street in Ballina in past but is a very rare event.
12. Road flooding in Lacken strand area on regular basis due to high tides.

Castlebar Area: Details of flood event

1. Land flooding in Stonepark area during periods of heavy rain.
2. Land and road flooding on N60 north of Balla in the vicinity of Drumadoon / Lagnamuck area during periods of heavy rain occurs at least once per year.
3. Land flooding at present in Brees area but historically the N60 road flooded but was raised in the past and does not flood anymore. Land flooding is recurring.
4. Land flooding south of Ballintober ponding on fields during periods of heavy rain.
5. Land & road flooding from Toormore river during periods of high flows river backs up onto N5 at Bellavary railway bridge but ponding is limited to the hard shoulder, main carriageway is unaffected.
6. Road flooding from Beltra lake in Kilgarve area when it swells after periods of heavy rain and floods R312. Occurs about once per year.

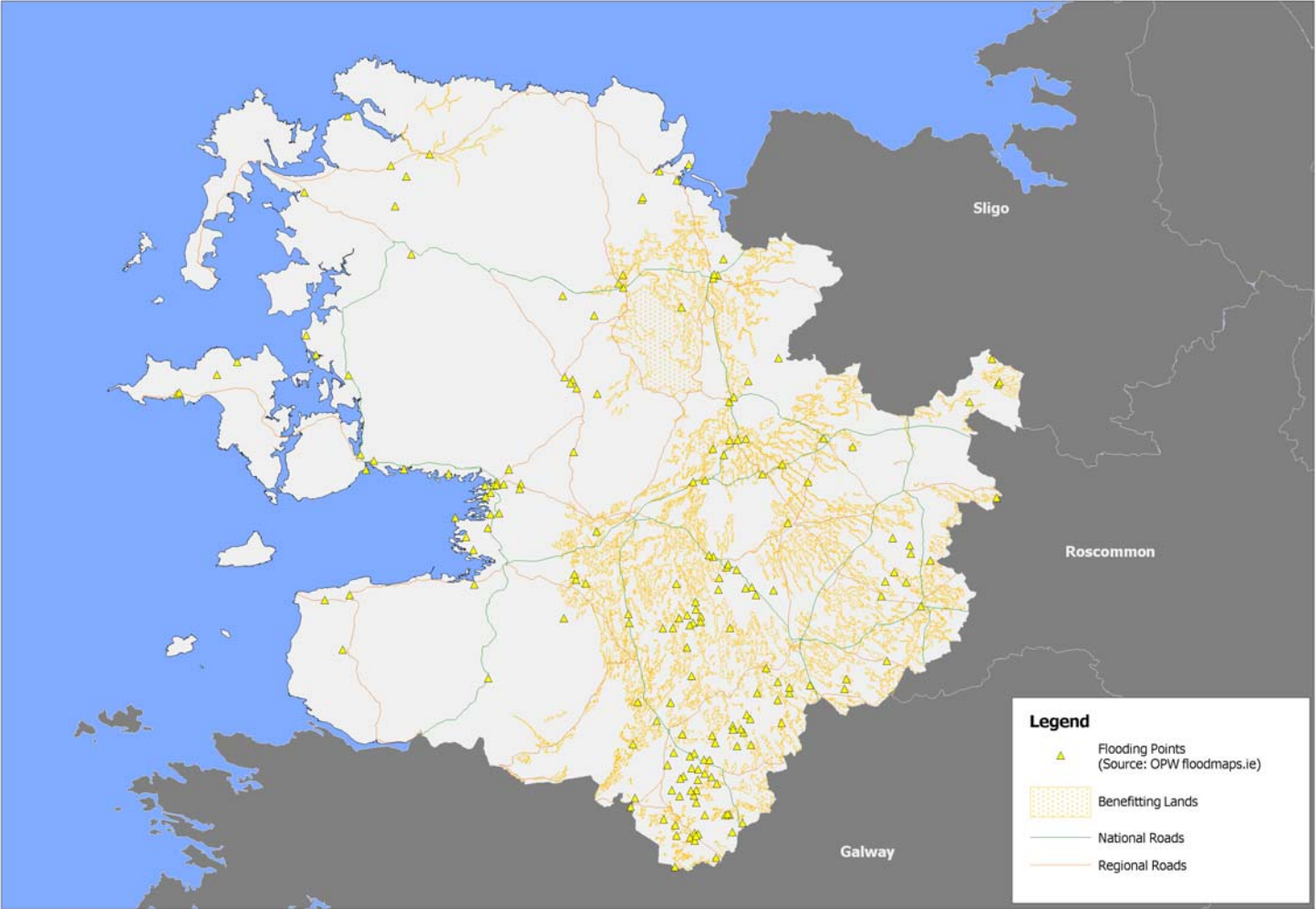


Figure 1.0 Flood Points in County Mayo

Achill Area: Details of flood events

1. Land flooding from inundation from sea. The spit connecting the main land & the Corraun point headland follows a cyclical pattern of building up from deposition and in periods of erosion. Occasionally the erosion reaches a stage where the spit washes away and the land and fields adjacent to Dooreel bay get flooded during high tides and from wave/wind action. Some property can become isolated during this flooding.
2. Road flooding over a 2km stretch of N59 in Castlehill area during periods of heavy rain. Road is lower than surrounding drainage and consequently floods.
3. Road and land flooding during high tides and winds, existing breakwater is overtopped. Mallaranny pier road cut-off during flooding.
4. Road, land and property flooding on N59 east of Mallaranny during periods of heavy rain when runoff from high ground cannot discharge into the gully system because it is blocked by debris washed down from high ground.
5. Road flooding on R312 during periods of heavy rain when Boghadoon river overflows its banks and floods a 1km stretch of road.
6. Land flooding during periods of heavy rain when Boghadoon river floods surrounding land.
7. Road & low-lying land flooding in Dooagh area during periods of heavy rain when runoff from high ground cannot drain to sea & causes flooding over a stretch of approximately 0.5km of road.
8. Road flooding over a stretch of approximately 0.5km during periods of heavy rain, runoff from Slievemore cannot drain off road and causes flooding.
9. Road flooding in vicinity of Dooagh strand during high tides and strong winds.
10. Road and land flooding from a combination of storm sea state and high flows in the Tenreege river after heavy rain. Event frequency approximately 1/5 years
11. Land and road flooding in vicinity of Rosturk strand during high tides and strong winds peninsula is completely cut-off at sea inundates old sea wall with damages sluice gates.
12. Road flooding on N59 adjacent to Bellacragher bay as a result of high tides, event frequency approximately 1/5 years, road was blocked in 2002 event.
13. Roads, N59 and R317 and land flooding from a combination of high tides and heavy rain when the runoff cannot discharge through existing sluice to sea because of the tides.
14. Road flooding over a stretch of approximately 0.5km south of Newport channel during high tides when sea deposits seaweed on road and causes flooding.
15. Road flooding west of the N59 in Carrowbeg South area as a result of high tides.
16. Road flooding over approximately a 1km stretch north of Rockfleet bay as a result of high tides.
17. Road flooding in Rosclave area as a result of high tides.
18. Road flooding over approximately a 1km stretch as a result of high tides, Inisnakillew island cut-off, rare event.
19. Road flooding at low point near bridge in Derrykill area north of the R317 during periods of heavy rain river swells and can be up to 3ft of water ponding.

Ballinrobe Area: Details of Flood events

1. Land flooding east of the R334 at Neale crossroads, pumping turlough exists and causes land flooding even without any rainfall but is more extensive with rainfall.
2. Road and land flooding at Turloughmore floods to 3-4ft depth during periods of heavy rainfall. Road can be blocked for extended period of time and it appears to be connected to Cahernagry area.
3. Road flooding during periods of heavy rain at Ballynacarra. The mechanism of flooding appears to begin in Thomastown turlough which fills up and water makes its way crossing the N84 to fill up the dip in the road at Ballynacarra between local house and field gate.
4. Road and land flooding from Thomastown to Coolisduff turlough during periods of heavy rainfall. Turlough fills up fields and causes water to flow across road and on into wood where it flows down the road into Coolisduff turlough. This is a precursor to water heading into Ballynacarra turlough.
5. Land flooding from Skealaghan turlough during periods of heavy rain, used to flood road but road was raised approximately 15 years ago.
6. Mweelish turlough floods almost every year on land and onto road up to 15 inches of water on road.
7. Ballymangan turlough floods almost every year on land and onto road up to 15 inches of water on road.
8. Bushfield turlough floods road on regular basis impassable for cars during periods of heavy rain.
9. Killeenreevagh turlough/swallow hole floods road on a regular basis and land up to house boundary on both sides.
10. Land flooding in Annagh area during periods of heavy rain lake level rises and land flooding results.
11. Land flooding in Aghinish area during periods of heavy rain as Lough Mask level rises.
12. Land flooding in Moyne area during periods of heavy rain.
13. Land and road flooding in Gortbrach area during periods of heavy rain when Lough Corrib swell and river backs up.

Claremorris Area: Details of Flood Events

1. Road flooding in Ballymackeogh area on road from Balla to Mayo, repairs to road required from time to time after flood damage, problem has not been resolved.
2. Road flooding in Monard area, road impassable at times and problem has not been resolved. Would require the road to be raised by greater than 3ft.
3. Road and land flooding in Curraghadooey area during periods of heavy rain when the Robe River overflows its banks and makes road impassable.
4. Road flooding at Ballyhankeen, relatively minor problem but unresolved.
5. Road flooding on R327 just west of Tulrohaun, road can flood to a depth of circa 4ft in some events. Drainage of the area is to a swallow hole.
6. Road flooding in Carn More area during periods of heavy rain low-lying area flood depths are circa 2-3ft.
7. Road flooding in Screeg area during periods of heavy rain low-lying area flood depths are circa 2-3ft.
8. Road flooding in Ballynacloy area during periods of heavy rain low-lying area flood depths are circa 1ft.

Swinford Area: Details of Flood Events

1. Road and land flooding in Foxford town during times of high flow in the River Moy.
2. Land flooding in Kiltamagh in vicinity of the GAA pitches from the river Pollagh overflowing its banks, occurred a few years ago and is not a frequent event.
3. Road flooding in Srah Upper area from the Coarse River during periods of high flow in river, occurs every few years.
4. Land flooding during periods of heavy rain at the confluence of the Gwestion River and the Trimoge River.
5. Land flooding in Aghaward area from high flows in the river Moy.
6. Land flooding in the callows near Derrygaury south of Foxford from the river Moy during particularly wet winter.
7. Land flooding in Creegagh area during periods of heavy rain from the Yellow river overflowing its banks.
8. Road flooding in Derrykinlough area as streams through forested areas back up and flood road, can be flooded for up to 1 month at a time.
9. Land and road flooding to rear of burial ground in Doocastle area. Caused by presence of a turlough nearby.

Flood Mapping

The OPW are currently involved in preparing Preliminary Flood Risk Assessments (PFRA's) with the relevant Local Authorities, the EPA and other key agencies. This will identify Areas with Potentially Significant Flood Risk (APSR's) based on historic and predictive data and consultation with stakeholders. Catchment-based Flood Risk Assessment and Management (CFRAM) studies will be undertaken focusing on these areas. These CFRAM studies will produce flood maps and establish, within a Flood Risk Management Plan a prioritised set of flood risk management measures for their relevant areas, including the use of physical and management responses.

Nationally, the PFRA's will be provisionally completed in 2010 with formal completion in 2011, and will identify areas of potentially significant flood risk. This is a screening exercise based on available and readily-derivable data. Detailed flood mapping will then be prepared for areas deemed to be potentially at significant risk by 2013. The focus of the CFRAM studies is on risk management as well as flood prevention. The PFRA plans are not yet available for County Mayo.

Existing Environmental Problems relating to Flooding

Flooding is a natural occurrence that can happen at any time in a wide variety of locations and plays a role in shaping the natural environment. River and coastal flooding are the most common forms, which are noticeable especially after prolonged and intense rainfall. Seasonal flooding can be caused by turloughs, seasonal lakes that are a feature of limestone lowlands of County Mayo. River flooding tends to be more common during the wetter months when soils are near saturation and can be exacerbated in coastal areas when interactions occur between high tides and high flows. Urban environments, which contain hard impermeable surfaces, can exacerbate the consequences of flooding through development in flood plain areas, which places property and people at risk or by building in areas where existing drainage infrastructure is deficient or inadequate. Flooding may impact on the economy, social well-being, public health and the environment. It can impact on individuals and communities resulting in personal suffering and financial loss and damaging effects on the environment.

In County Mayo the areas more prone to flooding and its effects are described below:

Ballvary

The Castlebar River can burst its banks causing flooding along the N5 near the railway bridge at Ballvary forcing a single-line traffic system to be introduced.

Ballinrobe/Neale Area

In the Ballinrobe area between November 2006 and January 2007 unprecedented levels of flooding was caused by prolonged periods of intense rainfall. The floods coincided with Lough Corrib and Lough Mask exceeding all previously high water levels. In addition to roads and fields being flooded, waters entered houses and resulted in a number of areas being cut off. Dwelling houses were accessed using agricultural vehicles.

The Neale cross roads were completely closed where there was three to four feet of water blocking the road. Mayo County Council were forced to close the road and traffic normally travelling to Galway through Cross and Glencorrib was diverted through the longer route from Ballinrobe, out the Kilmaine Road and into Shrule.

Crossmolina

In December 2006 in Crossmolina town, twelve hours of uninterrupted rainfall caused the River Deel to burst its banks. Twenty premises were evacuated as flood waters rose to a depth of three foot in some areas. Chapel Street, Church Street, Erris Street and parts of Main Street were underwater within an hour of the river bursting its banks. For businesses in the town, the floods brought devastation as Christmas stock fell foul to the raging waters. Flooding also occurred in Crossmolina in 1989 causing damage to the town centre and outlying areas.

Newport / Westport Area

In February 2006 heavy rain caused the Black River at Newport to burst its banks while at the Quay area of Westport, crashing waves came over the sea wall and into some nearby properties. In July 2008 the Newport, Glenhest and Belmullet areas bore the brunt of the damage as torrential rain swept the County. A landside occurred at Killawalla, outside Newport and flood damage was caused to homes and businesses in Newport and the surrounding area.

The effects of flooding can cause the road network to be severely disrupted and require improvements to be carried out afterwards.

Mitigation Measures

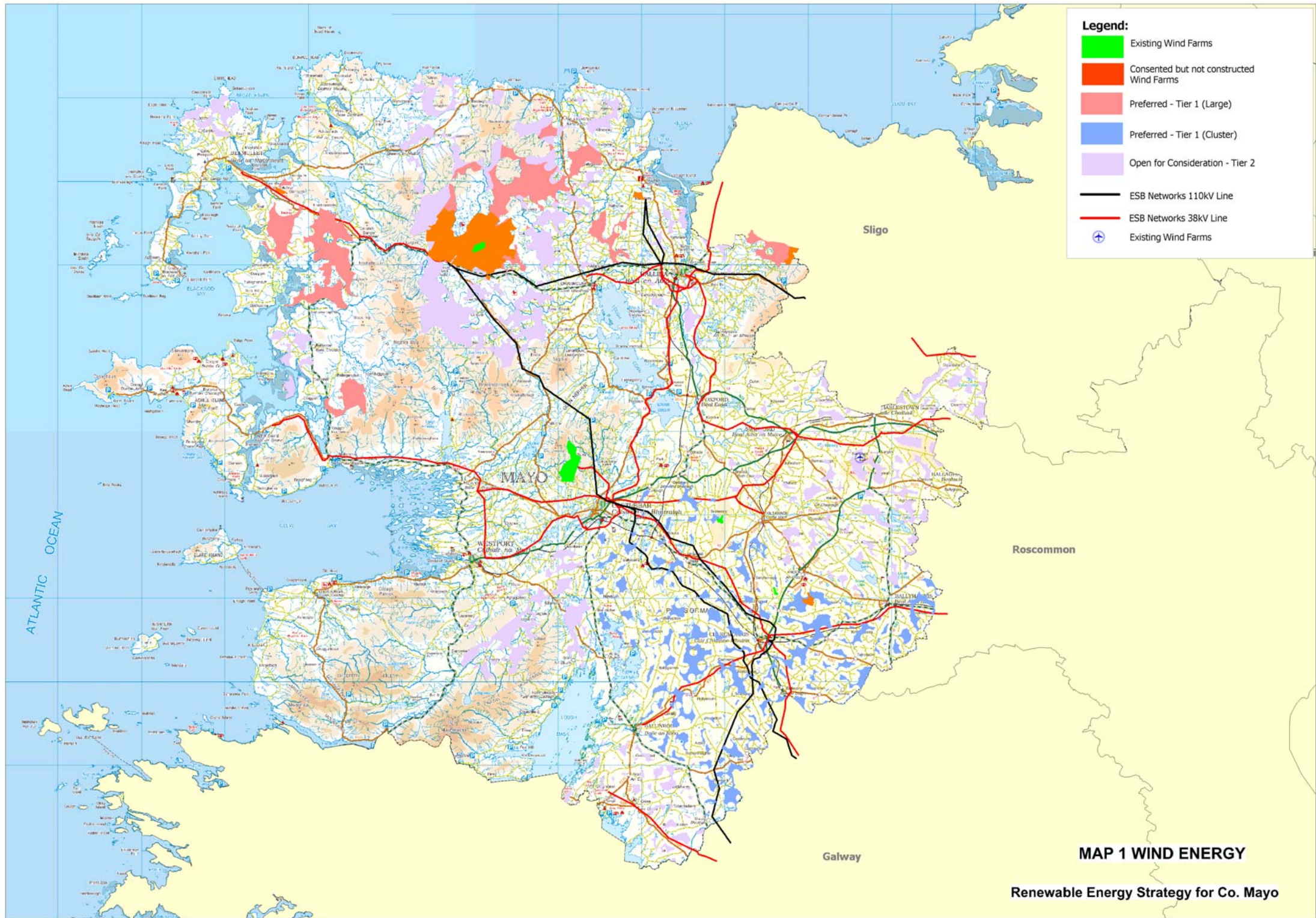
- Renewable energy development sites must comply with the provisions of the Department of Environment, Heritage and Local Government/Office of Public Works publication 'The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009'. Sites will be required to avoid areas of flood risk and where there is a strategic case for allowing development in such areas, these proposals will be subject to the '**justification and sequential tests**' outlined in the Flood Risk Management Guidelines and assessed to ensure that flood risk can be reduced and mitigated as appropriate.
- Sites identified for renewable energy development will support the provision of adequate surface water drainage infrastructure, promote the use of a sustainable drainage system (SUDS) approach and techniques and manage flood risk through the protection of natural drainage systems, the appropriate location and design of different types of development and the incorporation of flood risk assessments and works where necessary.

- Development in areas at risk of flooding, particularly floodplains, shall be avoided by not permitting development in flood risk areas unless; it is fully justified that there are wider sustainability grounds for appropriate development; unless the flood risk can be managed to an acceptable level without increasing flood risk elsewhere; and, where possible, it reduces flood risk overall.
- A sequential approach to flood risk management based on avoidance, reduction and then mitigation of flood risk as the overall framework for assessing the location of new development in the development planning processes shall be adopted.
- Flood risk assessments shall accompany planning applications and these assessments shall be incorporated into the process of making decisions on planning applications and planning appeals.
- The requirements of ‘The Planning System and Flood Risk Management: Guidelines for Planning Authorities 2009’ shall be adhered to.

In areas where the probability of flooding is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding) - referred to as Zone A in the DEHLG Planning Guidelines on the Planning System and Flood Risk Management (referred to hereafter in this section as ‘the Guidelines’) - and where a wide range of receptors would be vulnerable, development in this zone should be avoided and / or only considered in exceptional circumstances (through the Justification Test as outlined in the Guidelines) if adequate land or sites are not available in Zones B or C below. Most types of development would be considered inappropriate in this zone. Only water compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space, outdoor sports and recreation and essential transport infrastructure that cannot be located elsewhere, would be considered appropriate in this zone.

In areas where the probability of flooding is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding) - referred to as Zone B in the Guidelines - development should only be considered in this zone if adequate land or sites are not available in Zone C or if development in this zone would pass the Justification Test (through the Justification Test as outlined in the Guidelines). Highly vulnerable development, such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses and primary strategic transport and utilities infrastructure, would be considered inappropriate in this zone. Less vulnerable development, such as retail, commercial and industrial uses, sites used for short-let for caravans and camping and secondary strategic transport and utilities infrastructure, and water compatible development might be considered appropriate in this zone. In areas where the probability of flooding is low (less than 0.1% or 1 in 1000 for both river and coastal flooding) - referred to as Zone B in the Guidelines - development in this zone is appropriate from a flooding perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

Maps 1 and 2 of Draft Renewable Energy Strategy



Legend:

- Existing Wind Farms
- Consented but not constructed Wind Farms
- Preferred - Tier 1 (Large)
- Preferred - Tier 1 (Cluster)
- Open for Consideration - Tier 2
- ESB Networks 110kV Line
- ESB Networks 38kV Line
- + Existing Wind Farms

MAP 1 WIND ENERGY

LEGEND

- Marine Test Site (Proposed)
- Marine Test Site Land Point (proposed)
- ✈ Airport
- Main Harbours
- Piers
- ESB Networks 38kV Line
- ESB Networks 110kV line
- Area of Potential Wave Energy



MAP 2 OCEAN ENERGY
Renewable Energy Strategy for Co. Mayo