STRATEGIC ENVIRONMENTAL ASSESSMENT
ENVIRONMENTAL REPORT

FOR

VARIATION NO. 1

TO THE

GALWAY COUNTY DEVELOPMENT PLAN
2009-2015

for: **Galway County Council**

County Buildings

Prospect Hill

Galway

by: **CAAS Ltd.**

2nd Floor, The Courtyard

25 Great Strand Street

Dublin 1

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

AA	Appropriate Assessment
CSO	Central Statistics Office
DCENR	Department of Communications, Energy and Natural Resources
DEHLG	Department of the Environment, Heritage and Local Government
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EU	European Union
GSI	Geological Survey of Ireland
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NSS	National Spatial Strategy
RBD	River Basin District
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RPGs	Regional Planning Guidelines
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEO	Strategic Environmental Objective
SI No.	Statutory Instrument Number
SPA	Special Protection Area
WFD	Water Framework Directive (2000/60/EC)

Glossary

Appropriate Assessment

The obligation to undertake Appropriate Assessment (AA) derives from Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. AA is a focused and detailed impact assessment of the implications of a plan or project, alone and in combination with other plans and projects, on the integrity of Natura 2000 sites in view of their conservation objectives.

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.

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 outset 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.

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.

Strategic Environmental Objective (SEO)

Strategic Environmental Objectives (SEOs) are methodological measures which are developed from international, national and regional policies which generally govern environmental protection objectives and against which the environmental effects of the Variation can be tested. The SEOs are used as standards against which the objectives of the Variation can be evaluated in order to help identify areas in which significant adverse impacts are likely to occur, if not mitigated.

Section 1 SEA Introduction and Background

1.1 Introduction and Terms of Reference

This is the Strategic Environmental Assessment (SEA) Environmental Report for the Variation No. 1 to the Galway Development Plan (CDP) 2009-2015. The Variation provides for the introduction of a Core Strategy and amendment of the Settlement Strategy.

The purpose of this report is to provide a clear understanding of the likely environmental consequences of decisions regarding the making of the Variation. The SEA is carried out in order to comply with the provisions of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004). This report should be read in conjunction with the Development Plan as varied.

1.2 SEA Definition

Environmental assessment is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made. *Environmental Impact Assessment*, or EIA, is generally used for describing the process of environmental assessment which is limited to individual projects such as waste incinerators, housing developments or roads while *Strategic Environmental Assessment*, or SEA, is the term which has been given to the environmental assessment of plans, and other strategic actions, which help determine what kind of individual projects take place.

SEA is a systematic process of predicting and evaluating the likely environmental effects of implementing a proposed plan, or other strategic action, in order to insure that these effects are appropriately addressed at the earliest appropriate stage of decision-making on a par with economic and social considerations.

1.3 Legislative Context

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, referred to hereafter as the SEA Directive, introduced the requirement that SEA be carried out on plans and programmes which are prepared for a number of sectors, including land use planning. The SEA Directive was transposed into Irish Law through the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (SI No. 435 of 2004) and the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004). Both sets of Regulations became operational on 21 July 2004.

1.4 Implications for the Council and the Elected Members

The above legislation requires Proposed Variations to Development Plans to be screened at an early stage in order to ascertain whether implementation of Variations would be likely to result in significant environmental effects and would thus warrant SEA to be undertaken. As the Variation No. 1 to the Galway CDP 2009-2015 was screened as having the potential to give rise to effects on the environment - if unmitigated – the Council decided to apply the precautionary principle and to undertake SEA of the Variation.

The findings of the SEA were expressed in an earlier draft of this Environmental Report which was submitted to the Elected Members alongside the Proposed Variation. The Elected Members were required to take account of the Environmental Report before the making of the Variation.

After the Variation was made, the earlier draft of the Environmental Report was updated to become this final Environmental Report, taking into account both submissions on the Environmental Report which was placed on public display[1] and changes which were made to the Proposed Variation that was placed on

[1] Submissions were received from the Development Applications Unit of the Department of the Arts, Heritage and the Gaeltacht and Clare County Council.

public display. An SEA Statement has also been published and summarises, inter alia, how environmental considerations have been integrated into the Development Plan as varied.

Section 2 SEA Methodology

2.1 Introduction

This section details how the SEA for the Variation was undertaken alongside the preparation of the Variation.

Figure 2.1 lays out the main stages in the Variation/SEA process.

Figure 2.1 Variation No.1 and SEA Stages

2.2 Screening

Taking into account the criteria set out in Schedule 2A of the SEA Regulations, the Council screened the Proposed Variation in order to evaluate the requirement to undertake SEA. The Council determined that implementation of the Variation would have the potential to give rise to effects on the environment - if unmitigated - and decided to apply the precautionary principle and to undertake SEA of the Variation.

2.3 Scoping

In consultation with the relevant authorities, the scope of environmental issues to be dealt with by the SEA together with the level of detail to which they are to be addressed was broadly decided on after preliminary data collection. Scoping of the SEA was continuous with certain issues being selected for further examination after certain data was obtained.

As environmental authorities identified under the SEA Regulations, the Environmental Protection Agency (EPA), the Department of the Environment, Heritage and Local Government (DEHLG) and the Department of Communications, Energy and Natural Resources (DCENR)[2] were all sent SEA scoping notices indicating that submissions or observations in relation to the scope and level of detail of the information to be included in the environmental report could be made to the Council. Written submissions were taken into account as appropriate during the formulation of the scope of the SEA.

2.4 Environmental Baseline Data and Other Strategic Actions

The SEA process is informed by the environmental baseline (i.e. the current state of the environment - flora and fauna, soil, water, cultural heritage etc.) to facilitate: the identification and evaluation of the likely significant environmental effects of implementing the Variation; and, the subsequent monitoring of the effects of the Variation as made to the Development Plan. Data was collected to describe the environmental baseline and its likely evolution without implementation of the Variation.

The SEA Directive requires that information is provided on 'any existing environmental problems which are relevant to the plan or programme'. Information is therefore provided on existing environmental problems which are relevant to the County.

The SEA Directive requires that information on the baseline environment be focused upon the relevant aspects of the environmental characteristics of areas likely to be significantly affected and the likely evolution of the current environment in the absence of the strategic action i.e. the Variation. Any information that does not focus upon this is surplus to requirements; therefore the SEA focuses on the significant issues, disregarding the less significant ones. In addition, the SEA Directive aims to avoid duplication of the assessment whereby a strategic action forms part of a hierarchy. Furthermore, if certain matters are more appropriately assessed at different levels of the hierarchy in which the Variation is positioned, or, if certain matters have already been assessed by a different level of the hierarchy then additional assessment is not needed.

In order to describe the baseline (the current state of the environment) in the County, data was collated from currently available, relevant environmental sources.

2.5 Alternatives

The SEA Directive requires that reasonable alternatives (taking into account the objectives and the geographical scope of the plan or programme) are identified described and evaluated for their likely significant effects on the environment. Discussion on alternatives is provided in Section 6.

2.6 The SEA Environmental Report

In this Environmental Report, an earlier draft of which was placed on public display alongside the Proposed Variation, the likely environmental effects of the Variation are predicted and their significance evaluated with

[2] The Marine function of the Department of Communications, Marine and Natural Resources has been transferred to the Department of Agriculture Food and Fisheries

regard to the environmental baseline. The Environmental Report provided the decision-makers, the members of the Council, who decided whether or not to make the Variation, as well as the public, with a clear understanding of the likely environmental consequences of implementing the Proposed Variation.

The earlier draft of the Environmental Report was updated to take account of changes arising from submissions and observations as well as minor modifications which were made to the Proposed Variation.

2.7 The SEA Statement

After the Variation was made a document referred to as the SEA Statement was prepared. This is required to include information on: how environmental considerations have been integrated into the Variation - highlighting the main changes to the Variation which resulted from the SEA process; how the Environmental Report and consultations have been taken into account - summarising the key issues raised in consultations and in the Environmental Report indicating what action, if any, was taken in response; and the reasons for choosing the Variation in the light of other reasonable alternatives.

2.8 Legislative Conformance

This report complies with the provisions of the SEA Regulations and is written in accordance with Schedule 2B of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004).

Table 2.1 (overleaf) is a reproduction of the checklist of information to be contained in the Environmental Report (DEHLG, 2004)[3] and includes the relevant sections of this report which deal with these requirements.

[3] DEHLG (2004) *Implementation of SEA Directive (2001/42/EC): Guidelines for Regional Authorities and Planning Authorities* Dublin: Government of Ireland.

2.9 Appropriate Assessment

Note that an Appropriate Assessment (AA) - which derives from the Habitats Directive 92/43/EEC - was carried out for the Variation. The AA concludes that the Variation will not give rise to effects on the integrity of any Natura 2000 sites[4].

2.9.1 Strategic Flood Risk Assessment

The Galway County Development Plan 2009-2015 as varied contains policies and objectives regarding flood risk and flood management. A separate Strategic Flood Risk Assessment for the entire county is being undertaken at present.

2.10 Difficulties Encountered

2.10.1 Centralised Data Source

The lack of a centralised data source that could make all environmental baseline data for the County both readily available and in a consistent format posed a challenge to the SEA process. This difficulty is one which has been encountered while undertaking SEAs at local authorities across the Country and was overcome by investing time in the collection of data from various sources and through the use of Geographical Information Systems.

[4] Except as provided for in Section 6(4) of the Habitats Directive, viz.There must be:
(a) no alternative solution available,
(b) imperative reasons of overriding public interest for the plan to proceed; and
(c) adequate compensatory measures in place.

Table 2.1 Checklist of Information included in this Environmental Report

Information Required to be included in the Environmental Report	Corresponding Section of this Report
(A) Outline of the contents and main objectives of the Plan, and of its relationship with other relevant plans and programmes	Sections 4 and 5
(B) Description of relevant aspects of the current state of the environment and the evolution of that environment without implementation of the Plan	Section 3
(C) Description of the environmental characteristics of areas likely to be significantly affected	Sections 3, 4, and 7
(D) Identification of any existing environmental problems which are relevant to the Plan, particularly those relating to European protected sites	Section 3
(E) List 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 4, and 8
(F) Describe the likely significant effects on the environment	Sections 7
(G) Describe any measures envisaged to prevent, reduce and as fully as possible offset any significant adverse environmental effects of implementing the Plan	Section 8
(H) 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
(I) A description of proposed monitoring measures	Section 9
(J) A non-technical summary of the above information	Non Technical Summary (separately Bound)
(K) Interrelationships between each Environmental topic	Addressed as it arises within each Section

Section 3 County Galway's Baseline Environment

3.1 Introduction

The environmental baseline of County Galway is described in this section. This baseline together with the Strategic Environmental Objectives, which are outlined in Section 4, is used in order to identify, describe and evaluate the likely significant environmental effects of implementing the Variation and in order to determine appropriate monitoring measures.

The environmental baseline is described in line with the legislative requirements, encompassing the following components – biodiversity, flora and fauna, population, human health, soil, water, air and climatic factors, material assets, cultural heritage, landscape and the interrelationship between these components. A description is also included of the likely effects upon each environmental component under a *do-nothing scenario* i.e. the likely evolution of the environment without the implementation of the Core Strategy.

County Galway is the second largest county in Ireland with an area of 6,148 square kilometres and a population of 231,035 persons as of Census 2006[5], 159,052 of which live in the administrative area of Galway County Council and 71,983 of which live in Galway City.

Located in the west of Ireland, the County shares borders with five other counties - Mayo, Roscommon, Offaly, Tipperary and Clare - (see Figure 3.1) and borders the Atlantic Ocean to its east with a coastline of around 689 kilometres, excluding that of its many off shore islands.

Human interaction with the land and sea is evident from the earliest of times up to the present, from archaeological remains to farmland to growing urban centres such as Galway City, Athenry, Ballinasloe, Clifden, Gort, Headford, Loughrea, Oranmore, Oughterard, Portumna and Tuam.

West Galway is characterised by mountains, bogs, rivers and lakes while East Galway is characterised by a low-lying rolling topography of a fertile limestone plain, rich pasturelands, bog, and the River Shannon with its Callows and Lough Derg.

Due to its geology, the mild climate and plentiful rainfall, the Galway landscape has an abundance and diversity of wetlands, peatlands and freshwater features. Many of Galway's most important natural and semi-natural habitats are afforded protection under European and National Legislation by way of designation as National Heritage Areas (NHAs), candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

3.2 Evolution of the Environment in the Absence of the Variation

The SEA Directive requires that the Environmental Report includes a description of the likely evolution of the environment in the absence of the Variation.

In the absence of the making of the Variation to the existing County Development Plan, the evolution of the environment would be likely to occur in the same way as detailed in the SEA Environmental Report of the Galway County Development Plan 2009-2015 (April, 2009). The Variation provides for downward population allocations which mean that the intensity of potential adverse environmental effects would be likely to be reduced; however they will still exist and will be mitigated by existing Plan policies and objectives.

[5] CSO (2007) *Census 2006 Volume 1 - Population Classified by Area* Cork: CSO

Figure 3.1 Context of County Galway in relation to the Island of Ireland and surrounding Counties

3.3 Biodiversity and Flora and Fauna

3.3.1 Overview of High Value Biodiversity[6]

County Galway contains a variety of natural habitats including many of international nature importance such as blanket bogs, fens, heath, ancient oak woodland, turloughs, species-rich calcareous grassland and limestone pavement. The County also contains a large number of rare, threatened and uncommon species, including a large number of plants and animals that are protected under national and European Union legislation. A number of these species are found within the habitats of high value mentioned below as well as within the County's designated ecological sites (see Section 3.3.4).

3.3.1.1 Peatlands

Peatlands such as raised and blanket bogs, wet and dry heath, and fens are of particular value because of the rarity of these habitats in an international context, and because of the characteristic flora and fauna that live in these wet, peaty and often highly acidic places.

Irish raised bogs account for 50% of all the conservation-worthy raised bogs remaining in Europe. A number of high quality active raised bogs are found in the north and east of County Galway, as well as large areas of cutover and degraded raised bog.

Ireland, and in particular, Galway, contains some of the best examples of intact blanket bog in Europe. The most extensive habitat of nature importance within County Galway is lowland blanket bog, found mainly in south Connemara. This habitat, which often occurs in close association with nutrient-poor lakes and rivers, provides a habitat for a large number of rare plants including Slender Cotton Grass, Bog Orchid and Pillwort. The mountains of Connemara and other upland areas in the County are generally dominated by upland blanket bog, wet, dry and montane heath.

A number of birds live and breed on bogs including Red Grouse, Golden Plover and the Curlew. These birds are very vulnerable to loss of good quality bog habitat and their numbers have been declining for many years. Blanket bog, heath and young coniferous forestry habitats in the Slieve Aughties are important breeding ground for the Hen Harrier.

The coastal areas of Connemara tend to be dominated by extensive areas of dry heath and outcropping bedrock (mostly granite). The shallow, peaty soils found in these coastal heaths provide a habitat for a range of rare plants including Pyramidal Bugle, Pale Dog-violet, Green-winged Orchid and Spotted Rock-rose.

Fens are another important but less abundant peatland type found in Galway, which often occurs in association with raised bogs, eskers and/ or lakes. The Marsh Fritillary is one of the most endangered species in Europe due to the loss of its habitat across much of its range. County Galway contains a large proportion of the Irish population and colonies can be found on a number of fens and raised bog sites in the east of the County.

3.3.1.2 Limestone Pavement

Limestone pavement is a unique habitat found in the Burren region in Clare, south County Galway and on the Aran Islands. Exposed limestone outcrops and the associated habitats of limestone heath, scrub and woodland form some special habitat mosaics with many uncommon plant species and unusual plant assemblages present. Extensive areas of limestone pavement still occur to the south of Kinvarra with a number of small, isolated patches occurring along a corridor from Kilcolgan to Tuam and near Moycullen. These areas of limestone pavement often occur in close association with species-rich calcareous grassland and sometimes support the protected species, Wood Bitter-vetch. Often associated with limestone pavement, orchid-rich calcareous grasslands are another priority habitat. These species-rich semi-natural grasslands are becoming increasingly scarce in Ireland due to changes in agricultural practice and housing development. Some good examples can still be seen in the Aran Islands and around Castletaylor - both areas of which are designated as Special Areas of Conservation - and in the Cow Park in Clarinbridge.

Underground limestone caves can be important hibernation areas for bats such as the Lesser Horseshoe, which is found in just six counties on

[6] Text in this section is sourced from the Galway County Biodiversity Action Plan 2008 - 2013 which provides a detailed overview of the County's biodiversity [Galway County Council (2008) *Biodiversity Action Plan for County Galway 2008 - 2013* Galway: Galway County Council].

the western seaboard including Galway. The Irish population of Lesser Horseshoe bats is internationally important as the species is now in serious decline and even extinct in much of Europe.

3.3.1.3 Woodland

Native woodland is a relatively uncommon habitat in County Galway. In west Galway, Derryclare and Ballinahinch in Connemara are important native woodland sites, while in east Galway, significant areas of oak-birch-holly woodland include Gortnacarnaun, Drummin, and Woodford. An extensive area of oak-ash woodland is found in association with the turloughs of Coole and Garryland. These woodlands support many rare plant species including the Narrow-leaved Helleborine, Bird Cherry and Yellow Bird's Nest. They are also home to the Brown Hairstreak, a much localised butterfly species that is found only in Galway, Clare and North Tipperary living in limestone woodlands and hedges.

Even when dominated by non-native broadleaf trees - such as beech or sycamore -, woodland habitats can support a wide range of plants and animals. Forests such as Portumna Forest Park and Kilcornan Woods in Clarinbridge are home to important populations of Red Squirrel, a species that is in rapid decline in most of the east of the country due to competition from the introduced American Grey Squirrel. The Pine Marten is another important native mammal found in Galway woodlands. Due to centuries of persecution, Pine Marten numbers were critically reduced but now its range is expanding due to legal protection and increasing cover of coniferous forestry and scrub woodland.

3.3.1.4 Eskers

Eskers are distinctive Irish habitats found mostly in the midlands. They are long sinuous rounded hills which were formed at the end of the last ice age when silt, sand and gravel were deposited by rivers of glacial melt water under the ice. As well as being geomorphological features, eskers are important for the characteristic woodland and grassland habitats they support, including species-rich grasslands with abundant orchids. A number of eskers are found in the north and east of the County including Richmond Esker, a Nature Reserve near Kilkerrin, which has two of the few esker ridges left in the country which still carry native woodland.

3.3.1.5 Freshwater Aquatic Habitats

Turloughs, a priority habitat under the EU Habitats Directive, are unique to limestone regions in the west of Ireland. These seasonal lakes are home to a characteristic suite of animals and plants that are adapted to the fluctuating water table and include some rarities such as Fen Violet, Alder Buckthorn and Dropwort. Turloughs are abundant in north, east and south County Galway and there are a number of exceptional turlough sites in the region such as Coolcam, Croaghill, Ballinastack, Coole-Garryland and Glenamaddy Turloughs. Rahasane Turlough near Craughwell is the largest in Ireland and is important for over-wintering birds.

Galway also has an abundance of permanent freshwater lakes, the largest of which, Lough Corrib divides the geographically distinct regions of the east and west of the County. The shores of Lough Corrib provide habitat for a number of rare plant species including Irish Lady's Tresses, Shrubby Cinquefoil and Alder Buckthorn. Many of the rivers and lakes in County Galway have relatively good water quality (see Section 3.6 *Water*). These water bodies support a number of rare and important plant and animal species including important fisheries of salmon and brown trout.

The Arctic Char is a very rare fish similar in ecology and appearance to the brown trout. One of the first fish to colonise Ireland after the Ice Age, it is confined to just a few of the cold, deeper lakes including Lough Inagh, Fermoyle Lough and Athry in County Galway. It is now believed that one third of all native populations of the Arctic Char in Ireland are likely to be extinct, while the status of a further twenty one populations is unknown. In Galway, Arctic Char is believed to be extinct in three lakes while the population status of a further thirteen lakes is unknown. Pollan, another very rare fish, is found in Lough Derg. In Western Europe, its distribution is limited to just five lakes in Ireland.

The freshwater pearl mussel (*Margaritifera Margaritifera)* is a bivalve, which is a type of mollusc or snail with a body that is almost completely enclosed between a pair of shells. The Fresh Water Pearl Mussel is a critically endangered species due to pollution, habitat destruction and over-fishing. It requires particularly clean, clear and well-oxygenated water to survive and in Galway it is restricted to just a few soft-water sites in the west of the County including the Owenriff River in Oughterard. The presence of Freshwater Pearl

Mussels in a river system is indicative of water of the highest quality. See Section 3.3.4.11 for information on designation.

The White Clawed Crayfish is protected in Ireland and under EU legislation. It prefers calcareous waters and is found in Lough Corrib, Lough Derg and other rivers of the Shannon catchment. The Irish crayfish population is especially important, as it remains free of a fungal disease that has decimated populations elsewhere in Europe.

The callows, seasonally flooded grasslands of the floodplains of the Shannon and Suck Rivers, form important wildlife habitats and add to the rich habitat mosaic found along these rivers. During the summer the callows support exceptional flower rich wet meadows, and are home to the globally endangered Corncrake. In the winter they provide food and shelter for large numbers of over-wintering wild fowl including Whooper Swan, Wigeon and Lapwing and a large flock of Greenland White-fronted Geese, an Annex I species under the EU Birds Directive.

3.3.1.6 Coastal Habitats

The coastline of County Galway - including its various offshore islands - stretches for over 2,000 km. It is highly indented and supports a diverse range of habitats including rocky and sandy shores, shingle beaches, and saltwater lagoons.

Coastal sand dunes and grasslands are important habitats for many species of invertebrates including rare snails, dragonfly and butterfly species. Machair (flat sandy grassland) is a priority habitat found only along the coast of Ireland and Scotland. In Ireland the distribution of machair is limited to the north-west coast, from Galway Bay to Malin Head in Donegal. Many machair sites have traditionally been used for low intensity mixed-farming, often as commonage land. High quality machair is found at a few sites in Connemara including Dog's Bay near Roundstone and Slyne Head. These areas are awash with orchids and other wildflowers during the summer months.

South Connemara is home to the best site in the country for another priority habitat under EU legislation, coastal lagoons, including some saline lake lagoons situated on peat. The Foxtail Stonewort, a protected species of algae that grows in highly saline lagoons, has only been recorded at five locations in Ireland, three of which are in Connemara.

Salt marshes occur frequently in sheltered locations along the Galway coast. They contain a suite of species able to cope with the saline conditions and often are important habitats for Otters and a wide range of birds.
Underwater reefs are found off the Aran Islands and Kilkieran Bay (Ireland's first marine cSAC), and support a biodiversity of marine invertebrates including rare echinoderms, anemones, sponges, soft corals and sea fans. Irelands only known sublittoral population of the Purple Sea Urchin is found on a reef on the west coast of Inishmore.

Ireland has one of the most species-rich seaweed floras in Europe with many potential 'hot-spots' of seaweed diversity identified including Galway Bay, the coast of the Burren and Connemara. Of particular interest are the maerl beds found in western parts of the coasts of County Galway. These rare habitats are composed of deep deposits of calcareous red algae which produce the distinctive 'coral' beaches found around Carraroe.

The Atlantic waters off the Galway coast are home to a great diversity of large marine mammals including Bottlenose Dolphins and the Common and Grey Seal. The coast offers a variety of habitats for all manner of sea birds, including the Chough, which breeds on rocky coastal sites, and the Little Tern, which nests on sandy shores.

3.3.2 Ecological Networks and Connectivity

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. They 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 important for the migration, dispersal and genetic exchange of species of flora and fauna particularly for mammals, especially for bats and small birds. They facilitate linkages both between and within designated ecological sites, the non-designated surrounding countryside and the more urban areas of the County.

The County is dissected by many rivers and lakes with Lough Corrib, Ireland's second largest lake at its centre. The banks of these aquatic features together with the extensive coastline of the County provide significant connectivity across the County.

Hedgerows are a familiar landscape feature in the countryside of the County, particularly east of Lough Corrib. As well as providing food and shelter for insects, birds and other animals, hedgerows also act as important corridors. Typically, older, denser hedges support a greater abundance and diversity of wildlife.

As traditional species-rich grasslands decline, grassy roadside verges and other marginal grasslands act as important habitats and ecological networks for many species of wild flowers and the invertebrates they support. Because of a management regime which is generally of low-intensity, many grassy verges growing along roads contain a great variety of wild flowers. In Connemara, long stretches of grassy verges may contain a great variety of orchid species.

Manmade structures such as stone walls, bridges and buildings can also be very important for wildlife and provide feeding, hibernating and roosting sites for many species of invertebrates, birds and bats. A diversity of mosses, lichens and other plants are often found on old stone built structures.

3.3.3 Land Cover and Habitat Mapping

3.3.3.1 CORINE Land Cover Mapping[7]

The CORINE land cover mapping[8] for County Galway classifies land cover under various headings. CORINE land cover mapping for County Galway for the year 2006 is shown on Figure 3.2. The mapping shows an overall difference between land cover to the west of Lough Corrib and land cover to the east of the Lough.

The western half of the County is primarily covered by the *peat bogs* category of land cover whereas the eastern half of the County is primarily covered by *pastures* as well as significant portions of *peat bogs* and *complex cultivation patterns*.

Water bodies are spread across the western half of the County as are pockets of *transitional woodland scrub* and *coniferous forest*.

Agricultural lands with natural vegetation are found near the banks of the Corrib system and other lakes as well as being spread across the north of the County - to the south of Headford and to the north west of Tuam - and across the south west corner of the County.

A mosaic of *peat bogs*, *transitional woodland scrub* and *coniferous forests* is found over a wide area located between Gort and Portumna, in the vicinity of the Slieve Aughty Mountains.

Sensitive land cover for the year 2006 is shown on Figure 3.3. This map illustrates the land cover that is most sensitive to adverse conditions and includes *peat bogs, mixed forests, coastal lagoons and salt marshes*. There areas are likely to provide high value habitats for the counties flora and fauna as discussed in Section 3.3.1.

Landcover differences between the CORINE 2000 data (see Figure 3.4) and the data for the year 2006[9] is shown on see Figure 3.5. This shows areas of *transitional woodland scrub* changed to *mixed* and *broad leafed forest* by 2006. These changes in the data may reflect the land cover changes as a result of the planting, maturing and felling of forests.

Urbanisation of land occurred throughout the County, mainly in the vicinity of existing towns and villages. Some pastures, agricultural land, transitional woodland scrub, complex cultivation and coniferous mixed forests appear in the 2006 mapping as discontinuous urban fabric, industrial and commercial units and construction sites. These changes between 2000 and 2006 landcover indicate a cumulative loss of natural/ agricultural vegetation and associated habitats - and their flora and fauna - at the fringes of the County's largest settlements.

[7] CORINE Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. Land cover is the observed physical cover, as seen from the ground or through remote sensing, including for example natural or planted vegetation, water and human constructions which cover the earth's surface. Because of the scale of the CORINE data and the method by which it was collected there are likely to be a number of inaccuracies at the local level. It is noted, however, that the land cover shown on the maps is generally accurate at the County level. The European Environment Agency, in conjunction with the European Space Agency, the European Commission and member countries is currently updating the CORINE land cover database.

[8] European Environment Agency Coordination of Information on the Environment (2004) *Ireland's Corine Land Cover 2000 (CLC2000)* Copenhagen: EEA

[9] European Environment Agency Coordination of Information on the Environment (various) *Ireland's Corine Land Cover 2000 (CLC2000) and Ireland's Corine Land Cover 1990 (CLC1990)* Copenhagen: EEA

3.3.4 Designations

3.3.4.1 Introduction

The international significance of Galway's natural heritage is reflected in the fact that a high proportion of the County is designated for nature conservation under European and National legislation.

Figure 3.6 shows the spatial distribution of candidate Special Area of Conservation (cSAC), Special Protection Area (SPA) and Natural Heritage Area (NHA) designations across the County. As can be seen from the map, many of these sites overlap with each other. Other categories of designations are present in the County and are identified in proceeding sections however these generally overlap with those shown on Figure 3.6.

The majority of the western half of the County - including Lough Corrib, inner Galway Bay and most of the County's islands - is covered by designated sites, the largest of which is the Connemara Bog Complex cSAC and NHA which covers much of the County's peatlands to the west of the Lough Corrib SPA, candidate SAC and proposed NHA. Kilkieran Bay and its islands comprise a candidate SAC and there is an cSAC designation covering part of Inishmore Island and its waters. The Galway Bay Complex cSAC and pNHA and the Inner Galway Bay SPA together cover an area of the Bay stretching from Salthill (in the east of the Galway City) to Aughinish (on the Galway/Clare border) - as indicated by Figure 3.6 - and further into County Clare's offshore waters.

The eastern half of the County is covered to a significantly lesser extent by such designations; nevertheless a number of important areas are located in this half of the County. The Grange/Clare/Albert/Sinking River system which drains into Lough Corrib is part of the Corrib designated system and the designated River Suck and River Shannon Callows and Lough Derg comprise much of the County's western border. The Slieve Aughty Mountains SPA covers a wide area located between the settlements of Gort and Portumna.

3.3.4.2 Candidate Special Areas of Conservation

Candidate Special Areas of Conservation (cSACs) have been selected for protection under the European Council Directive on the conservation of natural habitats and of wild fauna and flora (92/43/EEC) by the DEHLG due to their conservation value for habitats and species of importance in the European Union. The sites are *candidate* sites because they are currently under consideration by the Commission of the European Union.

A total of 73 cSACs have been selected in County Galway for 47 Annex I habitats including 10 priority habitats. Annex I habitats are recognised by the European Union to be of particularly high nature conservation value.

Candidate SACs in Galway provide examples of bogs, callows, machair, limestone pavement, headlands, bays, loughs, turloughs, islands, woods and caves.

Candidate SACs are listed under Table 3.1 and mapped on Figure 3.6[10]. On designation, these cSACs together with the SPAs identified below will become part of Natura 2000 - a network of protected areas throughout the EU established under the Habitats Directive.

3.3.4.3 Special Protection Areas

Special Protection Areas (SPAs) have been selected for protection under the 1979 European Council Directive on the Conservation of Wild Birds (79/409/EEC) by the DEHLG due to their conservation value for birds of importance in the European Union.

16 SPAs have been designated in County Galway covering, inter alia, certain bays, loughs, islands, turloughs, callows, woods and marshes. These SPAs along with cSACs comprise Natura 2000 - a network of protected areas throughout the EU established under the Habitats Directive.

SPAs are listed under Table 3.2 and mapped on Figure 3.6[11].

3.3.4.4 Natural Heritage Areas

Natural Heritage Areas (NHAs) are designated due to their national conservation value for ecological and/or geological/geomorphological heritage. They cover nationally important semi-natural and natural habitats, landforms or geomorphological features, wildlife plant and animal species or a diversity of these natural attributes. NHAs are

[10] Site synopses for cSACs are available to download from the website of the National Parks and Wildlife Service at http://www.npws.ie/en/ConservationSites/.
[11] Site synopses for SPAs are available to download from the website of the National Parks and Wildlife Service at http://www.npws.ie/en/ConservationSites/.

designated under the Wildlife (Amendment) Act 2000.

39 NHAs have been designated in County Galway - mainly covering bog habitats with examples of marshes and eskers also included - and there are 106 sites for which Natural Heritage Area designations are proposed, including various bogs, eskers and woods.

NHAs are listed under Table 3.3 and mapped on Figure 3.6[12]. Proposed NHAs are listed under Table 3.4 and Table 3.5.

3.3.4.5 Connemara National Park

National parks are almost entirely state owned areas designated nationally with the aims of nature conservation and public recreation and appreciation.

Situated in the West of Ireland in County Galway, Connemara National Park covers some 2,957 hectares of scenic mountains, expanses of bogs, heaths, grasslands and woodlands. Some of the Park's mountains, namely Benbaun, Bencullagh, Benbrack and Muckanaght, are part of the famous Twelve Bens or Beanna Beola range. Connemara National Park was established and opened to the public in 1980.

Much of the present Park lands formed part of the Kylemore Abbey Estate and the Letterfrack Industrial School, the remainder having been owned by private individuals. The Park lands are now wholly owned by the State and managed solely for National Park purposes[13].

3.3.4.6 Ramsar Sites

Ramsar sites are designated and protected under the Convention of Wetlands of International Importance, especially as Water Fowl Habitat, which was established at Ramsar in 1971 and ratified by Ireland in 1984. Ireland presently has 45 sites designated as Wetlands of International Importance, with surface areas of 66,994 hectares. Three Ramsar sites are located in County Galway comprising 29,997 hectares in total or 44.7% of the national total.

The following synopses[14] provide details on each of the three sites:

Lough Corrib
Designated: 11/06/96
Area: 17,728 ha
Ramsar site no.: 846

The second largest lake in Ireland supports one of the largest areas of wetland vegetation consisting of reed, sedge and rush communities in the Country. Other habitats include Sessile Oak woodland, calcareous fen, callows grassland, marsh and raised bog with a soak system. The site provides important feeding grounds for waterbirds and supports internationally important numbers of several breeding and wintering waterbirds and nationally important numbers of numerous other waterbird species. The site supports the otter and numerous rare and threatened plant and fish species. Human activities include fishing and hunting.

Coole Lough and Garryland Wood
Designated: 30/05/90
Area: 364 ha
Ramsar site no.: 473

Part of a low-lying karstic limestone area characterized by a subterranean drainage system and seasonal lakes, known as turloughs, set in a matrix of woodland, limestone heath and grassland. The site together with the adjacent nutrient-poor lakes is the most important turlough complex in Ireland. Many rare species of flora and fauna and communities associated with the turlough to woodland transition are supported. Water levels fluctuate widely. The lakes are fringed by aquatic vegetation grading into grassland, tall grass and herb communities and, beyond the level of summer flooding, into scrub and high forest.

Inner Galway Bay
Designated: 11/06/96
Area: 11,905 ha
Ramsar site no.: 838

The shallow sheltered part of a large sea bay with numerous intertidal inlets and small low islands composed of glacial deposits. The area provides important habitat for marine life along Ireland's west coast. The site supports the richest seaweed flora on the Irish Coast (500+ species) and 65% of the Irish marine algal flora occur in the area.

[12] Site synopses for NHAs are available to download from the website of the National Parks and Wildlife Service at http://www.npws.ie/en/ConservationSites/.
[13] National Parks and Wildlife Service (unknown) *Connemara National Park* Dublin: Government of Ireland

[14] Ramsar Convention Secretariat (2000) *The Annotated Ramsar List of Wetlands of International Importance* Switzerland: Ramsar Convention Secretariat

The site supports internationally and nationally important numbers of numerous species of waterbirds. There is a large cormorant colony on Teer Island. Human activities include aquaculture.

3.3.4.7 Nature Reserve

A Nature Reserve is an area of importance to wildlife, which is protected under Ministerial order. There are currently 78 Statutory Nature Reserves. Most are owned by the State but some are owned by organisations or private landowners.

There are six of Nature Reserves in County Galway the descriptions of which are given below[15]:

Ballynastaig Wood and Coole-Garryland Nature Reserves (9.76 ha and 363.58 ha)
Located near Gort, State owned and established in 1983, these two reserves, through their combination of deciduous woods, limestone reefs, lakes and turloughs, constitute one of the most interesting Irish vegetation and faunal complexes still in existence. The Coole-Garryland reserve contains a variety of floral habitats including well-formed high forest on deep pockets of soil, dwarf woodland on limestone pavement, a turlough complex in the Callows and Coole Lake.

Clochar na gCon/Bealacooan Bog Nature Reserve (1,247 ha)
Situated in South Connemara, State owned and established in 1999, this bog forms part of the greater Connemara Bog Complex. It is a classic and intact example of Atlantic or oceanic blanket bog, with a diverse flora which includes a number of scarce plant species and a blanket bog fauna which includes many of Ireland's and Europe's more important and threatened species. Actively growing bog is a priority EU habitat.

Derrycrag Wood and Rosturra Wood Nature Reserves (110.48 and 17.68)
Located near Woodford, State owned and established in 1983, these two Reserves comprise fragments of a once extensive forest and now contain stands of oak and ash with an understorey of holly and hazel and a rich ground flora.

Leam West Bog Nature Reserve (373.48 ha)
Situated two miles south east of Maam Cross, State owned and established in 1991, this bog is of international importance. It is an area of very diverse blanket bog developed over both acid and base rich rocks at the north east limit of the Connemara blanket bogs. It forms part of one of the largest areas of intact bog in Connemara and it is one of the few sites containing both lowland and highland bog. A large number of habitats occur including rock outcrops, bog pools, extremely wet quaking areas, streams and relatively nutrient rich flushes.

Pollnaknockaun Wood (38.85 ha)
Located 1km north-east of Woodford village, State owned and established in 1983, this is a semi-natural woodland which once formed part of the extensive forest referred to under the Derrycrag Wood and Rosturra Wood Nature Reserves above.

Richmond Esker Nature Reserve (15.7 ha)
Located 4km. north-west of Moylough, State owned and established in 1985, this Nature Reserve is, along with Timahoe Esker Nature Reserve, one of the few esker ridges supporting native woodland left in the country. Although extensively planted with conifers and other exotic species it is planned to expand the native woodland using appropriate management techniques.

3.3.4.8 Shellfish Waters

The indented nature of County Galway's coastline protects certain bays from the full force of Atlantic waves and storms and allows for the mixture of fresh and salt water which is vital for producing high quality shellfish such as oysters which are significantly important to tourism and certain local economies along the County's coastline.

At present, there are 14 areas in Ireland designated and afforded protection as Shellfish Waters under the European Communities (Quality of Shellfish Waters) Regulations 2006 (SI No. 268 of 2006) which transposes the Shellfish Waters Directive 1979 (79/923/EEC) into Irish law. These regulations together with the Quality of Shellfish Waters Regulations 1994 (SI No. 200 of 1994) require that the shellfish waters are protected from the effects of the functions of planning authorities and require such functions to be performed in a manner that will comply with certain values for water quality which are specified in the Regulations.

Four Shellfish Waters are located along the coastline of County Galway. These Shellfish Waters are mapped on Figure 3.8. The following descriptions are taken from the action programmes for these waters which were published in May 2006:

[15] National Parks and Wildlife Service (various) *Statutory Nature Reserves: County Galway* Dublin: Government of Ireland

Killary Harbour
Killary Harbour is a fiord-like inlet straddling the County boundaries of Galway to the south and Mayo to the north on the West Coast of Ireland. The landscape is dominated by Mweelrea Mountain to the north, and the Maam Turk Mountains to the south. Their slopes are steep and mainly covered by peat with associated vegetation. Three main rivers feed into the harbour, the Erriff and Bundorragha on the Mayo side, and the Bunowen on the Galway side. Each is an important salmon fishing river, and each is regularly monitored by the EPA.

Kilkieran Bay
The designated area of Kilkieran or Cill Chiaráin is a south westerly facing bay, almost 13km long and covering approx. 5,800 hectares in the County. It is made up of three smaller bays: Camus Bay to the North East; Casheen Bay to the South East; and Kilkieran Bay to the West. The catchment is dominated by blanket bog, mountainous terrain and nutrient poor water bodies and extends to approx 300km^2. The principal rivers flowing into the bay are the Invermore, and the Inverbeag, which flow into the north of the bay and the Screeb (identified as being slightly polluted in the 2006 action programme) which flows into the North East part. Eight discharges are licensed in the area, principally for effluent from smolt production, fish processing, and light industry. There are no IPPC licensed activities in the area. Marine activities in the area include sailing, diving, windsurfing and angling.

Clarinbridge / Kinvara Bay
The designated area of Clarinbridge/Kinvara Bay covers an area of 2,700ha in the south-eastern corner of Galway Bay on the West Coast of Ireland. The general characteristics of the area are that for the most part, it is low lying and composed of good arable land with cattle rearing and milk production as well as some tillage. The water bodies of the catchment reflect the geological make up of the area in that they naturally have a high nutrient content and generally lie within a mesotrophic-eutrophic range. Another characteristic of the area is the presence of a number of turloughs and underground river systems one of which enters the sea at Kinvara. The principal freshwater inputs into the designated area are the Clarin, identified as being moderately polluted in the 2006 action programme, Kilcolgan, identified as being slightly polluted in the 2006 action programme, Ballynamanagh River, an unnamed stream and an unnamed underground river none of which are classified by the EPA. Marine activities in the area include sailing, diving, windsurfing and angling. There are 15 section 4 licences within the catchment, and of these, 6 are deemed to be significant. There are three IPPCs in the area. These have good monitoring programmes and are unlikely to be a threat to water quality.

Aughinish Harbour
The primary development pressure in the area is from tourism. The environs of Aughinish and the Burren, of which it is a part, are popular destinations for holidaymakers. Most development to date has taken place on the Co. Clare side of the bay.

3.3.4.9 Designated Salmonid Waters

The main channel of the River Corrib and the connecting Lough Corrib is designated and protected as a Salmonid Water under the European Communities (Quality of Salmonid Waters) Regulations 1988 (SI No. 293 of 1988). Designated Salmonid Waters are capable of supporting salmon (Salmo salar), trout (Salmo trutta), char (Salvelinus) and whitefish (Coregonus). Designated salmonid waters in County Galway are mapped on Figure 3.7.

3.3.4.10 Register of Protected Areas

In response to the requirements of the Water Framework Directive a number of water bodies or parts of water bodies which must have extra controls on their quality by virtue of how their waters are used by people and by wildlife have been listed on Registers of Protected Areas (see Section 3.6 *Water* and Figure 3.26).

The River Corrib is listed on the RPA for *Habitats Rivers*. The Shellfish Waters identified under Section 3.3.4.8 are listed on the RPA for *Shellfish Areas*. All the SPAs identified under Section 3.3.4.3 are listed on the RPA for *Species SPA*.

3.3.4.11 Freshwater Pearl Mussels

The Department of the Environment, Heritage and Local Government has prepared 27 Draft Management Plans for Freshwater Pearl Mussel in accordance with Article 13 (5) of the Water Framework Directive as transposed in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) and the Habitats Directive as transposed in Ireland by the European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997). The objective of the plans is to restore the freshwater pearl mussel populations in 27 rivers, or stretches

of rivers that are within the boundaries of Special Areas of Conservation.

Two river catchments are designated for Freshwater Pearl Mussels within County Galway, namely the Dawros and the Owenriff as mapped on Figure 3.8. See Section 3.3.1.5 for more information on Freshwater Pearl Mussels.

3.3.5 Existing Problems

With regard to terrestrial flora and fauna, all greenfield development causes an impact - the replacement of natural and semi natural habitats with artificial surfaces results in loss of flora and fauna and therefore adversely impacts upon this environmental component. The significance of the impact of greenfield development depends on whether individual greenfield developments result in the loss of habitats or species of importance together with the cumulative amount of habitats and species lost and fragmented as a result of all greenfield developments. Development of brownfield sites and re-development can also have impacts on terrestrial flora and fauna.

Urbanisation of land, as identified by CORINE data, can cause significant habitat destruction, fragmentation and degradation as natural habitats including wetlands, woods and grasslands may be required to be built upon or fragmented to accommodate new development.

Ecological networks have been adversely impacted upon by the development of infrastructure such as roads which result in the habitat fragmentation as well as by the development of housing which results in the removal of hedgerows or stone walls, or housing which occurs along the edges of inland surface waters.

Galway County Council must help to ensure compliance with the objectives of the Habitats Directive which aims to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of Member States. Most of the pressure upon designated habitats in County Galway as a result of development is likely to occur in coastal areas and on the banks of water bodies such as Lough Corrib where infringement could occur if unmitigated. It is noted that in addition to other designated habitats found along the coast, machair (flat sandy grassland) - a priority habitat found only along parts of the coast Scotland and the north-west coast of Ireland - stretches in County Galway from Galway Bay to the Galway-Mayo border.

The protection of rare and important habitats and plant and animal species may pose a potential constraint to new development in certain parts of the County. Such species include: the rare flora and fauna which are found throughout some the County's peatlands; the endangered bird species which are sustained by the flower rich wet meadows of the Shannon Callows; Arctic Char which is believed to be extinct in three lakes in Galway with the population status of a further thirteen lakes unknown; the Fresh Water Pearl Mussel which is a critically endangered species due to pollution, habitat destruction and over-fishing and is now only found in few soft-water sites in the west of the County; and, the White Clawed Crayfish which is protected in Ireland and under EU legislation and is found in Lough Corrib, Lough Derg and other rivers of the Shannon catchment.

Ireland, and in particular, Galway, contains some of the best examples of intact blanket bog in Europe. Loss of quality rare bog habitats - especially in the east of the County - has resulted in the decline in numbers of vulnerable birds which live and breed on the bogs.

Orchid-rich calcareous grasslands have in the recent past experienced pressure due to changes in agricultural practice and housing development. These grasslands are often associated with limestone pavement and are found south of Kinvarra with a number of small, isolated patches occurring along a corridor from Kilcolgan to Tuam and near Moycullen.

The problem of invasive alien species has become very prominent in recent years as a number of introduced plant and animal species have become ecological pests. In September 2007, the Western Regional Fisheries Board confirmed an infestation of zebra mussels in Lough Corrib. The zebra mussel is an invasive alien species which can impact on the lake in terms of water supplies, ecology, fisheries and amenity. The infestations in Lough Corrib are not confined to one particular area as the presence of the mussel has been confirmed at a number of sites in the upper north west section of the lake and at one site in the lower lake. Other examples of invasive alien species include the African Pond Weed, 'Chilean Rhubarb', Japanese Knotweed, Rhododendron and the American Mink.

Aquatic flora and fauna is vulnerable to all forms of pollution such as that which can occur as a

result of agricultural run-off and industrial and municipal effluents. As identified under Section 3.6 *Water*, several water bodies within and surrounding the County area are of "poor" or "bad" water quality status.

The indented nature of County Galway's coastline protects certain bays from the full force of Atlantic waves and storms and allows for the mixture of fresh and salt water which is vital for producing high quality shellfish such as oysters which are significantly important to tourism and certain local economies along the County's coastline. At present, there are 14 areas in Ireland designated and afforded protection as Shellfish Waters under the Quality of Shellfish Waters Regulations 2006 four of which are located along the coastline of County Galway. The shellfish which live in the waters are extremely sensitive to pollution and it is important that the effluents from existing and new development - both farming and housing - are treated and disposed of so as not to adversely impact upon the water quality of the waters.

The channelling and piping of a number of surface waters within the County Galway area has in the past impacted upon aquatic biodiversity, flora and fauna as well as ecological connectivity.

Site Code	Site Name	Site Code	Site Name
000212	INISHMAAN ISLAND	001285	KILTIERNAN TURLOUGH
000213	INISHMORE ISLAND	001309	OMEY ISLAND MACHAIR
000216	RIVER SHANNON CALLOWS	001311	RUSHEENDUFF LOUGH
000218	COOLCAM TURLOUGH	001312	ROSS LAKE AND WOODS
000231	BARROUGHTER BOG	001313	ROSTURRA WOOD
000238	CAHERGLASSAUN TURLOUGH	001321	TERMON LOUGH
000242	CASTLETAYLOR COMPLEX	001774	LOUGH CARRA/MASK COMPLEX
000248	CLOONMOYLAN BOG	001913	SONNAGH BOG
000252	COOLE-GARRYLAND COMPLEX	001926	EAST BURREN COMPLEX
000255	CROAGHILL TURLOUGH	002008	MAUMTURK MOUNTAINS
000261	DERRYCRAG WOOD NATURE RESERVE	002031	THE TWELVE BENS/GARRAUN COMPLEX
000268	GALWAY BAY COMPLEX	002034	CONNEMARA BOG COMPLEX
000278	INISHBOFIN AND INISHSHARK	002074	SLYNE HEAD PENINSULA
000285	KILSALLAGH BOG	002110	CORLISKEA/TRIEN/CLOONFELLIV BOG
000286	KILTARTAN CAVE (COOLE)	002111	KILKIERAN BAY AND ISLANDS
000295	LEVALLY LOUGH	002117	LOUGH COY
000296	LISNAGEERAGH BOG AND BALLINASTACK TURLOUGH	002118	BARNAHALLIA LOUGH
000297	LOUGH CORRIB	002119	LOUGH NAGEERON
000299	LOUGH CUTRA	002126	POLLAGOONA BOG
000301	LOUGH LURGEEN BOG/GLENAMADDY TURLOUGH	002129	MURVEY MACHAIR
000304	LOUGH REA	002130	TULLY LOUGH
000308	LOUGHATORICK SOUTH BOG	002180	GORTACARNAUN WOOD
000318	PETERSWELL TURLOUGH	002181	DRUMMIN WOOD
000319	POLLNAKNOCKAUN WOOD NATURE RESERVE	002213	GLENLOUGHAUN ESKER
000322	RAHASANE TURLOUGH	002241	LOUGH DERG, NORTH-EAST SHORE
000324	ROSROE BOG	002244	ARDRAHAN GRASSLAND
000326	SHANKILL WEST BOG	002265	KINGSTOWN BAY
000328	SLYNE HEAD ISLANDS	002293	CARROWBAUN, NEWHALL AND BALLYLEE TURLOUGHS
000330	TULLY MOUNTAIN	002294	CAHERMORE TURLOUGH
000474	BALLYMAGLANCY CAVE, CONG	002295	BALLINDUFF TURLOUGH
000606	LOUGH FINGALL COMPLEX	002296	WILLIAMSTOWN TURLOUGHS
001228	AUGHRUSBEG MACHAIR AND LAKE	002317	CREGG HOUSE STABLES, CRUSHEEN
001242	CARROWNAGAPPUL BOG	002347	CAMDERRY BOG
001251	CREGDUFF LOUGH	002350	CURRAGHLEHANAGH BOG
001257	DOG'S BAY	002352	MONIVEA BOG
001271	GORTNANDARRAGH LIMESTONE PAVEMENT	002356	ARDGRAIGUE BOG
001275	INISHEER ISLAND		

Table 3.1 Candidate Special Areas of Conservation

Site Code	Site Name	Site Code	Site Name
004031	INNER GALWAY BAY	004096	MIDDLE SHANNON CALLOWS
004042	LOUGH CORRIB	004097	RIVER SUCK CALLOWS
004056	LOUGH CUTRA	004107	COOLE-GARRYLAND WOOD
004058	LOUGH DERG (SHANNON)	004123	SLYNE HEAD ISLANDS
004062	LOUGH MASK	004134	LOUGH REA
004067	HIGH ISLAND (GALWAY)	004142	CREGGANNA MARSH
004088	LOUGH SCANNIVE	004168	SLIEVE AUGHTY MOUNTAINS
004089	RAHASANE TURLOUGH	004170	CRUAGH ISLAND

Table 3.2 Special Protection Areas

Site Code	Site Name	Site Code	Site Name
000220	LOUGH NAMUCKA BOG	001227	AUGHRIM BOG
000221	MOORFIELD BOG/FARM COTTAGE	001229	SLIEVE AUGHTY BOG
000222	SUCK RIVER CALLOWS	001240	CAPIRA/DERREW BOG
000229	BALLYGAR BOG	001241	CARNA HEATH AND BOG
000235	BRACKLAGH BOG	001244	CASTLE FFRENCH EAST BOG
000245	CLOONCULLAUN BOG	001254	DERRINLOUGH BOG
000247	SLIEVE BOG	001255	DERRYNAGRAN BOG AND ESKER
000249	CLOONOOLISH BOG	001264	ESKERBOY BOG
000253	CREGGANNA MARSH	001280	KILLACLOGHER BOG
000254	CRIT ISLAND WEST	001283	KILLURE BOG
000267	FUNSHIN BOG	001303	MOORFIELD BOG
000280	CASTLE FFRENCH WEST BOG	002344	ANNAGHBEG BOG
000281	KEELOGES BOG	002364	MOYCULLEN BOGS
000283	KILMORE BOG	002374	CLOON AND LAGHTANABBA BOG
000284	KILNABORRIS BOG	002377	LOUGH ATORICK DISTRICT BOGS
000292	LEAHA BOG	002379	DERRYOOBER BOG
000307	LOUGH TEE BOG	002431	OUGHTERARD DISTRICT BOG
000310	MEENEEN BOG	002436	TOOREEN BOG
000321	RAFORD RIVER BOG		

Table 3.3 Natural Heritage Areas

Site Code	Site Name	Site Code	Site Name
000011	LOUGH DERG	001228*	AUGHRUSBEG MACHAIR AND LAKE
000212*	INISHMAAN ISLAND	001231	BALLYCONNEELY BAY
000213*	INISHMORE ISLAND	001234	BERTRAGHBOY BAY
000215	RATHBAUN TURLOUGH	001237	BOYOUNAGH TURLOUGH
000216*	RIVER SHANNON CALLOWS	001239	CALLOW LOUGH
000218*	COOLCAM TURLOUGH	001242*	CARROWNAGAPPUL BOG
000224	ALTORE LAKE	001247	CLOONASCRAGH FEN AND BLACK WOOD
000228	BALLYCUIRKE LOUGH	001251*	CREGDUFF LOUGH
000231*	BARROUGHTER BOG	001253	DERNASLIGGAUN WOOD
000234	BELCLARE TURLOUGH	001257*	DOG'S BAY
000238*	CAHERGLASSAUN TURLOUGH	001260	DRIMCONG WOOD
000240	CAMDERRY BOG NHA	001266	FINISH ISLAND MACHAIR
000242*	CASTLETAYLOR COMPLEX	001267	FURBOGH WOOD
000244	CLONFERT CATHEDRAL	001271*	GORTNANDARRAGH LIMESTONE PAVEMENT
000248*	CLOONMOYLAN BOG	001275*	INISHEER ISLAND
000252*	COOLE-GARRYLAND COMPLEX	001279	KILKERRIN TURLOUGH
000255*	CROAGHILL TURLOUGH	001282	KILTULLAGH LOUGH
000256	CURRAGHLEHANAGH BOG NHA	001285*	KILTIERNAN TURLOUGH
000261*	DERRYCRAG WOOD NATURE RESERVE	001288	KNOCKMAA HILL
000263	DRUMBULCAUN BOG	001289	LEAGAUN MACHAIR
000265	EESHAL ISLAND	001294	LOUGH HACKET
000268*	GALWAY BAY COMPLEX	001300	MACE HEAD ISLANDS
000275	HIGH ISLAND	001302	MASON ISLAND MACHAIR

Table 3.4 Proposed Natural Heritage Areas Table A
*=Also a candidate SAC

Site Code	Site Name	Site Code	Site Name
000278*	INISHBOFIN AND INISHSHARK	001306	MWEENISH ISLAND MACHAIR
000282	KILLOWER TURLOUGH	001309*	OMEY ISLAND MACHAIR
000285*	KILSALLAGH BOG	001311*	RUSHEENDUFF LOUGH
000286*	KILTARTAN CAVE (COOLE)	001312*	ROSS LAKE AND WOODS
000287	KILTULLAGH TURLOUGH	001313*	ROSTURRA WOOD
000289	KNOCKAVANNY TURLOUGH	001318	ST. MACDARA'S ISLAND
000295*	LEVALLY LOUGH	001319	SUMMERVILLE LOUGH
000296*	LISNAGEERAGH BOG AND BALLINASTACK TURLOUGH	001321*	TERMON LOUGH
000297*	LOUGH CORRIB	001322	TURLOUGH MONAGHAN
000299*	LOUGH CUTRA	001709	TIAQUIN BOG
000301*	LOUGH LURGEEN BOG/GLENAMADDY TURLOUGH	001774*	LOUGH CARRA/MASK COMPLEX
000304*	LOUGH REA	001779	BALLINASLOE ESKER
000308*	LOUGHATORICK SOUTH BOG	001788	TURLOUGHCOR
000311	MONIVEA BOG NHA	001913*	SONNAGH BOG
000318*	PETERSWELL TURLOUGH	001917	CRUMP ISLAND COMPLEX
000319*	POLLNAKNOCKAUN WOOD NATURE RESERVE	001926*	EAST BURREN COMPLEX
000320	POLLDUAGH CAVE, GORT	001972	FRIAR ISLAND
000322*	RAHASANE TURLOUGH	001973	CRUAGH ISLAND
000323	RICHMOND ESKER NATURE RESERVE	001974	INISHMUSKERRY
000324*	ROSROE BOG	002008*	MAUMTURK MOUNTAINS
000326*	SHANKILL WEST BOG	002031*	THE TWELVE BENS/GARRAUN COMPLEX
000328*	SLYNE HEAD ISLANDS	002034*	CONNEMARA BOG COMPLEX
000330*	TULLY MOUNTAIN	002038	CASTLE HACKETT SOUTERRAIN
000331	TURLOUGH O'GALL	002062	OLD DOMESTIC BUILDING, HEATH ISLAND, TULLY LOUGH
000385	ROSTAFF TURLOUGH	002074*	SLYNE HEAD PENINSULA
000474*	BALLYMAGLANCY CAVE, CONG	002075	KINVARRA SALTMARSH
000606*	LOUGH FINGALL COMPLEX	002080	LETTERFRACK HOSTEL
000735	MAUMTRASNA MOUNTAIN COMPLEX	002082	OUGHTERARD NATIONAL SCHOOL
001126	ARDMORE POINT GRASSLAND	002083	KILLARAINY LODGE, MOYCULLEN
001224	ARDGRAIGUE BOG NHA	002110*	CORLISKEA/TRIEN/CLOONFELLIV BOG

Table 3.5 Proposed Natural Heritage Areas Table B
*=Also a candidate SAC

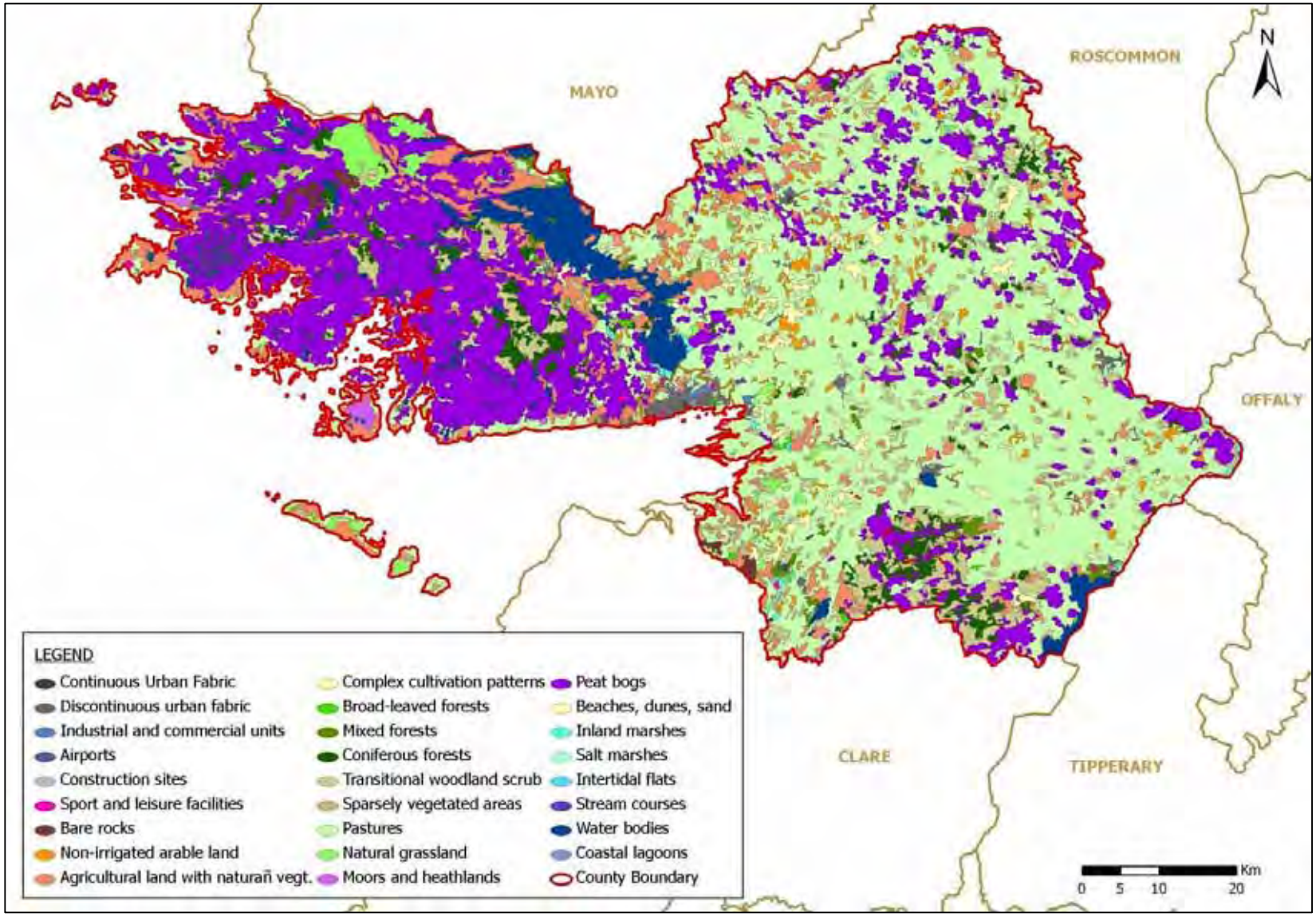

Figure 3.2 CORINE Land Cover Data 2006
Source: EPA (2009)

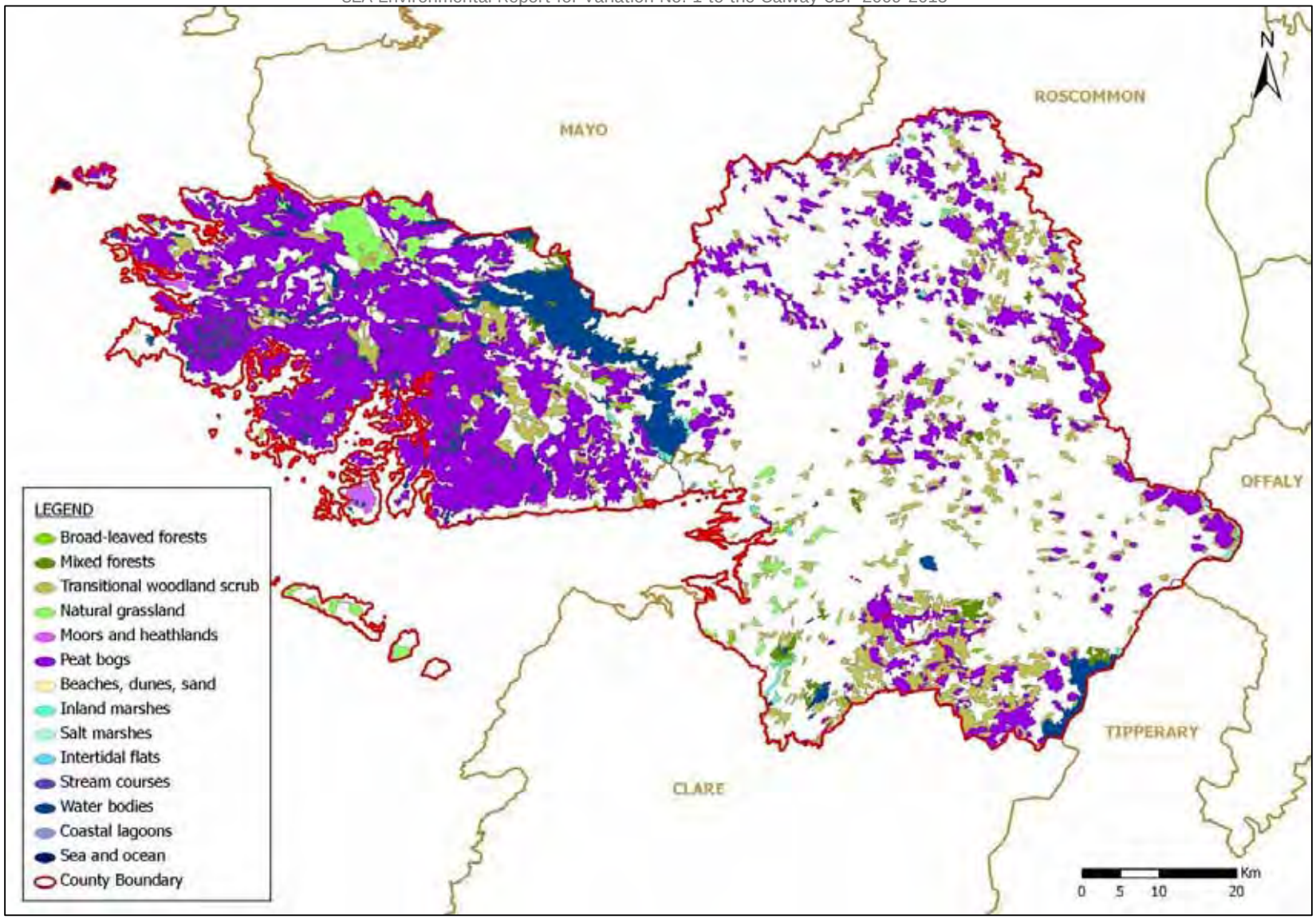

Figure 3.3 CORINE Sensitive Land Cover Classifications 2006
Source: EPA (2009)

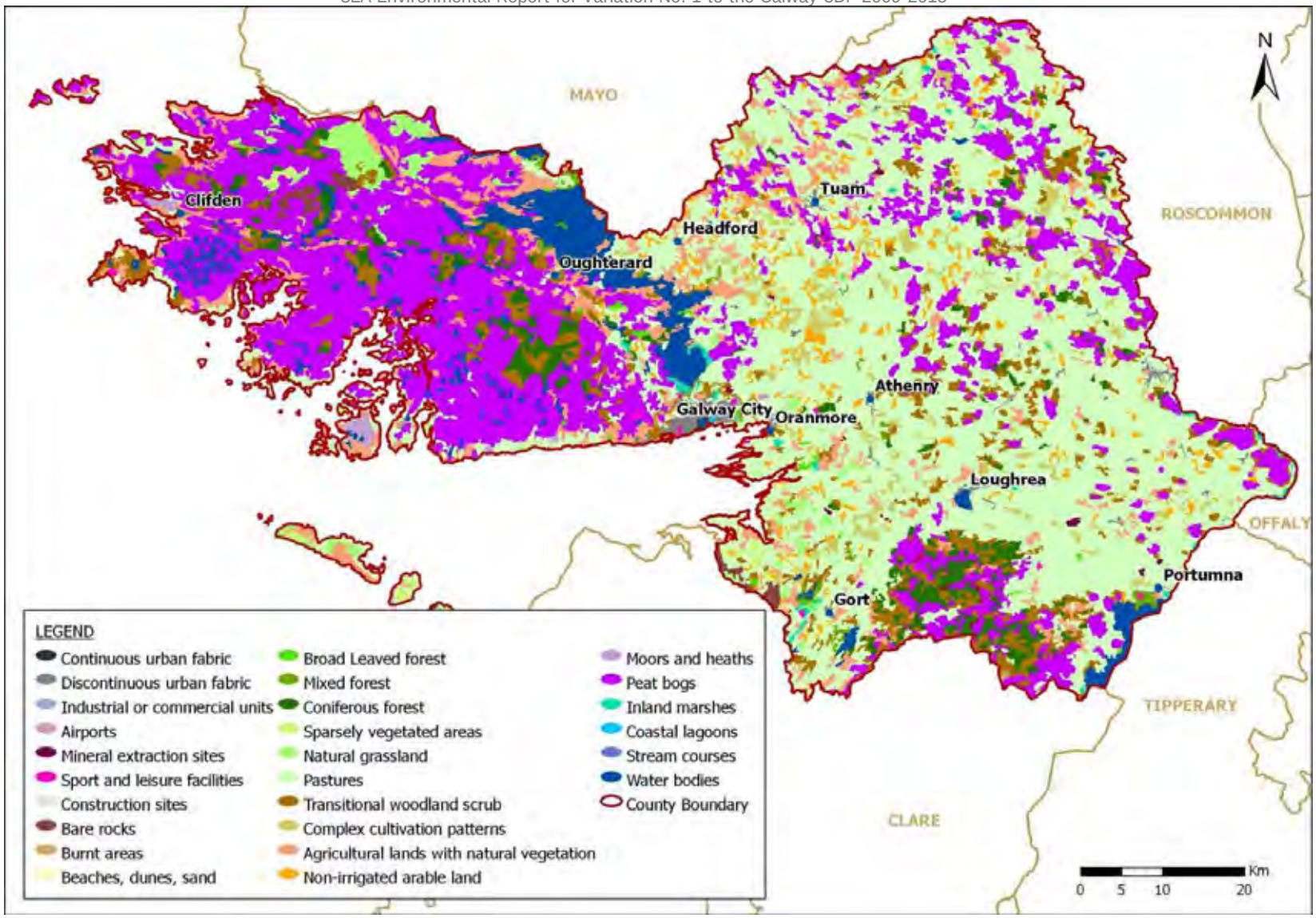

Figure 3.4 CORINE Land Cover Data 2000
Source: EPA (2009)

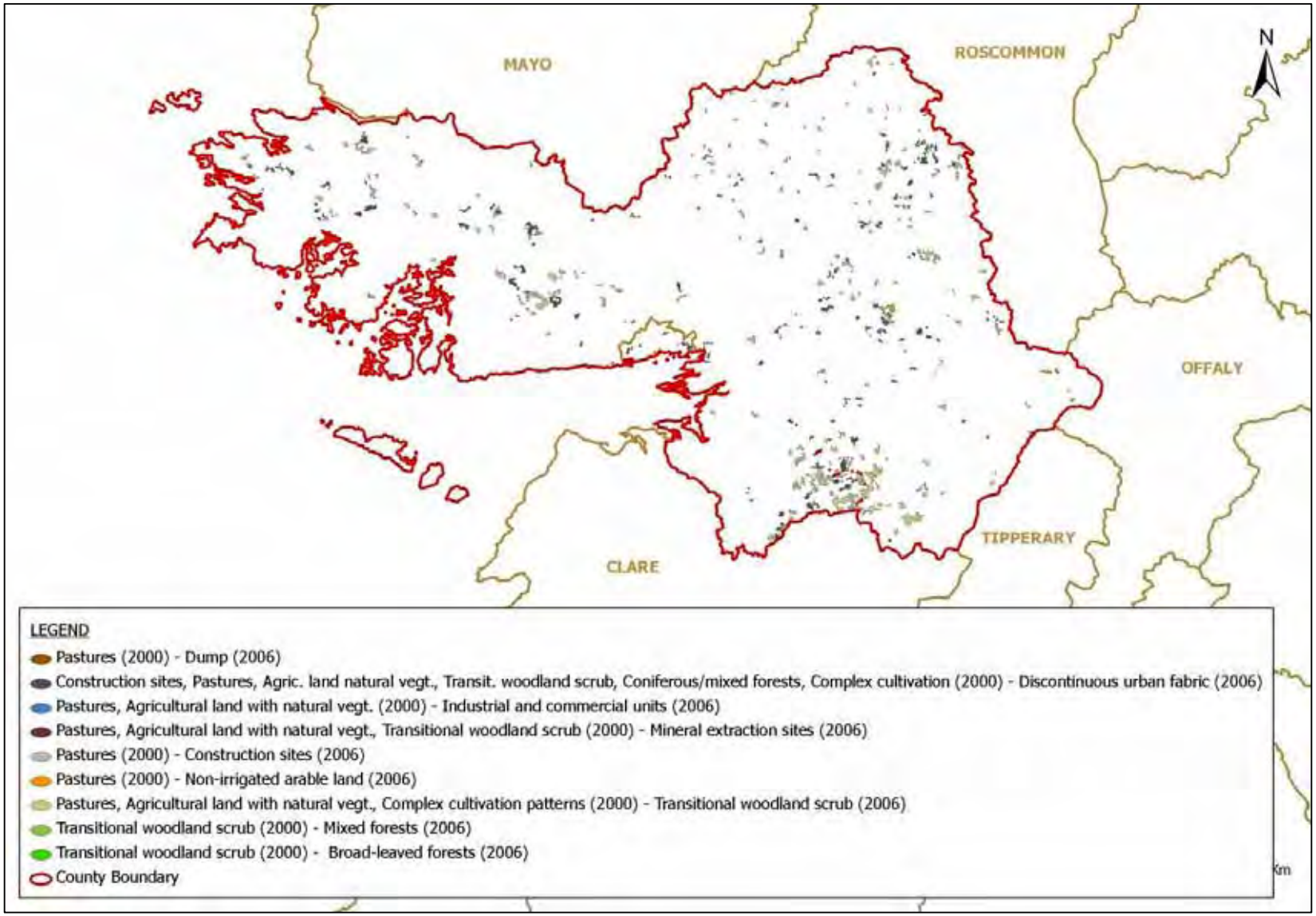

Figure 3.5 CORINE Land Cover Data Changes 2000-2006
Source: EPA (2009)

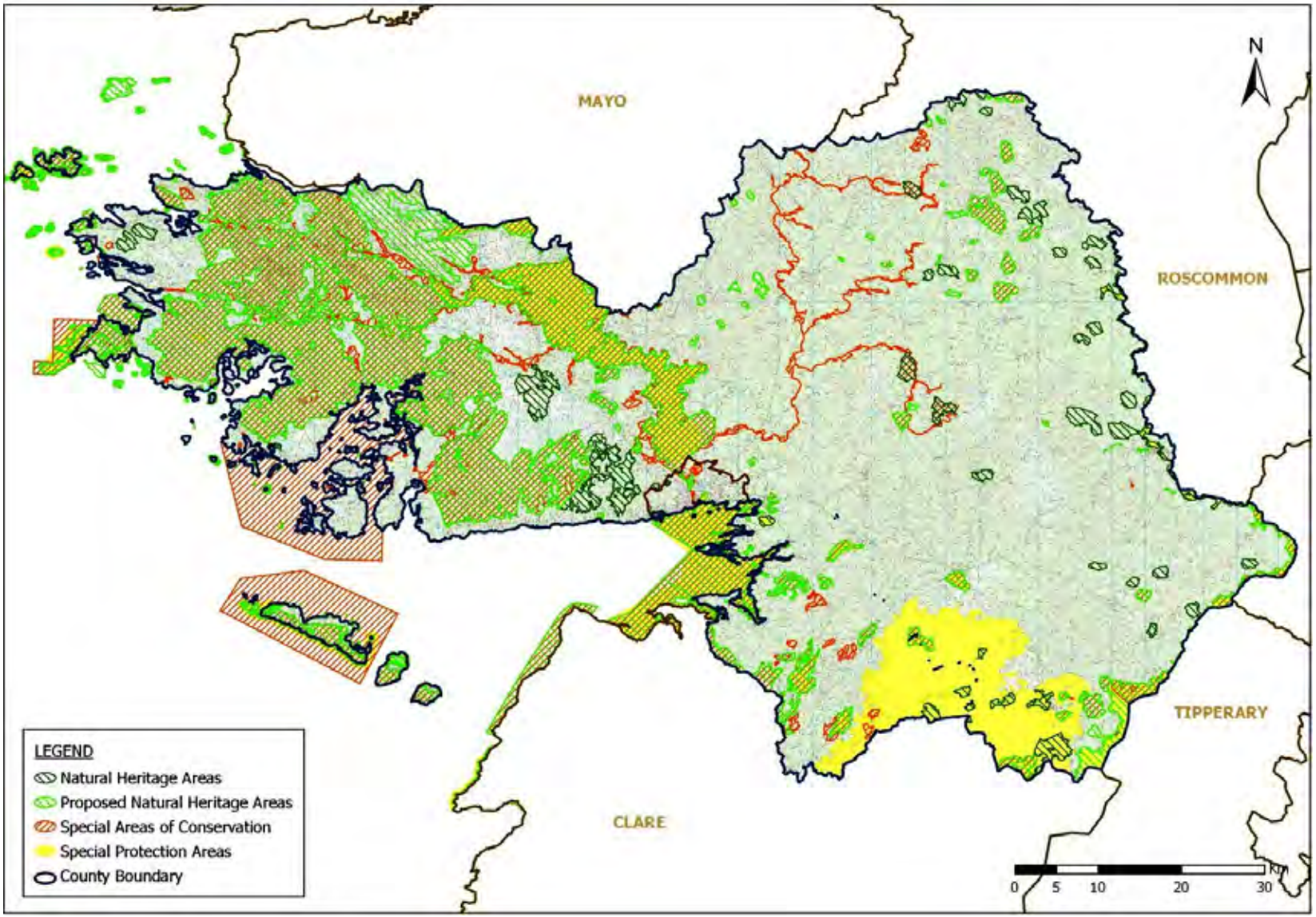

Figure 3.6 County Galway SPAs, candidate SACs and NHAs
Source: NPWS (datasets downloaded July, 2011)

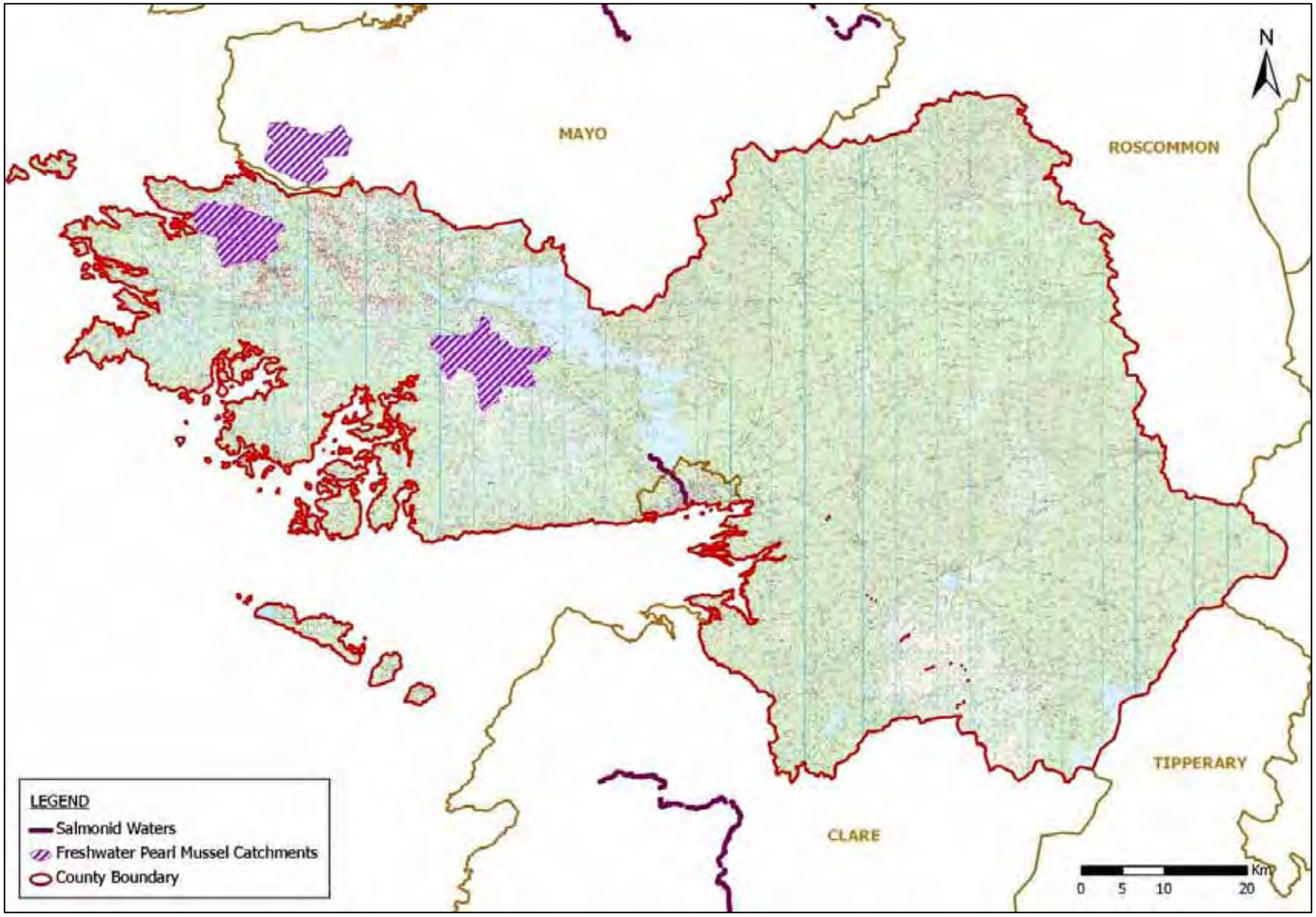

Figure 3.7 Salmonid Waters and Freshwater Pearl Mussel Catchments in County Galway and surrounding areas
Source: EPA (2009)

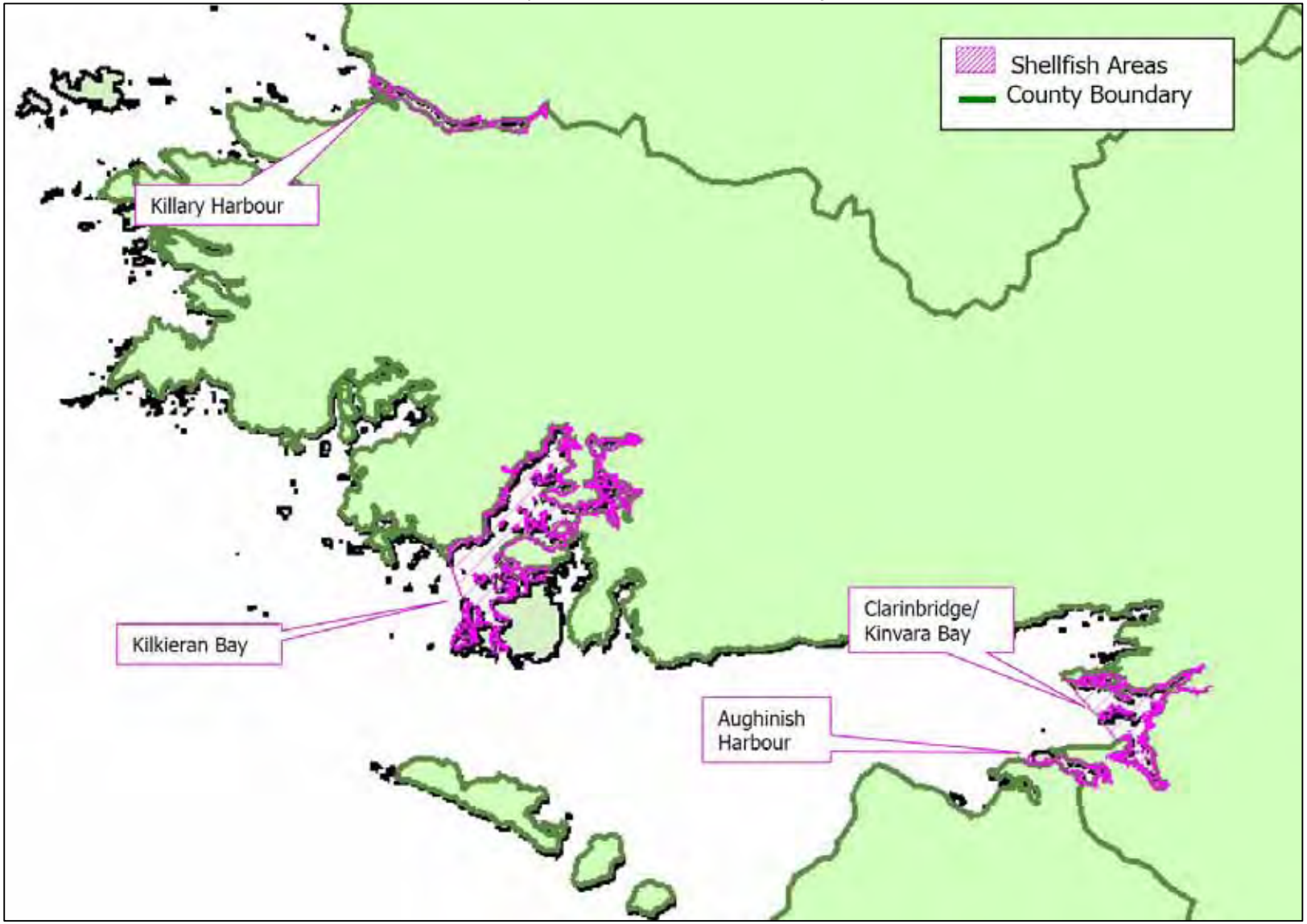

Figure 3.8 Shellfish Waters under the European Communities (Quality of Shellfish Waters) Regulations 2006
Source: EPA (2009)

3.4 Population and Human Health

3.4.1 Population[16]

The population of the County (all the areas outside of Galway City) was estimated at 159,052 during 2006. This is an increase of 11% on the 2002 Census figure of 143,245.

In the same 2002 to 2006 period Galway City experienced a 9.3% increase in population, from 209,077 persons in 2002 to 231,035 persons in 2006.

Galway County is predominantly rural with only around 15% of the population living in towns of more than 1,500 people. The largest towns located in east Galway - namely Ballinasloe, Tuam, Athenry, Gort - followed by Clifden in Connemara, west Galway.

Significant rural population growth between 1996 and 2006 - the two most recent intercensal periods - occurred within the Galway Transportation and Planning Study boundaries which include Galway City and its catchment within the County.

More rural parts of County Galway, i.e. the County area outside the Transportation and Land Use study area experienced mixed growth, with some District Electoral Divisions (DEDs) in the extreme west and uplands areas experiencing population decline.

Figure 3.9 shows the location of population across the County's DEDs in 2006. Districts surrounding and close to the City as well as districts which include large towns such as Ballinasloe, Tuam, Athenry, Gort, Clifden and Oughterard have the highest populations.

Figure 3.10 shows population density in persons/km² for the County's DEDs in 2006. The most densely populated DEDs outside of Galway City are either found surrounding the City and/or in the eastern half of the County and include those which encompass the towns and environs of Ballinasloe, Tuam, Gort and Oranmore. DEDs outside of these, including all DEDs to the west of Bearna, had significantly lower densities.

Figure 3.11 shows the percentage population change experienced by the County's DEDs during the period 2002 to 2006. The greatest percentage increases in population occurred in DEDs in the eastern half of the County and include those which encompass the towns and environs of Gort, Oranmore, Athenry, Tuam, Clarinbridge and Kinvarra. The greatest proportion of DEDs which experienced declines in population occurred in the western half of the County.

3.4.2 Human Health

With regard to human health, impacts relevant to the SEA are those which arise as a result of interactions with environmental vectors (i.e. 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).

Human health has the potential to be impacted upon by environmental vectors including water, soil and air. Hazards or nuisances to human health can arise as a result of exposure to these vectors arising from incompatible adjacent landuses, for example. These factors have been considered with regard to the description of: the baseline of each environmental component; and the identification and evaluation of the likely significant environmental effects of implementing the plan and the alternatives.

There is no spare supply at three of the Counties 18 water treatment plants and there is limited supply at 5.

The seawater bathing area of Clifden exceeded EU mandatory values different types of coliforms for the fifth year (see Section 3.6). These values are set to protect human health and exceedences of them could lead to adverse impacts upon human health.

County Galway is vulnerable to adverse effects from changes in the occurrence of severe rainfall events and associated flooding of the County's rivers combined with small changes in sea level. Much of the flooding in the County occurs during adverse weather conditions whereby heavy rainfall causes high river flows (see Section 3.6.9). Flooding is an environmental phenomenon which, as well have causing economic and social impacts, could in certain circumstances pose a risk to human health.

[16] CSO (various) *Census 2002 Volume 1 - Population Classified by Area*; *Census 2006 Volume 1 - Population Classified by Area* Cork: CSO

With regard to air quality *(3.7) traffic hotspots* within some of the County's towns are likely to have elevated levels of air pollution and noise due to traffic congestion. Traffic hotspots are located along the main road routes - especially at intersections - and provide for a harsh sensory environment which may impact upon human health.

It is noted that Galway County Council have prepared a Major Emergency Plan (2007) in order to:

- outline generally the procedures to be followed and functions to be undertaken by the County Council services in the event of a Major Emergency; and,

- co-ordinate the procedures to be followed and functions to be undertaken by the County Council with those of the HSE, Gardai and any other agencies responding to the emergency.

The Major Emergency Plan provides for a coordinated response to major emergencies arising, for example, from fires, explosions, gas releases, transportation accidents, spillages of dangerous substances, etc. The total provision for major emergency planning is the combined co-ordinated plans of Galway County Council, Galway City Council, Health Service Executive (Western Area) and Gardai in the area where the emergency occurs.

3.4.3 Existing Problems

Certain environmental vectors within the County area - such as air, water or soil - have the potential to transport and deposit contaminants or pollutants, which have the potential to cause harm and adversely impact upon the health of the County's population. Issues relevant to this potential in County Galway are expanded upon in the section above.

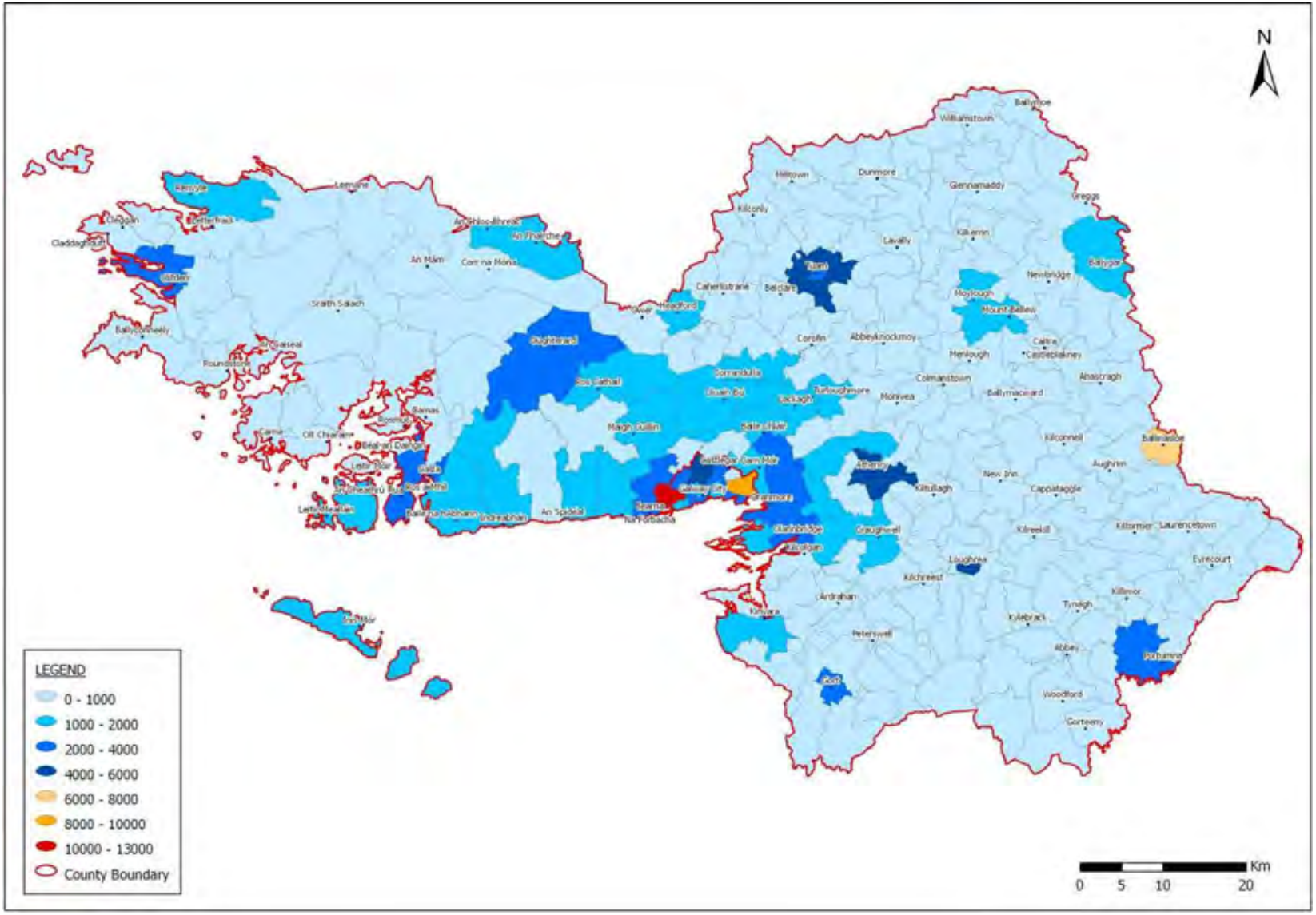

Figure 3.9 Population by District Electoral Division 2006
Source: CSO (2007)

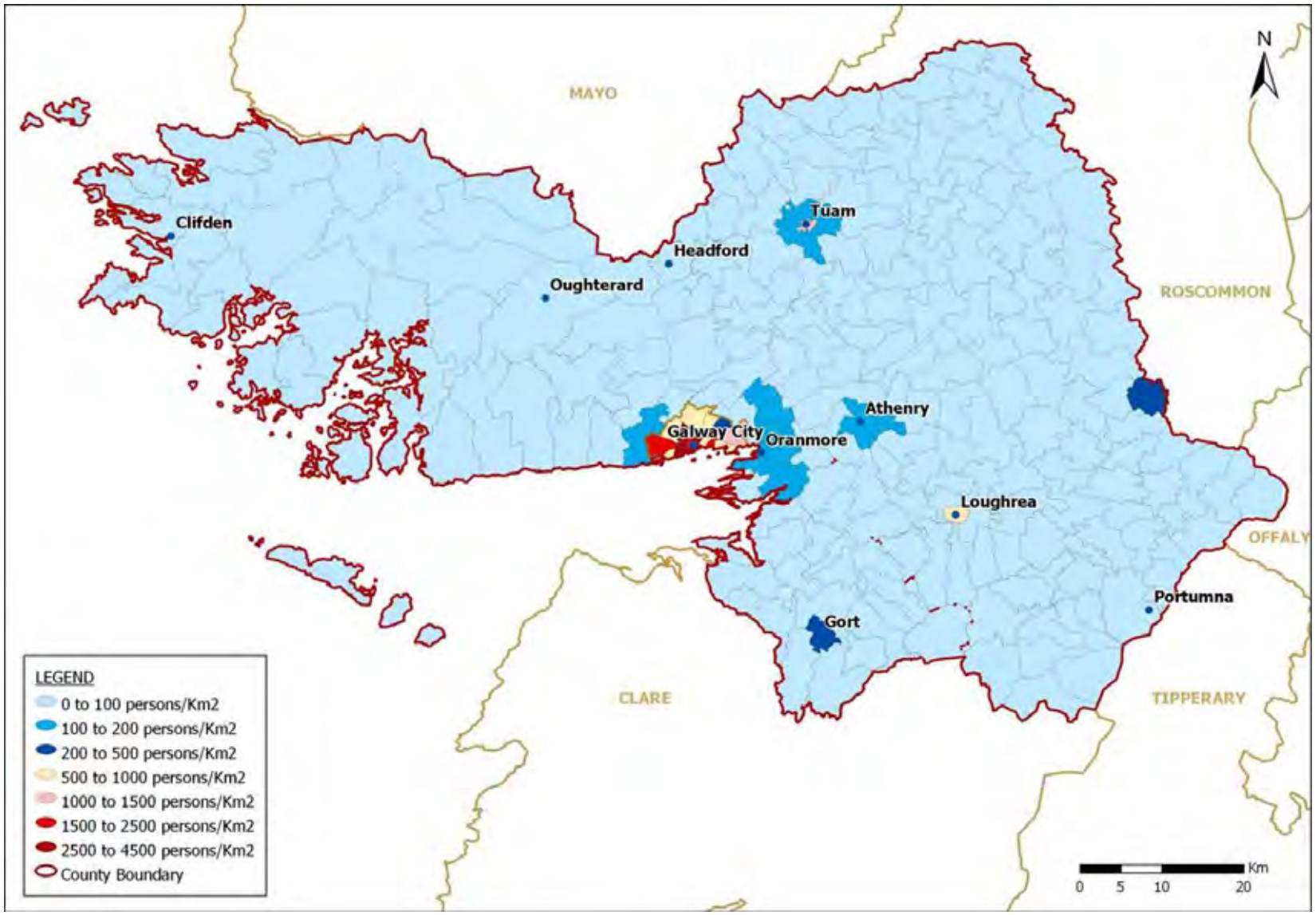

Figure 3.10 Population Density by District Electoral Division 2006
Source: CSO (2007)

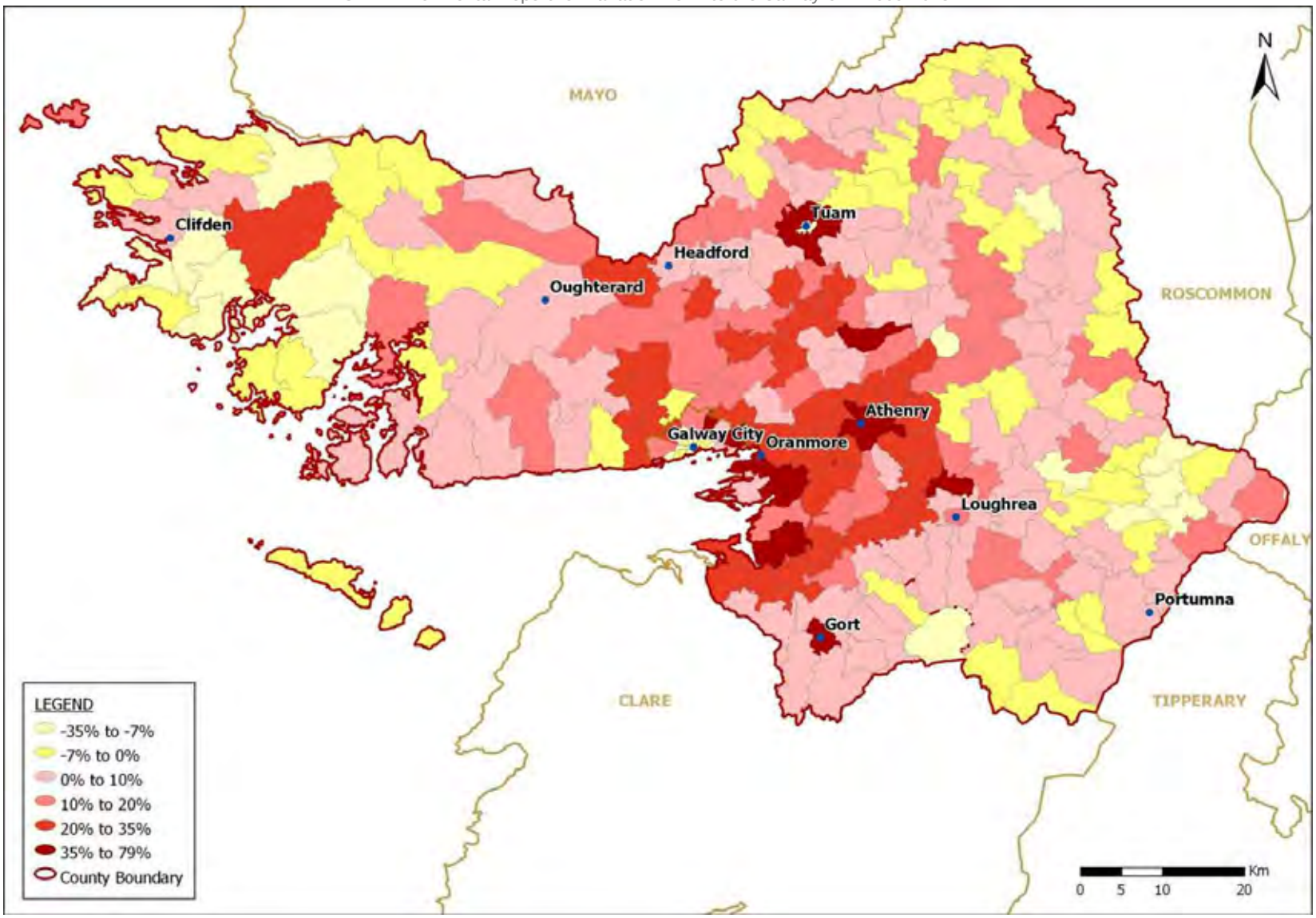

Figure 3.11 Population Change (%) by District Electoral Division 2002-2006
Source: CSO (2007)

3.5 Soil

3.5.1 Introduction

Soil is the top layer of the earth's crust. It is formed by mineral particles, organic matter, water, air and living organisms. Soil can be considered as a non-renewable natural resource because it develops over very long timescales. It is an extremely complex, 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. Soil has a role as a habitat and gene pool, serves as a platform for human activities, landscape and heritage and acts as a provider of raw materials. Such functions of soil are worthy of protection because of their socio-economic as well as environmental importance.

Soils in any area are the result of the interaction of various factors, such as parent material, climate, vegetation and human action.

To date, there is no legislation which is specific to the protection of soil resources. However, there is currently an EU Thematic Strategy on the protection of soil which includes a proposal for a Soil Framework Directive which proposes common principles for protecting soils across the EU.

3.5.2 Bedrock Geology

The underlying geology of County Galway is mapped on Figure 3.12. The basic rock formation of County Galway varies between the eastern and western half of the County.

The bedrock geology of the County to the east of Lough Corrib consists of limestone which was laid in the carboniferous period, around 280 to 345 million years ago.

To the west of Lough Corrib, the bedrock geology type generally differs either side of a line stretching from Glinsk to Oughterard. To the north of this line in areas such as the Connemara Uplands, the bedrock geology is new red sandstone while to the south of this line in coastal and more low-lying areas the bedrock geology is granite[17].

3.5.3 Quaternary Geology

Quaternary geology comprises the study of soils which have been deposited or formed during the last 2 million years. This quaternary geology - or subsoil - underlies the County's soils and is shown on Figure 3.13[18].

Glacial deposits and post glacial peat formation have provided the County with the majority of its subsoils.

After the end of the last ice age, bog began to form in the County. Initially peat formation was confined to shallow lakes and wet hollows and later, the peat spread out to cover larger areas. Most areas were not engulfed until 4,000 years ago when the climate became wetter.

To the west of Lough Corrib, blanket peat comprises subsoil with the exception of areas which are covered by water and upland and coastal areas where the bedrock geology lays exposed.

During the last ice age, which ended around 12,000 years ago, glaciers transported eroded materials to certain areas and deposited them in the form of glacial deposition.

The eastern half of the County is covered by two main subsoil types - tills and cutaway raised bogs.

Although the half of the County to the west of Lough Corrib experienced little or no glacial deposition, much the half of the County to the east of Lough Corrib has been overlain with non-stratified glacial tills which were formed in and beneath the ice which overlay the landscape.

Raised bogs formed in the east of the County in the many post-glacial lakes which covered this part of the County and spread to larger areas when the climate became wetter.

Karsified limestone bedrock forms the subsoil of the south west of the County, in areas around Lough Corrib and in areas within and surrounding Galway City. Blanket bog is found in the Slieve Aughty Mountains.

[17] (Geological Survey of Ireland, undated, as sourced in Aallen et al *Atlas of the Irish Rural Landscape*)

[18] Teagasc, GSI, Forest Service & EPA (2006) *Soils and Subsoils Class* Dublin: DEHLG

3.5.4 Soil Types

Soil types in County Galway are mapped on Figure 3.14[19].

The area of the County to the west of Lough Corrib is generally covered by blanket bog with upland areas in Connemara and areas close to the coast covered by acid mineral soils.

The area of the County to the east of Lough Corrib is generally covered with a mix of basic mineral soils and cutaway raised bog, with the latter increasing in occurrence in the north and west of the County. Grey brown podzolic basic mineral soils are deep, well drained soils which are derived from calcareous drift composed mainly of limestone with some coal shales and sandstone. These soils are relatively fertile, support grasslands and are facilitate the production of a wide range of vegetable crops.

The Slieve Aughty foothills are covered by acid mineral soils while the Slieve Aughty uplands are by blanket bog. The County's river floodplains are covered with fertile alluvium.

The majority of soils within the County's towns are *urban soils*. Urban soils are soils which have been disturbed, transported or manipulated by man's activities in the urban environment and are often overlain by a non-agricultural, man-made surface layer that has been produced by mixing, filling, or by contamination of land surfaces in urban and suburban areas.

The most extensive habitat of nature importance within County Galway is lowland blanket bog, found mainly in south Connemara. This and other areas of bog within the County are internationally important - supporting a large variety of rare flora and fauna - and large areas are protected by a number of ecological designations identified under Section 3.3.

Extensive areas of limestone pavement occur to the south of Kinvarra with a number of small, isolated patches occurring along a corridor from Kilcolgan to Tuam and near Moycullen. These areas of limestone pavement often occur in close association with species-rich calcareous grassland and sometimes support the protected species.

In addition to being a valuable ecological resource, Galway's soils provide employment within the County through areas such as agriculture, forestry, harvesting of peat and tourism.

Figure 3.15 maps "soil sealing" in County Galway. This map indicates lands that have been built upon, thus sealing off the soil. As would be expected, these areas generally coincide with the urbanised areas of the County.

3.5.5 Sites of Geological Interest

At the end of the last ice glacial deposition features named eskers began to form when silt, sand and gravel were deposited by rivers of glacial melt water under the ice of glaciers. They are long sinuous rounded hills. A number of eskers are found to the east of Tuam and Claregalway and between Oranmore and Ballinasloe.

As well as being geomorphological features, eskers are important for the characteristic woodland and grassland habitats they support, including species-rich grasslands with abundant orchids.

3.5.6 Structural Issues in Karst Areas

As outlined above a certain areas within the County are underlain by karsified limestone bedrock.

In a number of places this geological formation has been the subject of slow chemical processes that have led to the decomposition of rock and the formation of 'solution features' such as cracks, fissures and occasional cavities or caves.

These features can adversely interact - sometimes severely - with new developments in two principal ways. Firstly the introduction of new loads on the surface - due to new developments - can cause the underlying rock to become overloaded and settle - with resultant structural degradation overhead. The works that are incidental to development - such as the diversion, concentration of removal of surface or groundwaters - can also lead to structural failure - sometimes over an extensive area. There may also be a possibility for this potential effect to be more severe due to changes in the intensity of rainfall events resulting from climate change.

[19] Teagasc, GSI, Forest Service & EPA (2006) *Soils and Subsoils Class* Dublin: DEHLG

3.5.7 Existing Problems relating to Soil

Greenfield development involves the building upon and thereby sealing off of non-renewable subsoil as well as topsoil. Such sealing can prevent soils from performing certain functions such as drainage. Soil sealing is mapped on Figure 3.15.

Development that takes place without sufficient surveying and assessment of the potential for the presence of karsified limestone under or adjacent to the site has the potential to give rise to problems both for the structures and for the receiving environment - particularly if storage or piping infrastructure is caused to leak by a geological collapse.

Ireland, and in particular, Galway, contains some of the best examples of intact blanket bog in Europe. Loss of quality rare bog habitats has resulted in the decline in numbers of vulnerable birds which live and breed on the bogs.

Soil can be polluted and contaminated by development which is not serviced by appropriate waste water infrastructure and by agricultural activities.

Soil erosion due mainly to surface erosion resulting from construction works and agricultural / forestry operations has major potential to impact on water quality and fishery resources.

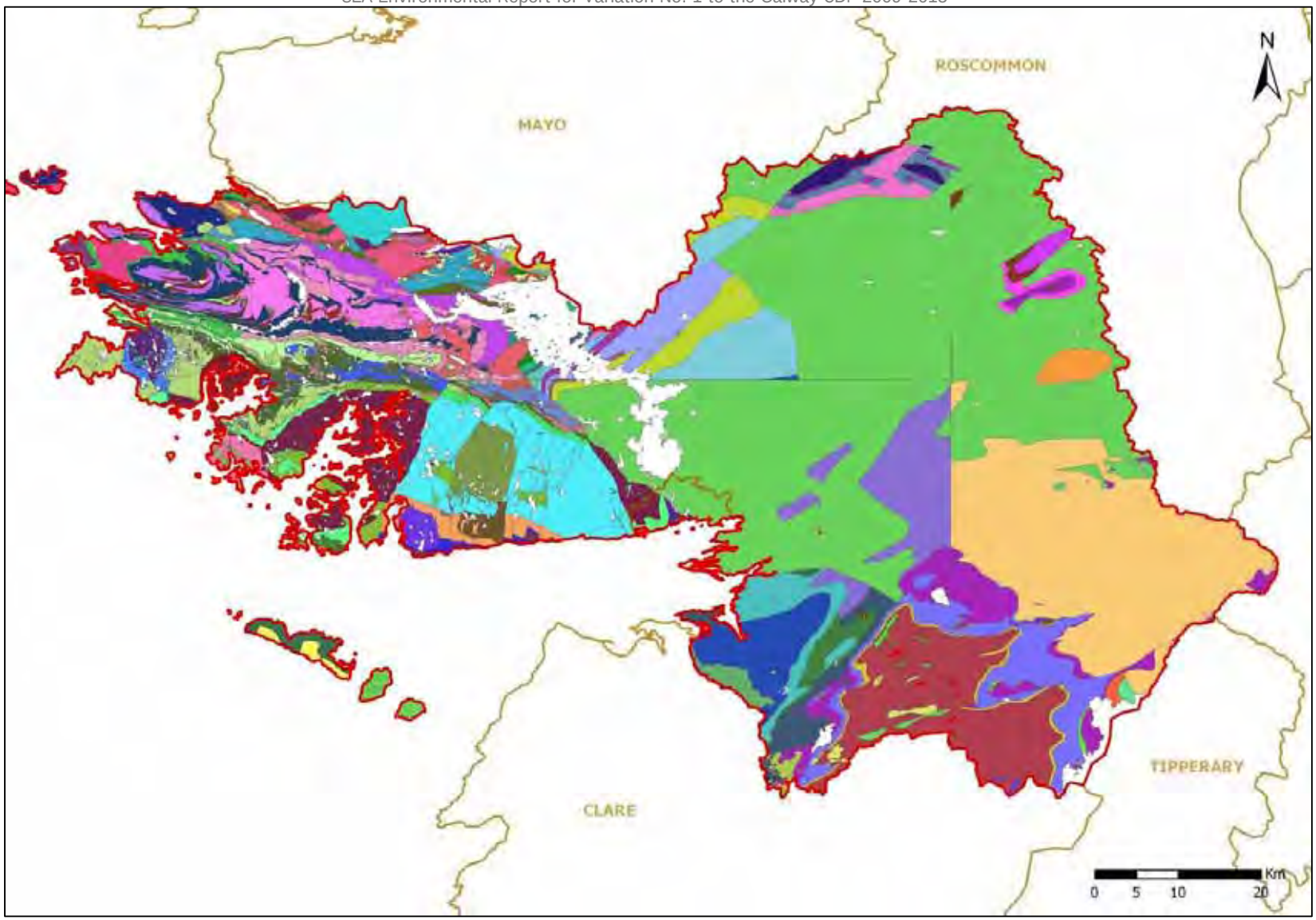

Figure 3.12 Geology
Source: GSI (2005)

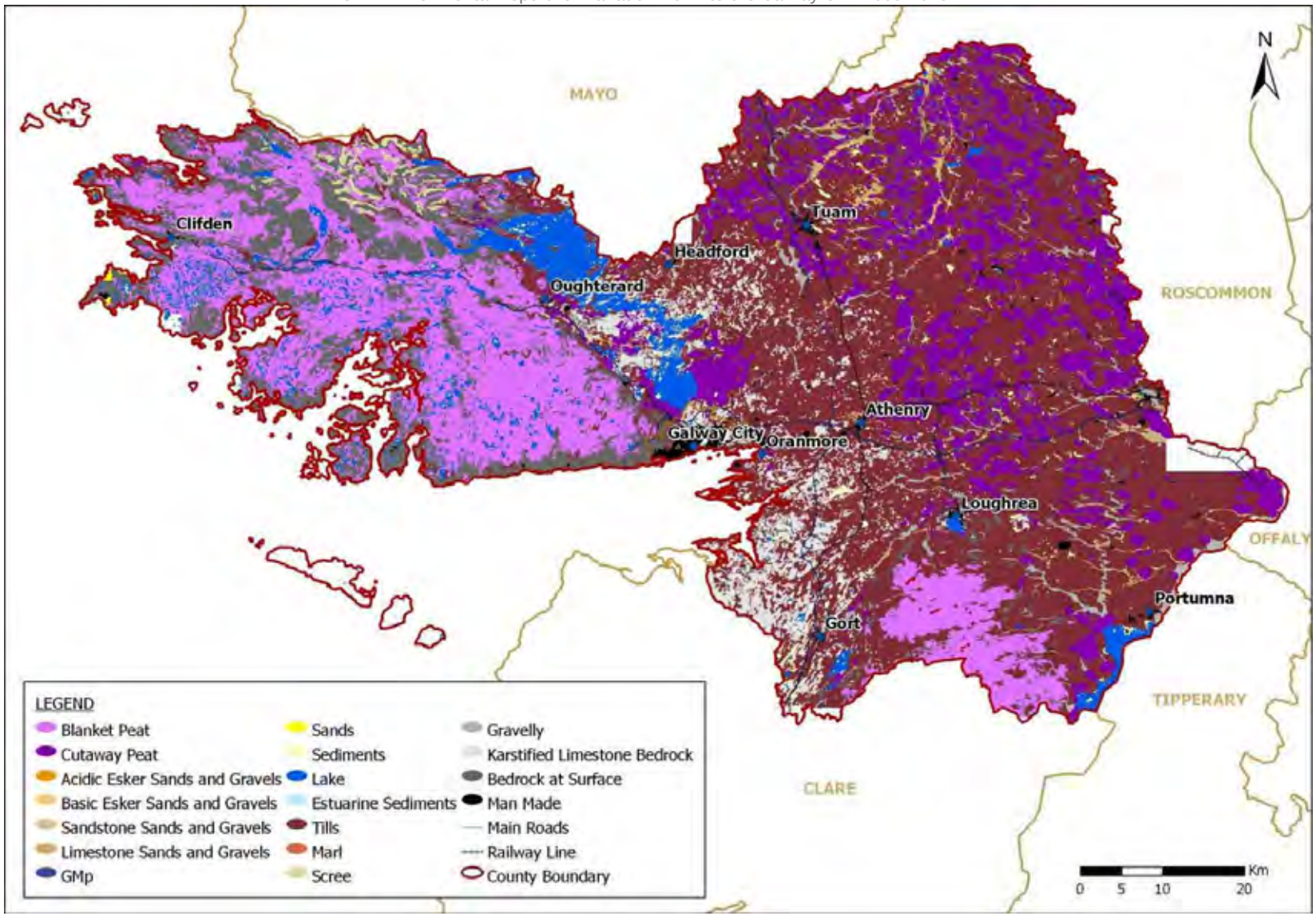

Figure 3.13 Suboils
Source: Teagasc in co-operation with the Forest Service, EPA and GSI (2006)

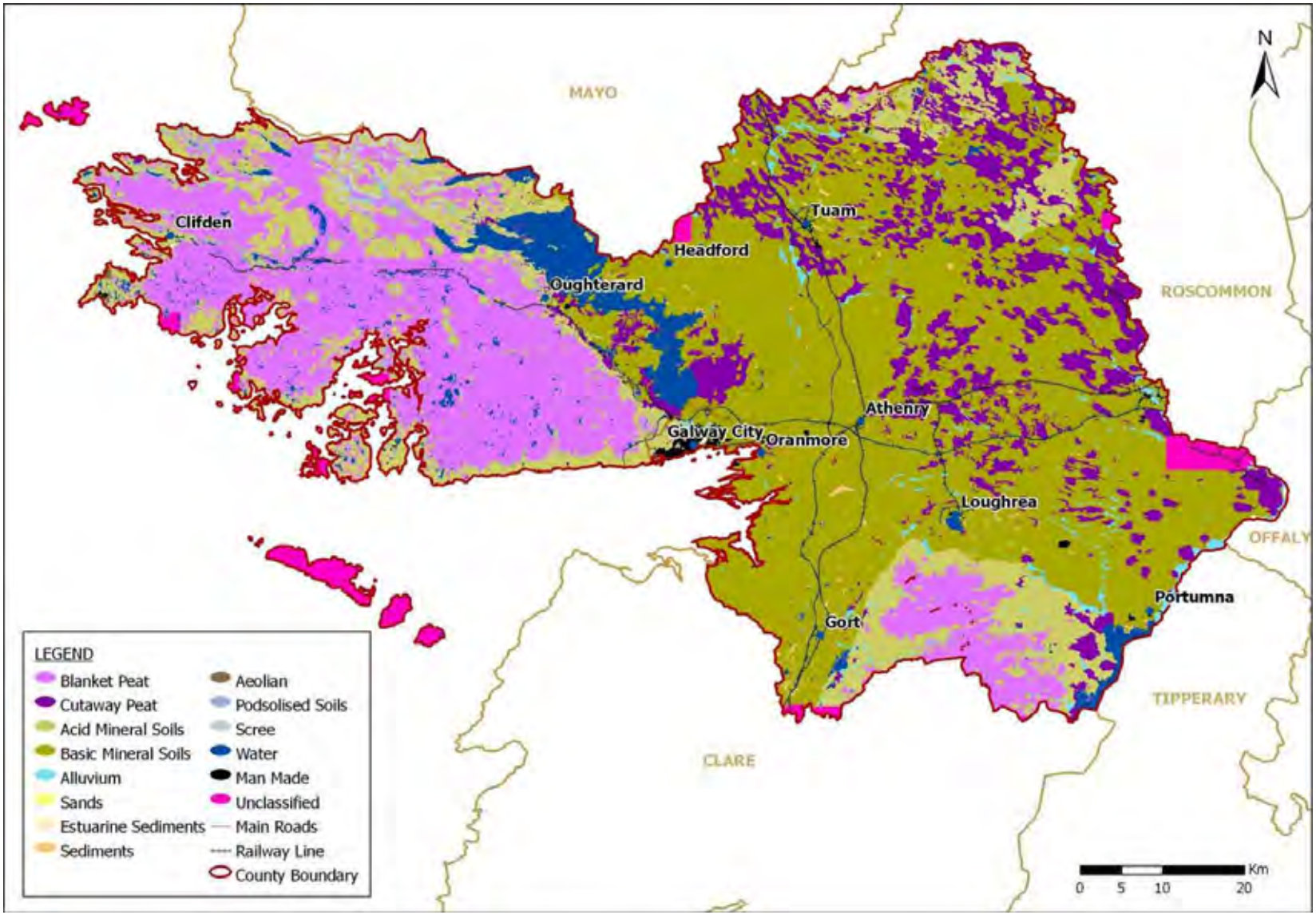

Figure 3.14 Soils
Source: Teagasc in co-operation with the Forest Service, EPA and GSI (2006)

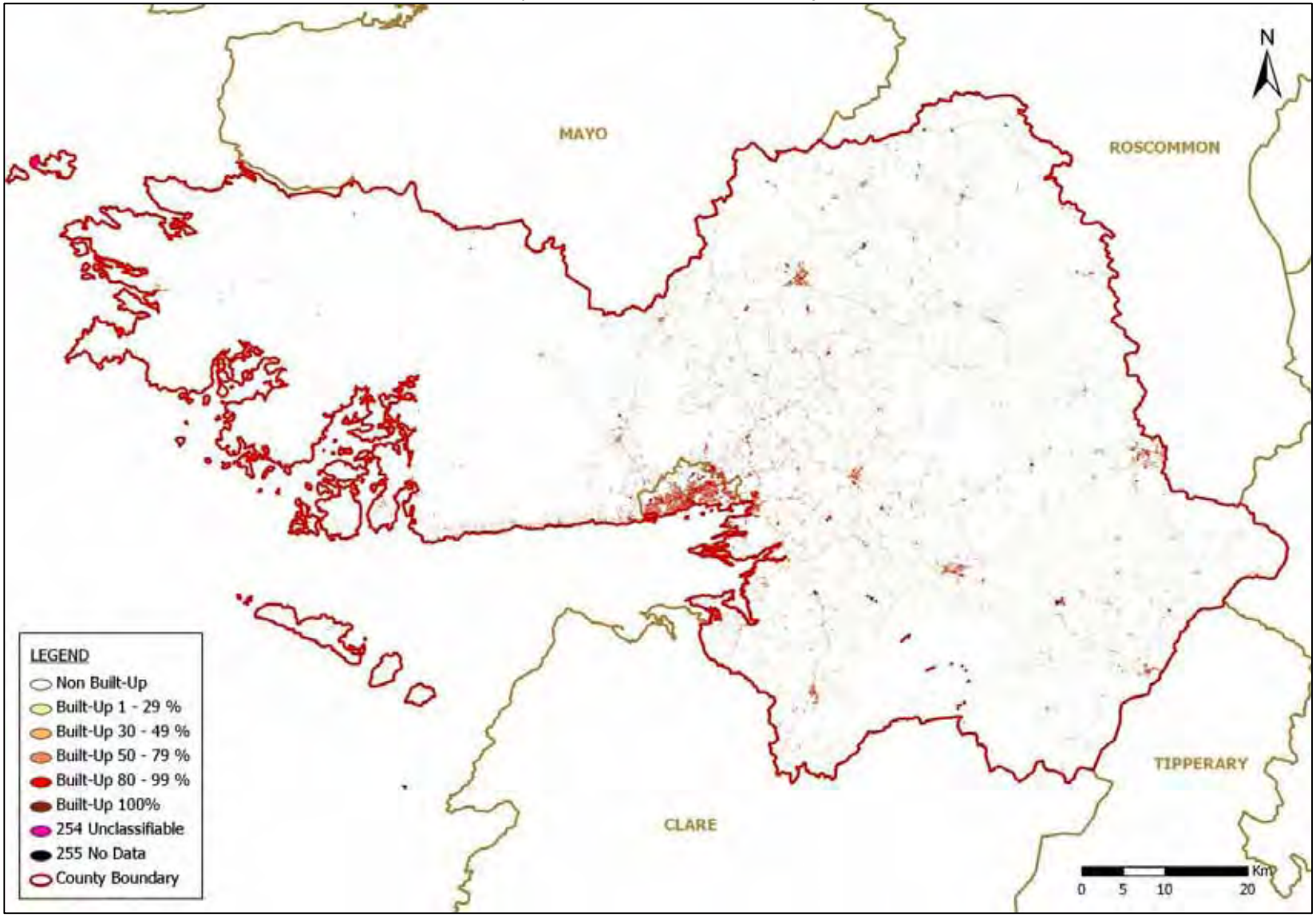

Figure 3.15 Soil Sealing
Source: EPA (2009)

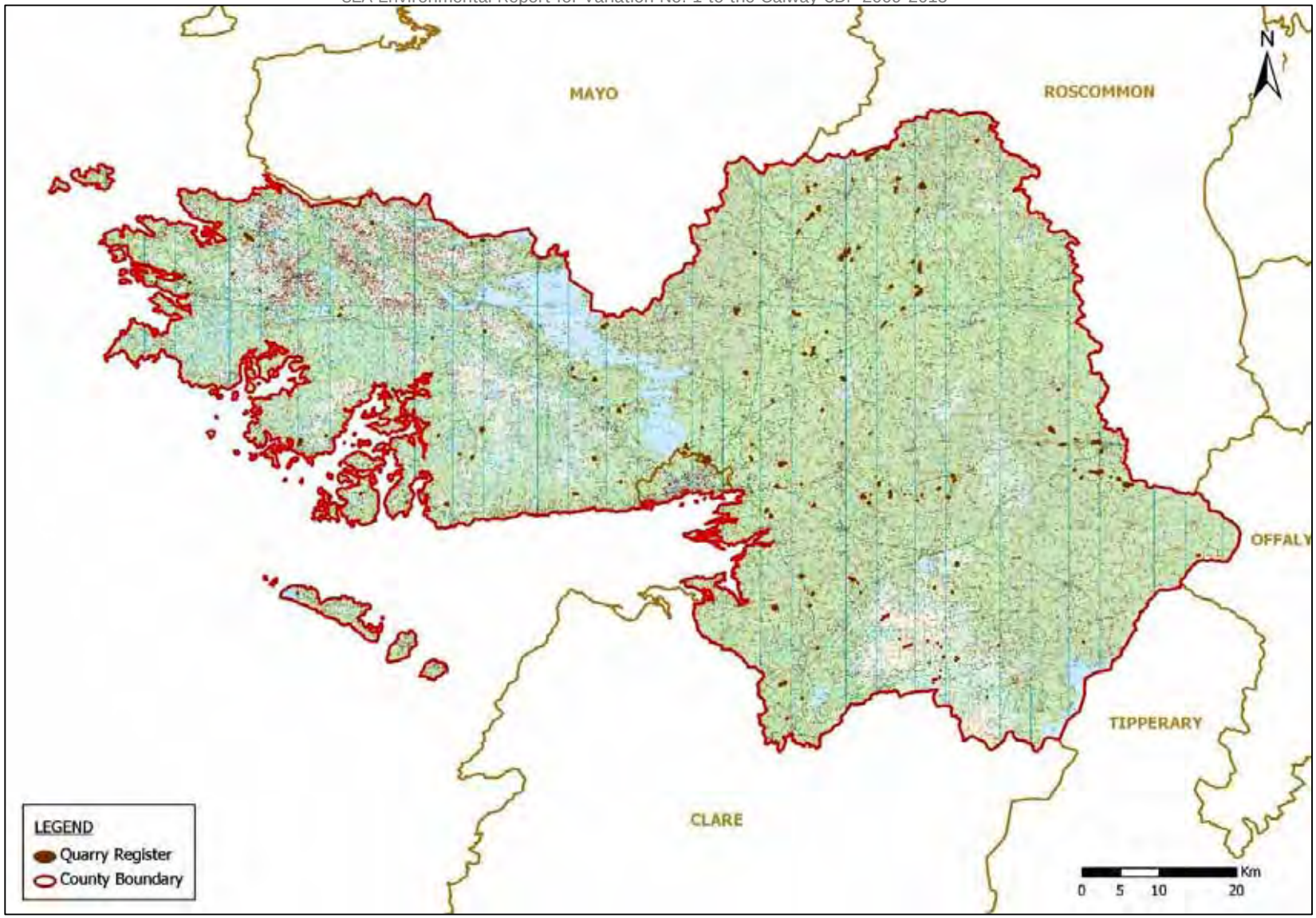

Figure 3.16 Quarry Locations
Source: GSI (2001)

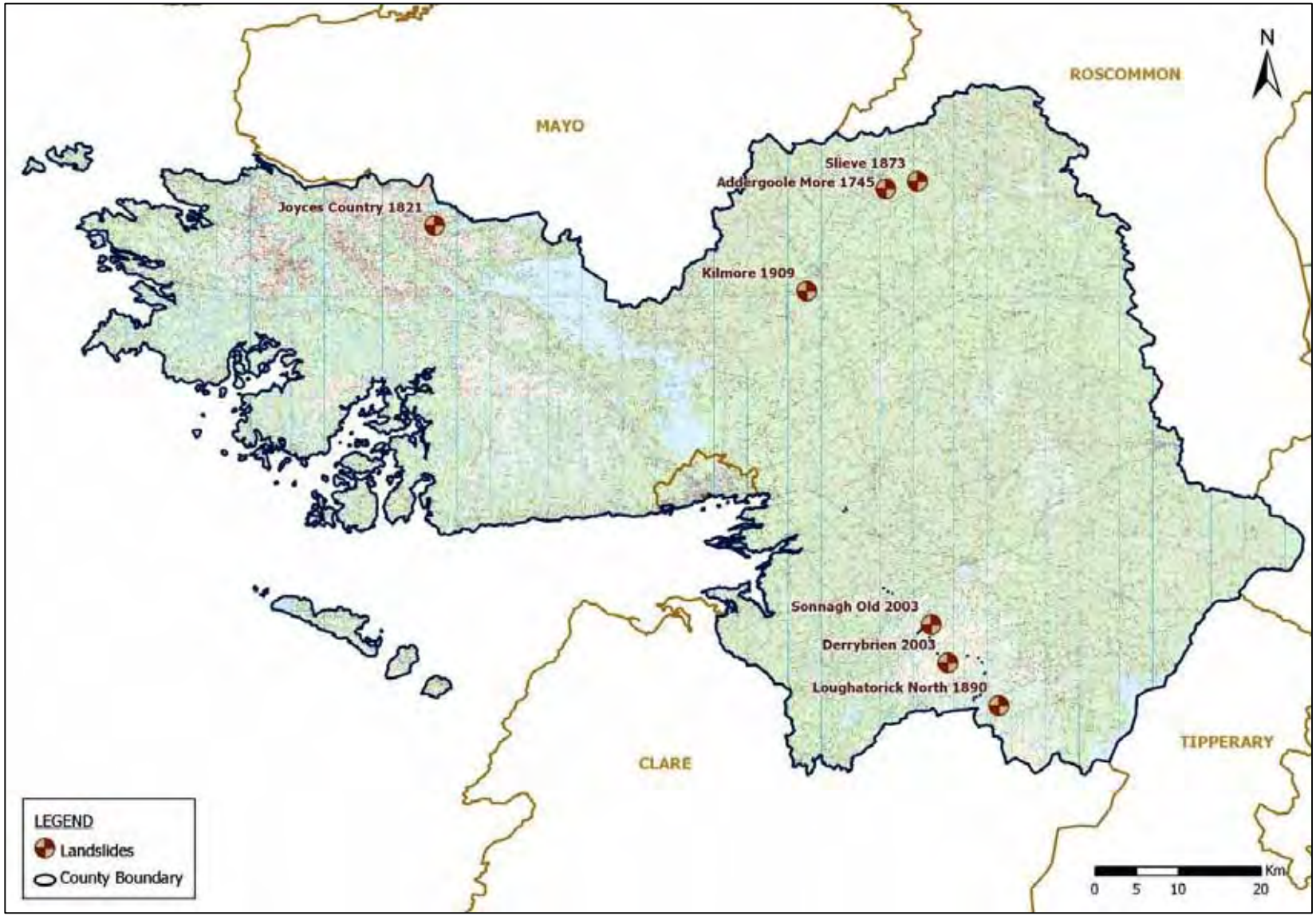

Figure 3.17 Landslides within the County
Source: GSI (2009)

3.6 Water

3.6.1 Introduction

Water within and surrounding County Galway has many functions: it provides drinking water to the County's population; it sustains the biodiversity and flora and fauna described under Section 3.3; and, it is an integral part of the County's land and seascapes.

3.6.2 Potential Pressures on Water Quality

Human activities, if not properly managed, can cause deterioration in water quality. Pressures exerted by human activities include the following:

- sewage and other effluents discharged to waters from point sources, e.g. pipes from treatment plants;
- discharges arising from diffuse or dispersed activities on land;
- abstractions from waters; and
- structural alterations to water bodies.

A *point source* pressure has a recognisable and specific location at which pollution may originate. Examples of significant point source pressures include direct discharges from waste water treatment plants, licensed discharges from industrial activities, landfills, contaminated lands (e.g. disused gas works) and mines.

A *diffuse source* pressure unlike a point source is not restricted to an individual point or location. The source of a diffuse pressure can be quite extensive. Significant examples of diffuse pressures include runoff from forestry and agricultural lands.

Excessive *abstractions* from surface waters and groundwater for drinking and industrial purposes can create pressures on the ability of a water body to maintain both chemical and ecological status.

Structural alterations such as river straightening; construction of embankments, weirs, dams, port facilities and dredging can create conditions such that a water body is no longer able to support the natural ecology which would have existed prior to such modifications. These pressures are also referred to as morphological pressures.

3.6.3 The Water Framework Directive

3.6.3.1 Introduction and Requirements

Since 2000, Water Management in the EU has been directed by the Water Framework Directive 2000/60/EC (WFD). The WFD requires that all member states implement the necessary measures to prevent deterioration of the status of all waters - surface, ground, estuarine and coastal - and protect, enhance and restore all waters with the aim of achieving good status by 2015. All public bodies, including Galway County Council, are also required to: coordinate their policies and operations so as to maintain the good status of water bodies which are currently unpolluted; and improve polluted water bodies to good status by 2015.

3.6.3.2 River Basin Districts and Water Bodies

For the purpose of implementing the WFD, Ireland has been divided into eight river basin districts (RBDs) or areas of land that are drained by a large river or number of rivers and the adjacent estuarine / coastal areas. The management of water resources will be based upon these river basin districts.

The west and centre of County Galway is located within the Western RBD while the east of the County is located within the Shannon RBD.

Within each river basin district water has been divided into groundwater, rivers, lakes, estuarine waters and coastal waters which are in turn divided into specific, clearly defined *water bodies*. This is for the purpose of assessment, reporting and management.

3.6.3.3 River Basin Management Plans

Local Authorities located in the Western and Shannon RBDs, including Galway County Council, have prepared River Basin Management Plans which are implemented in order to help protect and improve waters in the RBDs. The Management Plans provide specific policies for individual river basins in order to implement the requirements of the WFD.

3.6.4 Rivers and Lakes

3.6.4.1 River Water Quality

The WFD defines "surface water status" as the general expression of the status of a body of surface water, determined by the poorer of its ecological status and its chemical status. Thus, to achieve "good surface water status" both the ecological status and the chemical status of a surface water body need to be at least "good".

Ecological status is an expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as of "good ecological status" when they meet Directive requirements.

Good surface water chemical status means that concentrations of pollutants in the water body do not exceed the environmental limit values specified in the Directive.

Figure 3.18 maps the WFD Surface Water Status for the County. The map illustrates that surface water status in the west of the County is mainly of "high" and "good" status with areas of "moderate" and "poor" status interspersed. WFD status in the east of the County is mostly "moderate" or "poor" in its status. Large areas of "good" status occur followed by smaller areas of "high" and "bad" status.

Water quality within the County is monitored by the EPA at a number of locations along rivers as mapped on Figure 3.19. The most recent water quality data[20] identifies varying Q-values in the County from Bad Status (Q1) to High Status (Q5)[21]. The majority of rivers sampled are Q4 followed by Q3. Only two points have been identified as Q2/Q1-2/Q1.

3.6.4.2 Lake Water Quality

The EPA classifies lakes according to their trophic status[22]. All lakes in the County monitored by the EPA are identified as being of oligotrophic status.

Oligotrophic lakes have low algal growth, high dissolved oxygen, very low levels of pollution and generally no impairment of use, supporting diverse biological communities.

Good status as defined by the Water Framework Directive equates to mesotrophic in the trophic classification of lakes, as set out by the EPA. Therefore the data suggests that the water quality of all lakes in the County is in line with that which is required by the WFD. WFD status for lakes is mapped on Figure 3.20.

3.6.5 Transitional, Estuarine and Coastal Waters

3.6.5.1 Introduction

Transitional waters are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows. Coastal waters are important for tourism, for use as bathing locations and for supporting marine wildlife.

3.6.5.2 EPA Monitoring

The Assessment of Trophic Status of Estuaries and Bays in Ireland (ATSEBI) System is used by the EPA in order to classify the quality status of transitional waters. Categories of criteria for nutrient enrichment, accelerated growth, and undesirable disturbance are used by the ATSEBI in order to classify the estuarine and coastal waters. There are four classifications:

[20] EPA (various) *Water Quality in Ireland* Wexford: EPA

[21] 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 EPA. Waters of Moderate Status (Q3-4) support reduced or much reduced biological community diversity, have water quality which is fair or doubtful, and, may be of a satisfactory or unsatisfactory condition, referring to the likelihood of interference with beneficial or potential beneficial uses. Waters of Poor Status (Q2-3 or Q3) support much reduced or low biological community diversity, have water quality which is doubtful or poor, and, are of unsatisfactory condition.

[22] Nutrient enrichment, resulting in eutrophication, is the principal pressure on lake quality in Ireland. Nutrient inputs result in plant growth in lakes whose presence is quantified by a measure of the algal pigment chlorophyll. Lake trophic status, or the extent to which a lake is nutrient enriched, is determined by a consideration of the annual maximum chlorophyll values. Trophic Status ranges from Oligotrophic/Mesotrophic to Moderately Eutrophic to Highly/Strongly Eutrophic to Hypertrophic.

- Eutrophic waterbodies are those in which each of the criteria are breached, i.e. where elevated nutrient concentrations, accelerated growth of plants and undesirable water quality disturbance occur simultaneously.

- Potentially Eutrophic waterbodies are those in which two of the criteria are breached and a third falls within 15 per cent of the relevant threshold value/values.

- Intermediate waterbodies are those which do not fall into the Eutrophic or Potentially Eutrophic classes but in which breaches one or two of the criteria occur;

- Unpolluted waterbodies are those which do not breach any of the criteria

It is noted that good status as defined by the Water Framework Directive can be attained by estuarine and coastal waters through the achievement of "unpolluted" status. WFD status of coastal and transitional waters is mapped on Figure 3.21.

All seven bays, harbours and estuaries which have been classified under the ATSEBI system in Galway are "unpolluted." Coastal water quality is mapped on Figure 3.21.

3.6.6 Bathing Waters

3.6.6.1 Bathing Water Directive

EU Mandatory and Guide levels are set out for bathing waters in the Bathing Water Directive (Directive 76/160/EEC concerning the Quality of Bathing water) as implemented in Ireland by the Quality of Bathing Water Regulations, 1992, (SI No. 155 of 1992). The purpose of the Bathing Water Regulations is the protection of human health, local authorities.

Mandatory Values are values which must be observed if the bathing area is to be deemed compliant with the Directive. Compliance with guide values exceeds guidance with mandatory values and can be regarded as quality objectives which bathing sites should endeavour to achieve.

A new Bathing Water Directive (2006/7/EC) - which entered into force in March 2008 - revises the 1976 Directive with the purpose of: preserving, protecting and improving the quality of the environment and protecting human health by complementing the Water Framework Directive (2000/60/EC). The 2006 Bathing Water Directive is implemented by the Bathing Water Quality Regulations 2008 (SI No. 79) of 2008.

3.6.6.2 Compliance with EU Values

The EPA monitors nine seawater bathing locations around the coast of Galway County Council's administrative area (An Cnoc in Inverin, Beach at Spiddal Pier, Cill Muirbhthe in Inis Mór, Clifden, Gortin in Cloch Na Rón, Na Forbacha, Main Beach in Spiddal, Trá An Dóilín in Ceathrú Rua, Trá Chaladh bhFuinnse and Traught in Kinvara), two seawater bathing locations along the coast of Galway City Council's administrative area (Salthill and Silver Strand) and two freshwater bathing locations inland in the County (Bathing Place Lake at Loughrea and Bathing Place at Portumna).

The most recently published figures (EPA, 2011[23]) show that the seawater bathing area of Clifden exceeded EU Mandatory and Guide Values for the fifth year running. Clifden exceeded these values due to levels of faecal coliforms. The EPA identified the existing wastewater treatment plant in Clifden as the most significant source of contamination of bathing waters as it does not currently have secondary treatment. Bathing water quality is mapped on Figure 3.22.

3.6.7 Groundwater

3.6.7.1 Introduction

Groundwater is stored in the void spaces in underground layers of rock, or aquifers. These aquifers are permeable, allowing both the infiltration of water from the soils above them and the yielding of water to surface and coastal waters. Groundwater is the part of the subsurface water that is in the saturated zone - the zone below the water table, the uppermost level of saturation in an aquifer at which the pressure is atmospheric, in which all pores and fissures are full of water. Groundwater bodies within County Galway follow the pattern of the underlying geology, the empty spaces of which they are contained in. Ground water is important for drinking water supply together as well as the source of some surface waters across County Galway.

3.6.7.2 WFD Status

For groundwater bodies, the approach to classification is different from that for surface

[23] EPA (2011) *Water Quality in Ireland 2007-2009*, Wexford: Environmental Protection Agency

water. For each body of groundwater, both the chemical status and the quantitative must be determined. Both have to be classed as either "good" or "poor". The WFD sets out a series of criteria that must be met for a body to be classed as good chemical and quantitative status. The WFD status of Galway's groundwater is mapped on Figure 3.23.

3.6.7.3 Aquifer Vulnerability

The Geological Survey of Ireland (GSI) rates aquifers according to their vulnerability to pollution. Figure 3.24 shows this rating.

The most productive, regionally important aquifers in the County - labelled Major Aquifers - underlie the majority of the area to the east of Lough Corrib as well as areas surrounding Lough Corrib and the Aran Islands. These aquifers are those which are most vulnerable to pollution in the County - most of them are either of high or medium vulnerability - and are those over which most existing development occurs and most new development is likely to occur. Aquifer vulnerability refers to the ease with which pollutants of various kinds can enter underground water.

The less productive aquifers - labelled Poor aquifers - underlie the western half of the County and the south eastern, more upland area of the County. These aquifers have the potential to be productive in local zones. These aquifers are generally of low vulnerability although a number in the east are of medium vulnerability.

3.6.7.4 Aquifer Productivity

The GSI rates aquifers based on the hydrogeological characteristics and on the value of the groundwater resource. Ireland's entire land surface is divided into nine aquifer categories, four of which are recorded in the County.

Galway is underlain by the most productive all of the aquifers, *Regionally Important Karstified Aquifers*

Locally Important Sand/Gravel Aquifers occur in small areas throughout the County. These types of aquifers are capable of yielding enough water for boreholes or springs to supply domestic, commercial and industrial uses, depending on the nature and scale of the development.

Poor Bedrock Aquifers - which are generally unproductive - are found in the south east of the County and in the west.

Figure 3.25 shows aquifer vulnerability data for the area.

3.6.8 Register of Protected Areas

The WFD requires that Registers of Protected Areas (RPAs) are compiled for a number water bodies or part of water bodies which must have extra controls on their quality by virtue of how their waters are used by people and by wildlife.

The WFD requires that these RPAs contain: areas from which waters are taken for public or private water supply schemes; designated shellfish production areas; bathing waters; areas which are affected by high levels of substances most commonly found in fertilizers, animal and human wastes - these areas are considered nutrient sensitive; areas designated for the protection of habitats or species e.g. salmonid areas; Special Areas of Conservation (SACs); and, Special Protection Areas (SPAs).

A number of water bodies within and surrounding the County Galway area have been listed on the WFD Register of Protected Areas (RPAs) - these are as follows (Figure 3.26):

- There River Corrib is listed on the RPA for *Habitats Rivers*;
- The Shellfish Waters identified under Section 3.3 *Biodiversity and Flora and Fauna* are listed on the RPA for *Shellfish Areas*;
- The SPAs identified under Section 3.3 *Biodiversity and Flora and Fauna* are listed on the RPA for *Species SPA*;
- Thirteen of County's beaches are listed on the RPA for *Beaches*;
- A number of stretches the County's rivers, Lough Corrib and Lough Derg and the County's groundwater are listed on the RPAs for *Drinking Water*; and
- Lough Derg is listed on the RPA for *Nutrient Sensitive Lakes* and *Recreational Lakes* along with Lough Rea.

3.6.9 Flooding

3.6.9.1 Introduction

Flooding is an environmental phenomenon which, as well have causing economic and social impacts, could in certain circumstances pose a risk to human health. County Galway is vulnerable to adverse effects which are exacerbated by changes in the occurrence of severe rainfall events and associated flooding of the County's rivers. Local conditions such as low-lying lands and inadequate

surface water drainage increase the risk of flooding. The risk of flooding has also been increased in the past by human actions including the clearing of vegetation to make way for agriculture, draining of bog and wetland areas and the development of settlements in the flood plains of rivers. Infrastructural development, culverting, forestry operations and all urban development in the floodplain present ongoing flooding hazards. Increased surface water runoff due to construction of new hard surfaced areas is now generally not as significant a problem as it was in the past in terms of its impact on peak flows because of the implementation of Sustainable Urban Drainage Systems (SUDS).

Seasonal flooding can be caused by turloughs, seasonal lakes that are a feature of the limestone lowlands of the County. The turloughs drain slowly via underground routes. This tends to cause a backing-up of water over the winter months, causing turloughs to expand. Extensive areas can become inundated if the accumulation of rainfall is greater than average over the autumn and winter months as was the case in the winter of 1994–1995 when severe flooding occurred in the Gort–Ardrahan area in the south of the County.

3.6.9.2 EU Floods Directive

European Directive 2007/60/EC on the assessment and management of flood risks requires Member States to carry out a preliminary assessment by 2011 in order to identify the river basins and associated coastal areas at risk of flooding. For such zones, flood risk maps are required to be drawn up by 2013. Flood risk management plans focused on prevention, protection and preparedness must be established by 2015. The OPW is currently involved in a research project to develop maps with national coverage indicating areas that might be prone to flooding from rivers and streams. Further work is underway to refine the method and outputs.

3.6.9.3 DEHLG Flood Risk Management Guidelines

In November 2009 the DEHLG published *The Planning System and Flood Risk Management* Guidelines for Planning Authorities. These are aimed at ensuring a more consistent, rigorous and systematic approach which will fully incorporate flood risk assessment and management into the planning system. Planning authorities are required to undertake flood risk identification, assessment and management processes as appropriate when preparing or varying development plans and local area plans and in consideration of applications for planning permission.

3.6.9.4 OPW's National Flood Hazard Mapping

Figure 3.27 maps the locations of the most significant flooding events in the Plan area - accessible from the OPW's National Flood Hazard Mapping website.

Flood events are recorded at various locations along the County's rivers. Flood extents are identified in the south of the County.

Figure 3.28 identifies rivers and streams which are part of the Office of Public Work's Flood Channels Scheme. These are among the water bodies within the County which are most at risk from flooding and include those which drain the north of the County east of Lough Corrib into the Lough and those which drain the south east of the County - the catchments of the Cappagh, Kilcrow, Killadullisk and Killoran Rivers - into Lough Derg.

3.6.9.5 Future Influences of Flood Risk

Large scale changes in the County over the next 50 to 100 years which could significantly influence flood risk and increase the magnitude and occurrence of flooding may include:

- Climate changes resulting in increased river flows and rising sea levels (see Section 3.7);
- Large scale land use changes such as increased afforestation and associated clear-cutting, changes in agricultural land use and drainage of upland wetlands;
- Urban development increasing the speed and volume of run-off; and
- Changes to geomorphological processes such as sediment transport, siltation and erosion.

3.6.10 Existing Problems

The above descriptions identify a number of sensitivities with regard to the status of water bodies within and in the vicinity of County Galway.

By virtue of how they are used by people and wildlife a number of water bodies are listed on various Registers of Protected Areas.

The compliance of all water bodies within the County with the objectives of the Water Framework Directive will contribute to the protection of drinking water resources and consequently human health. Failure to comply could result in adverse impacts upon drinking water resources and consequently human health.

A number of Moderate and Poor Status monitoring values for river water quality and ground water are found.

The seawater bathing area of Clifden has exceeded EU mandatory values different types of coliforms for the fifth year in a row. The EPA identified that the existing wastewater treatment plant in Clifden is the most significant source of contamination of bathing waters. The waste water treatment plant is being addressed by the EPA through the wastewater discharge licensing regime and will ensure that secondary treatment will be put in place at this plant.

The most productive aquifers in the County are those which are most vulnerable to pollution and are those over which most existing development occurs and most new development is likely to occur.

Flooding is a long-established environmental phenomenon in County Galway that gives rise to significant economic and social effects. The magnitude and occurrence of these effects have been increased by development within the County's flood plains and may be increased in the future should changes in climate occur and should new development be located in flood plains.

Structural alterations of surface water bodies within the County Galway area including river straightening and the construction of the City port - in the City Council area - have impacted upon ability of the certain water bodies to support the natural ecology which would have existed prior to these modifications.

The Athenry WWTP was identified in an EPA Water Quality Report[24] as causing severe pollution to a local river. However, this is currently being addressed by the EPA through the wastewater discharge licensing regime.

[24] EPA: 2011 *Water Quality in Ireland 2007-2009*, Wexford: EPA.

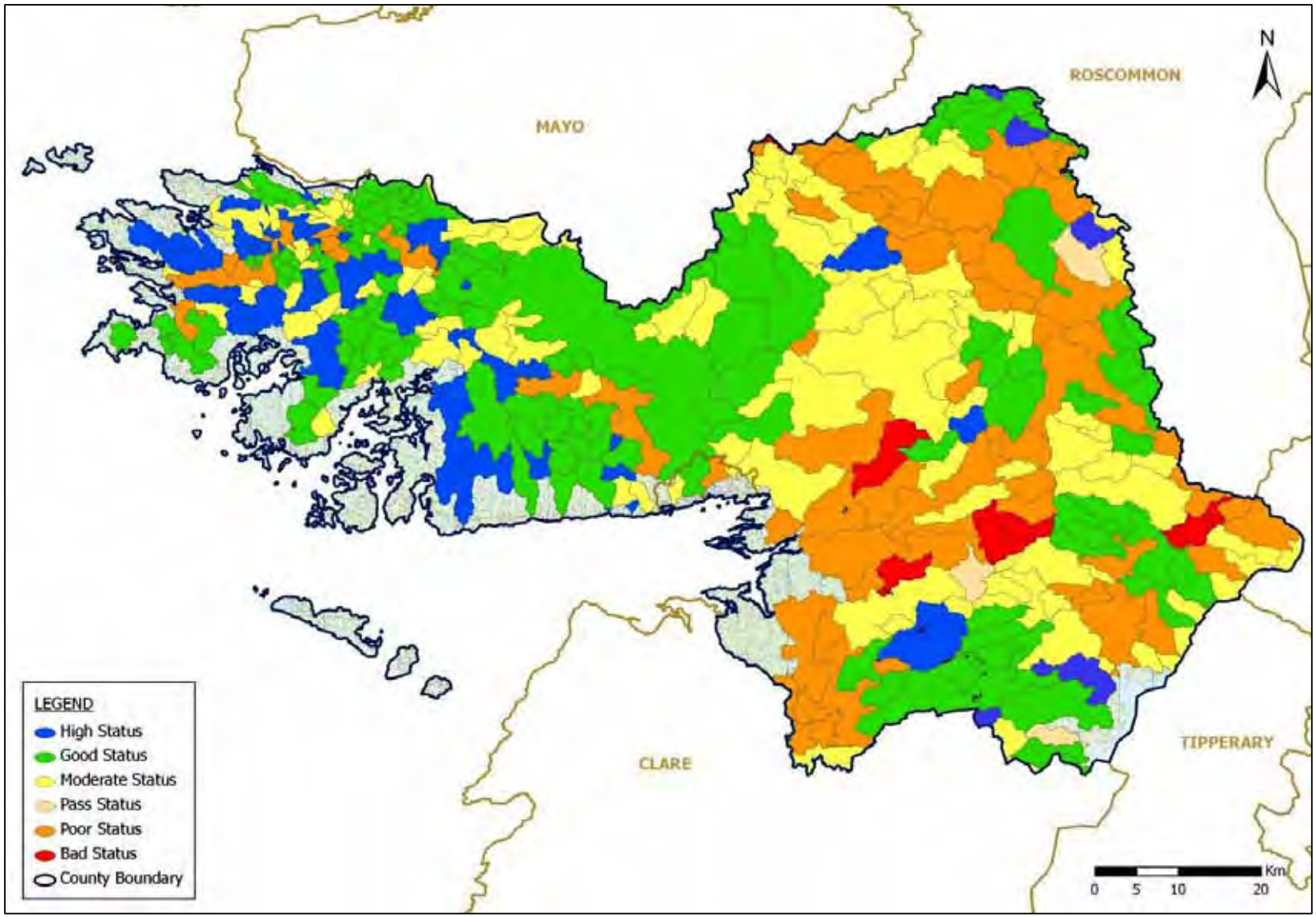

Figure 3.18 WFD Surface Water Status
Source: WRBD (2010)

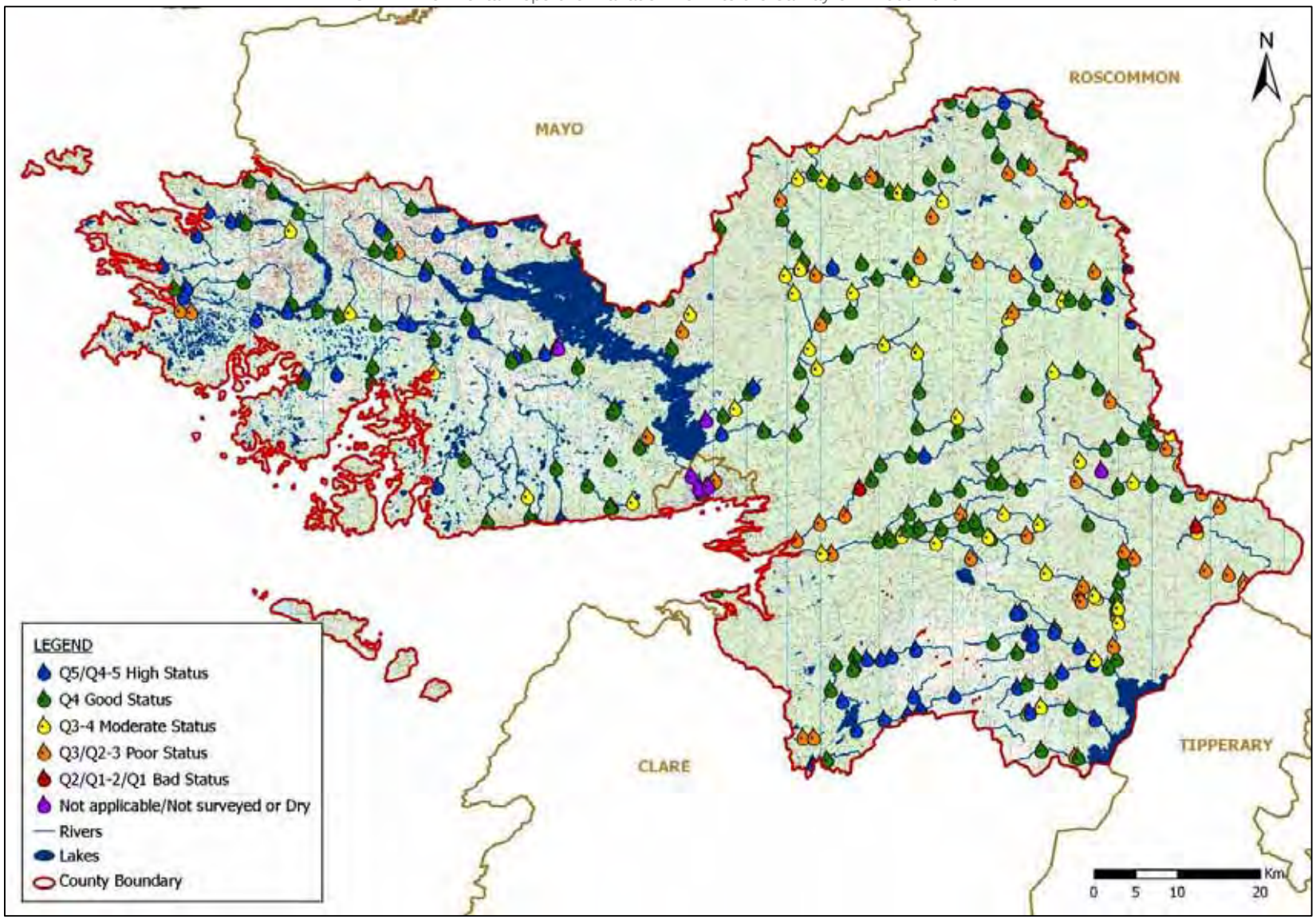

Figure 3.19 Q-Values (Biotic Index Ratings) at Points on Rivers
Source: EPA (Various)

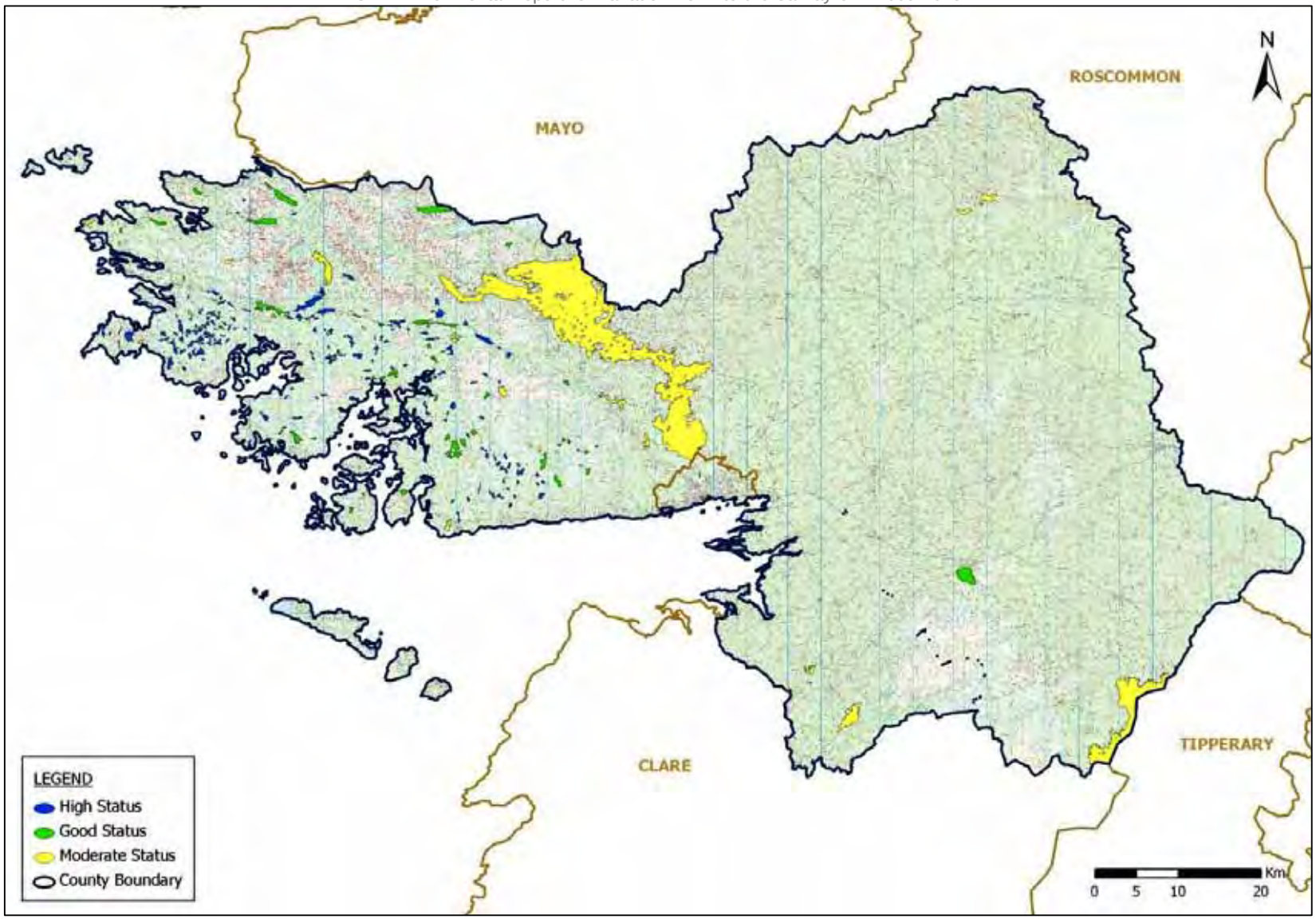

Figure 3.20 WFD Lake Status
Source: WRBD (2010)

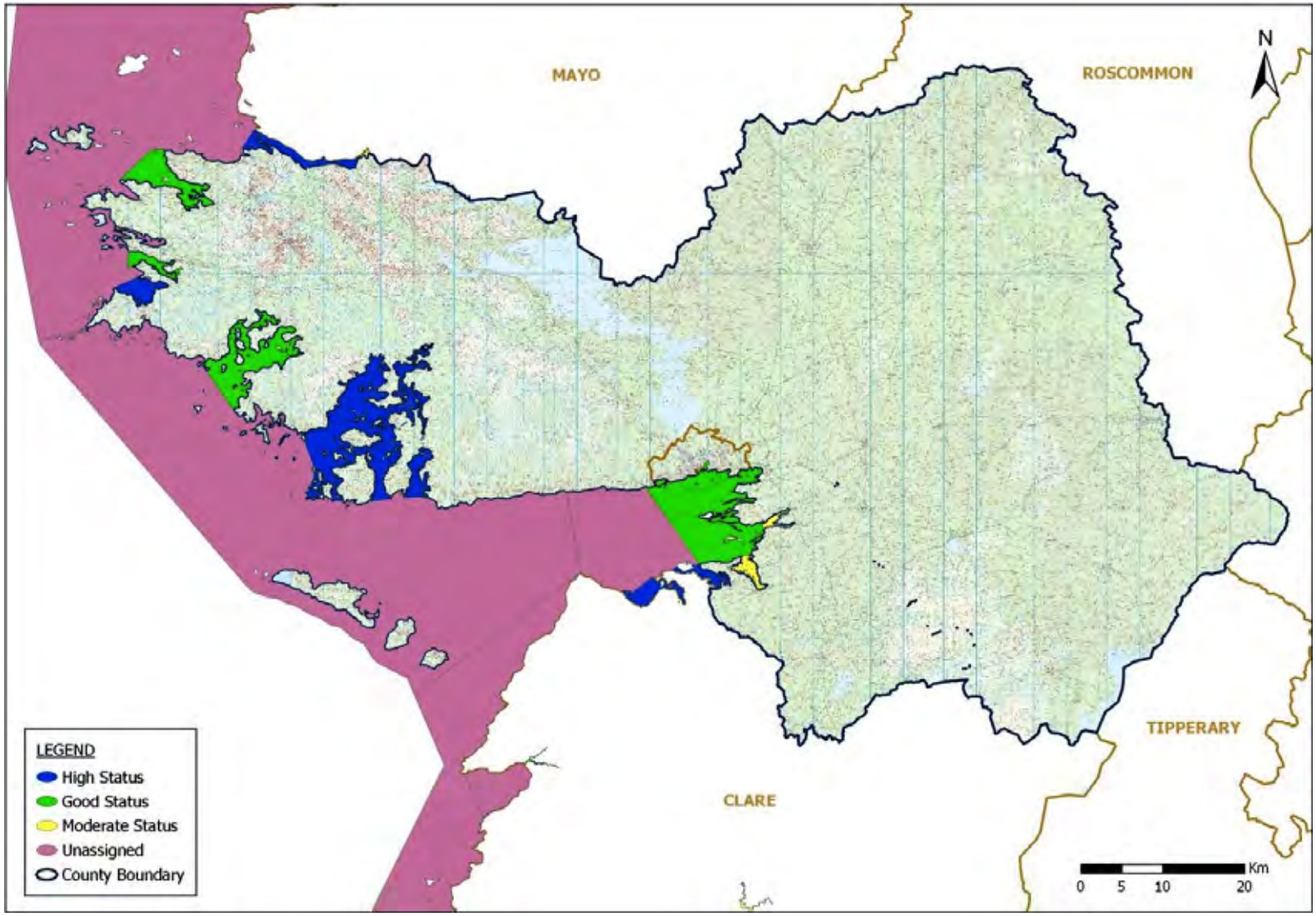

Figure 3.21 Coastal and Transitional Water WFD Status
Source: WRBD (2010)

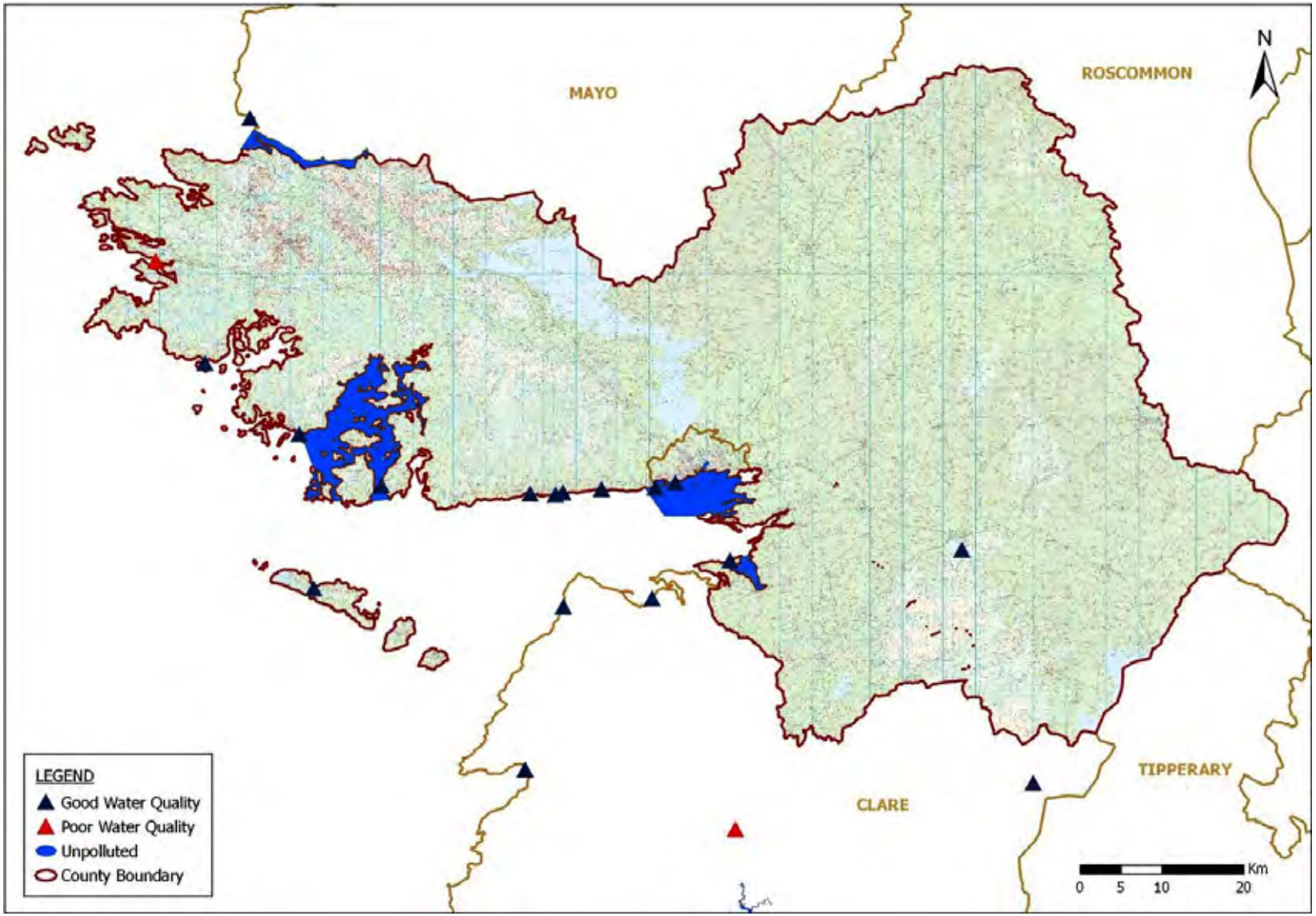

Figure 3.22 Coastal and Bathing Water Quality
Source: EPA (2009)

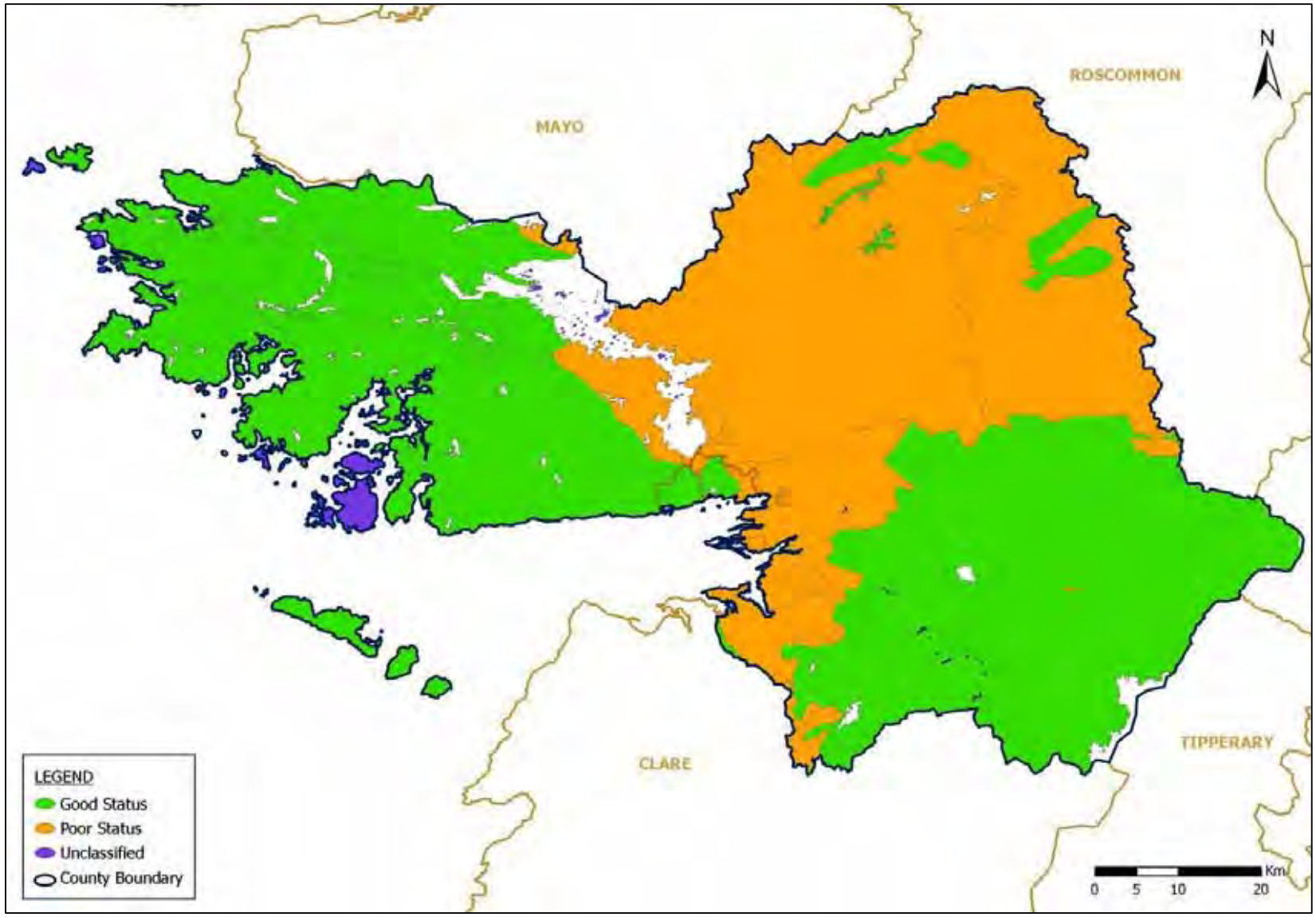

Figure 3.23 WFD Groundwater Status
Source: WRBD (2010)

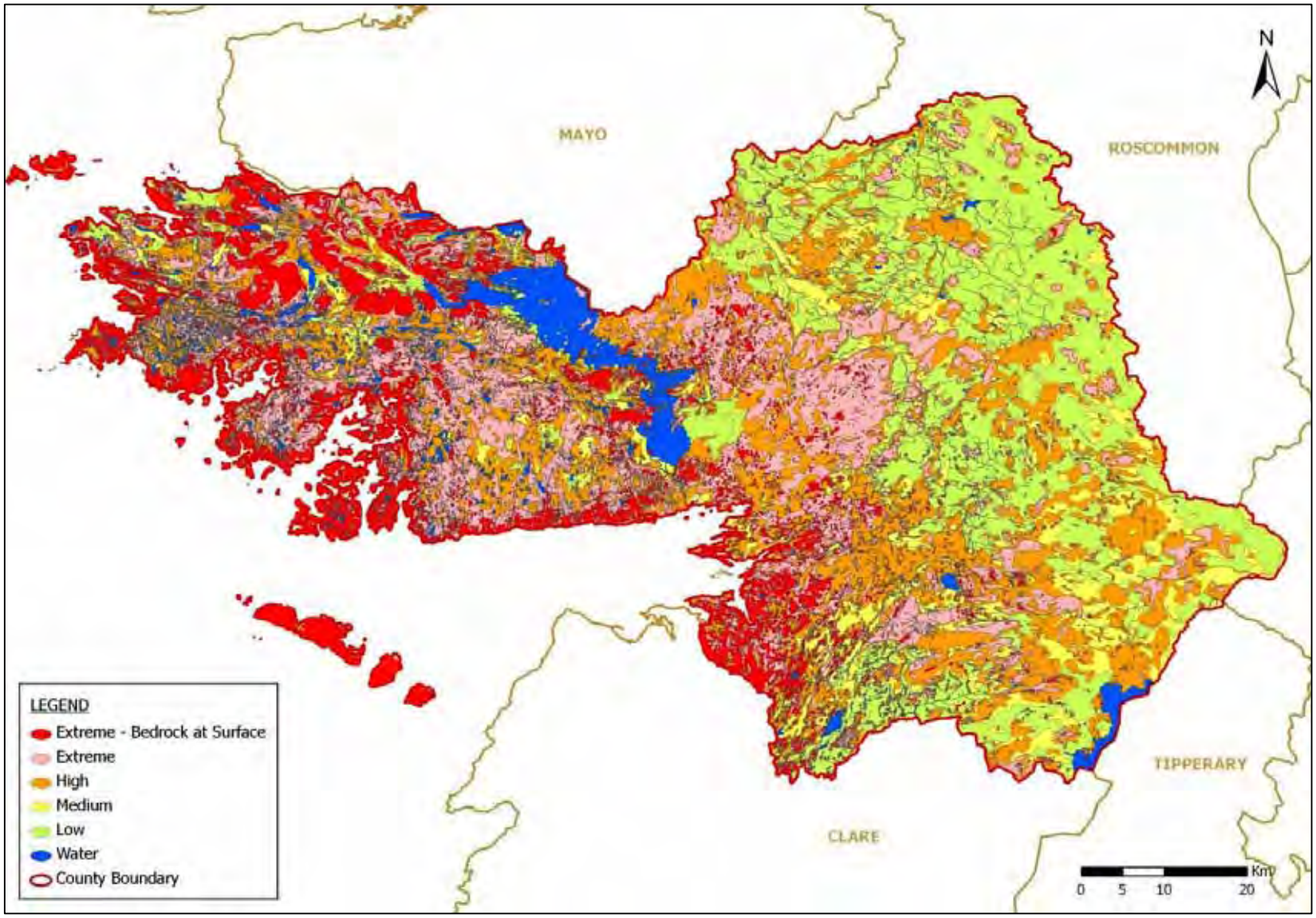

Figure 3.24 GSI Aquifer Vulnerability
Source: GSI (2006)

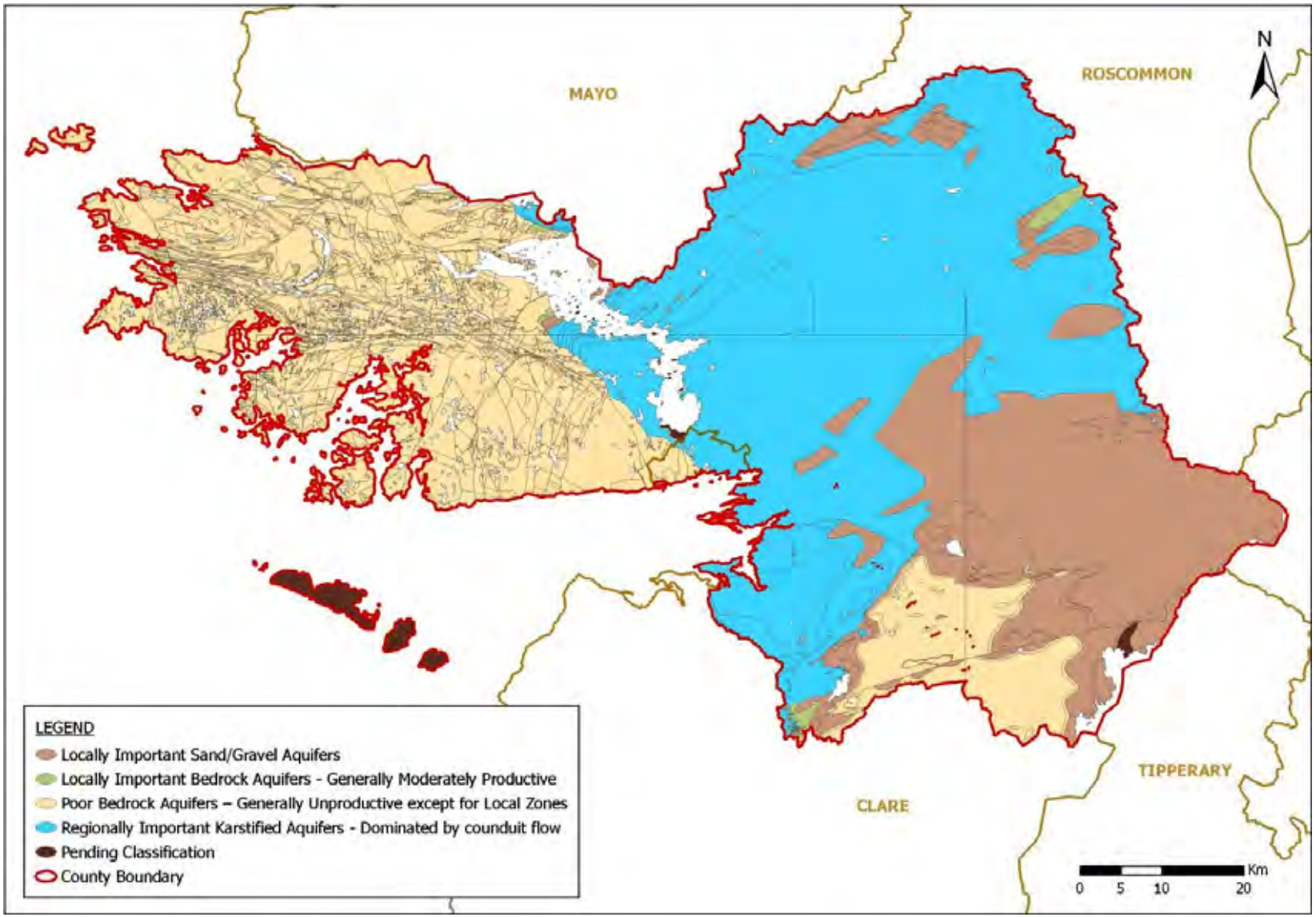

Figure 3.25 Aquifer Productivity
Source: GSI (2005)

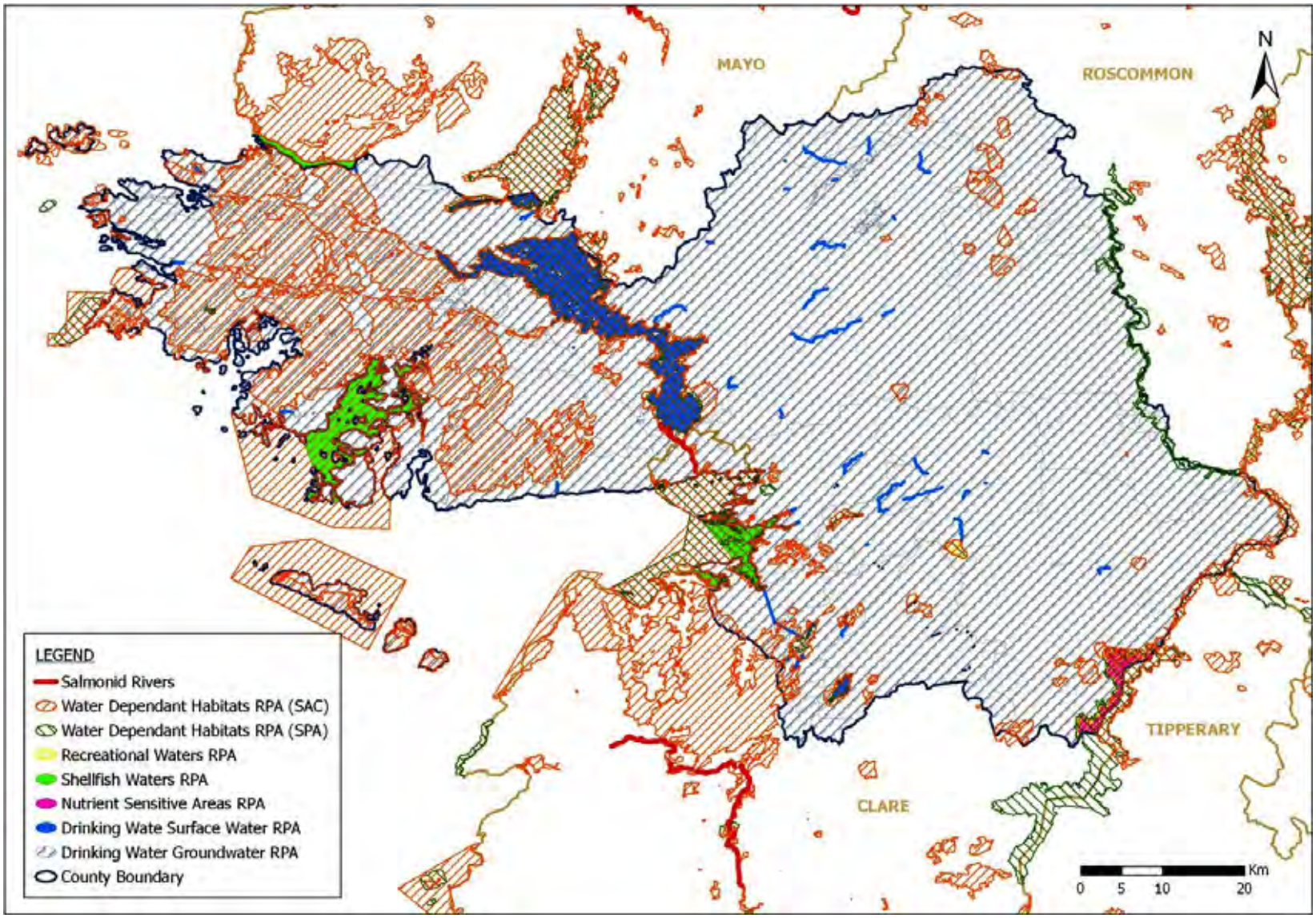

Figure 3.26 WFD Registers of Protected Areas
Source: EPA (2009)

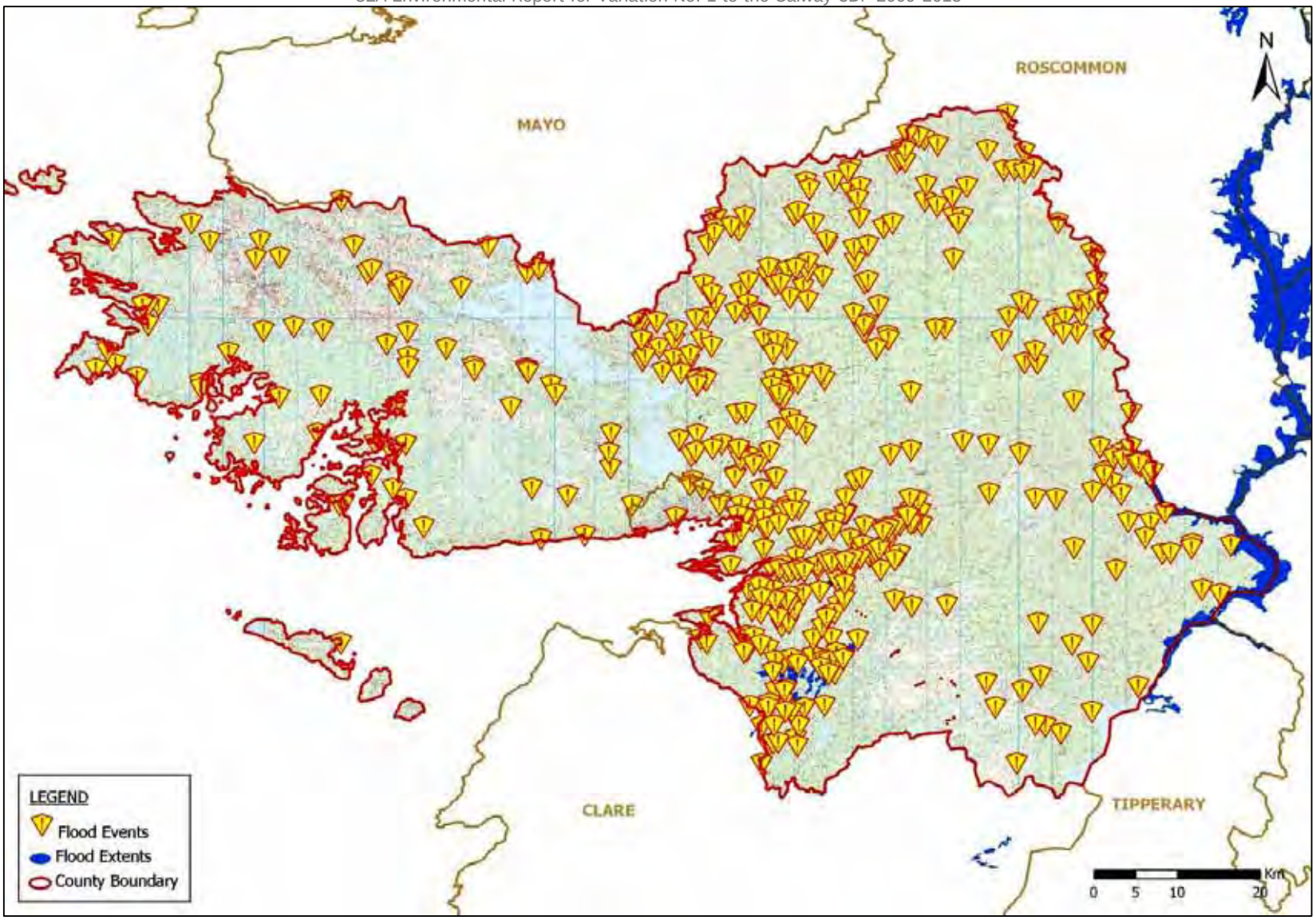

Figure 3.27 Flood Events (OPW)
Source: OPW (Various)

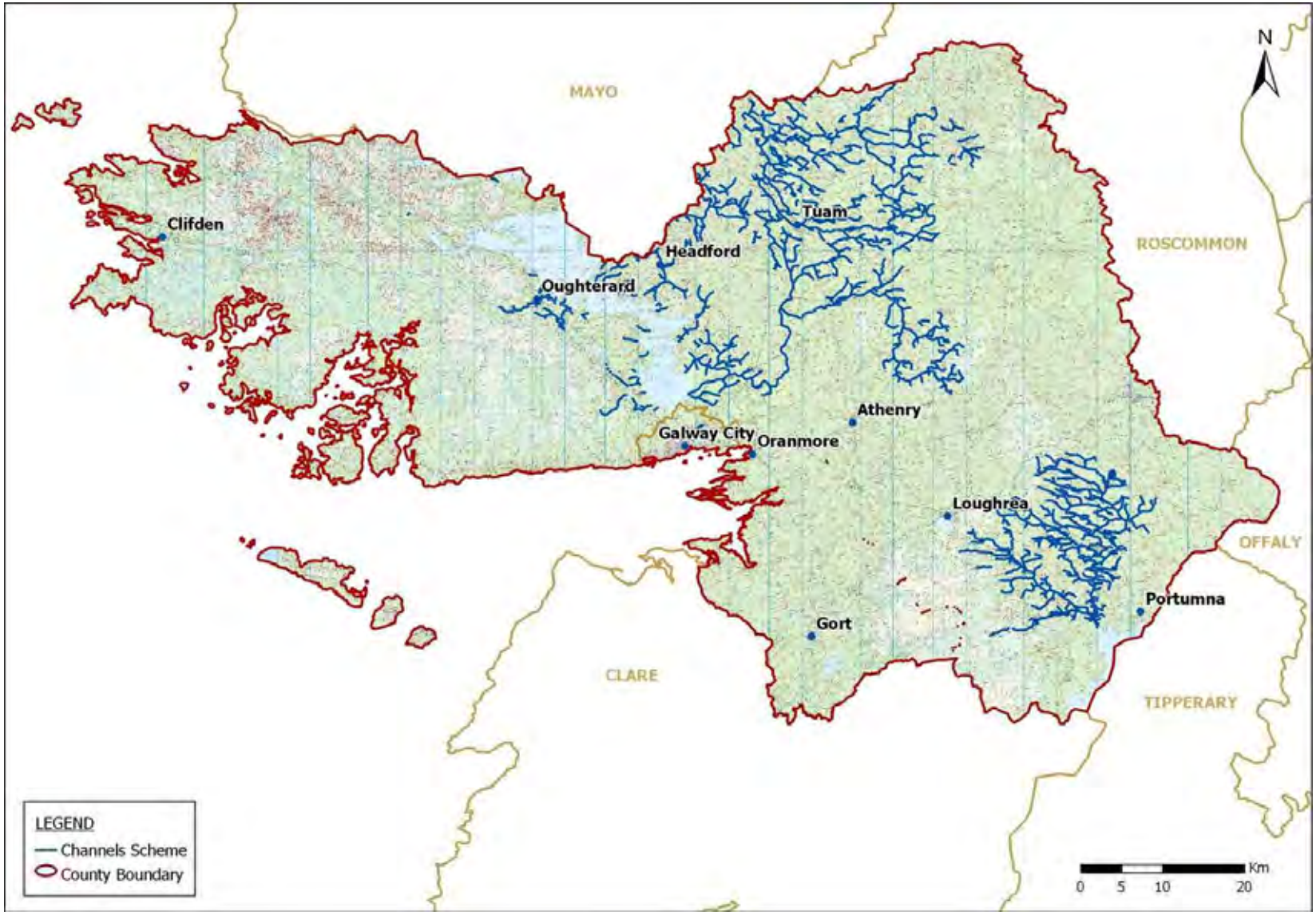

Figure 3.28 Flood Channels Scheme
Source: OPW (Unknown)

3.7 Air and Climatic Factors

3.7.1 Ambient Air Quality

3.7.1.1 Introduction and Legislation

In order to protect human health, vegetation and ecosystems, EU Directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These pollutants are generated through fuel combustion, in space heating, traffic, electricity generation and industry and, in sufficient amounts, could affect the well being of the County inhabitants. The EU Directives include details regarding how ambient air quality should be monitored, assessed and managed.

The principles to this European approach are set out under the Air Quality Framework Directive 1996 as transposed into Irish law under the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (SI No. 33 of 1999).

Four daughter Directives lay down limits or thresholds for specific pollutants. The first two of these directives cover: sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead; and carbon monoxide and benzene. Two more daughter directives deal with: ozone; and polyaromatic hydrocarbons, arsenic, nickel, cadmium and mercury in ambient air.

In order to comply with these directives, the EPA measures the levels of a number of atmospheric pollutants. For the purposes of monitoring in Ireland, four zones are defined in the Air Quality Standards Regulations 2002 (SI No. 271 of 2002). The main areas defined in each zone are:

- Zone A: Dublin Conurbation.
- Zone B: Cork Conurbation.
- Zone C: Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee and Dundalk.
- Zone D: Rural Ireland, i.e. the remainder of the State - small towns and rural areas of the country - excluding Zones A, B and C.

The administrative area of Galway County Council is located in Zone D while the administrative area of Galway City Council is located in Zone C.

Air quality is monitored at one location in the west of the County - Mace Head.

3.7.1.2 Air Quality Monitoring at Mace Head

The EPA Mace Head site monitors concentrations of ground level Ozone (O_3).

Ground level ozone is formed from reactions between pollutants such as nitrogen oxides, carbon monoxide and various volatile organic compounds in the presence of sunlight. Ozone is also a transboundary pollutant whose impacts mainly affect central and southern Europe during the summer months. Ozone levels over Ireland can be influenced by the transport of pollutants from other European regions and across the Atlantic from North America. High concentrations of ground level ozone can affect the functioning of the respiratory system and damage crops and other vegetation.

The 3rd Daughter Directive (2002/3/EC) on Ozone sets target values and long term objectives for ozone levels rather than limit values. Data at the Mace Head monitoring site identifies that ozone target values are currently being achieved. However the long term objectives for ozone are not currently being achieved - this is due to weather fluctuations and fluctuations of ozone being transported across the Atlantic Ocean, rather than local, county or national causes.

3.7.1.3 Limitation in the Monitoring Data for the County and Likely Issues

Although EPA air quality monitoring data apart from that generated at Mace Head does not exist for Galway County Council's area, it is likely that, given the rural nature of much of the County, that the Air Quality Standards Regulations 2002 are generally complied with and air quality is good relative to other European urban areas, despite the occurrence of traffic congestion and new development.

It is noted however that *traffic hotspots* within some of the County's towns are likely to have elevated levels of air pollution and noise due to traffic congestion. Traffic hotspots are located along the main road routes - especially at intersections - and provide for a harsh sensory environment which may impact upon human health. Traffic hotspots in low lying areas that have retaining high buildings are likely to provide

for harsher sensory environments with regard to air pollution and noise levels.

Localised air pollution incidences with regard to PM_{10} and $PM_{2.5}$ and noise pollution are both likely to occur when demolition/construction takes place - especially in relation to PM_{10} if suppression techniques are not introduced - and when traffic is queuing for long periods of time.

Localised levels of pollution may arise from concentrations of the pollutants described below:

- **Particulate matter (PM_{10} and $PM_{2.5}$)**

Particulate matter (PM_{10} and $PM_{2.5}$), or dust, arise from vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. Small particles can penetrate the lungs and cause damage. These are known as PM_{10} (diameter less than 10µm) and $PM_{2.5}$ (diameter less than 2.5µm). There are high levels of PM_{10} in many cities and towns. In County Galway and Galway City, levels of particulate matter decreased after the ban on bituminous coal in the City in 2000.

The use of catalytic converters, cleaner fuels, and better engine technology and maintenance can result in reductions in the concentrations of PM.

- **Sulphur dioxide (SO_2)**

Sulphur dioxide (SO_2), the main source of which in Ireland is burning coal and oil to heat homes and industries and to produce electricity. It is an irritant gas which attacks the throat and lungs. It contributes to the formation of acid rain which damages vegetation and buildings. Levels of SO_2 have decreased over recent years due to increased use of low-sulphur coal, increased use of natural gas instead of solid fuels and reduced industrial emissions through IPPC licensing.

- **Nitrogen oxides (NO_X)**

The main source of nitrogen oxides (NO_X), including nitrogen dioxide (NO_2), is traffic along with electricity generating stations, industry and space heating, which is mostly used in winter. When fuel is burnt in air, a small fraction of nitrogen in the air is converted to nitric oxide. Nitric oxide slowly converts to NO_2 and particularly in the presence of ozone.

NO_2 can adversely affect the throat and lung causing emphysema and cellular damage. Nitrogen oxides are aesthetically unpleasant as they have a brown colour and gives rise to a brown haze. Levels in Ireland are increasing due to growth in traffic numbers.

Increases in the use of catalytic converters, cleaner fuels, better engine technology and maintenance is reducing the amount of NO_2 omitted per motor vehicle however this reduction is probably being offset by the increase in the number of cars as well as the increase in the volume and incidences of traffic congestion.

- **Carbon monoxide (CO)**

Carbon monoxide (CO), the main source of which in Ireland is traffic, is absorbed into the bloodstream more readily than oxygen and can have harmful effects. It is an invisible, odourless and toxic gas and is produced by the inefficient combustion of fuel.

- **Benzene (C_6H_6)**

Benzene (C_6H_6) arises from vehicle exhaust emissions and is a carcinogen. It can function as an anti-knock agent in petrol in place of banned lead. The maximum concentration of C_6H_6 permitted in petrol is fixed by an EU Directive. Although complete combustion should eliminate these substances, the engines of motor vehicles are not completely efficient. Catalytic converters can improve this efficiency.

- **Lead (Pb)**

Lead (Pb), the main source of which is vehicular emissions, can - in high concentrations - retard mental development in children and can - through long-term exposure to low levels - affect the nervous system. As a result of the change to unleaded petrol there has been a dramatic fall in the average concentrations of lead in the air on a national level.

3.7.2 Potential Point Sources of Emissions

3.7.2.1 IPPC Licensed Facilities

The EPA has been licensing certain large-scale industrial and agriculture activities since 1994. Originally the licensing system was known as Integrated Pollution Control (IPC) licensing, governed by the Environmental Protection Agency Act, 1992. The Act was amended in 2003 by the Protection of the Environment Act, 2003 which gave effect to the Integrated Pollution Prevention Control (IPPC) Directive. Detailed procedures concerning the IPPC licensing process are set out

in the EPA Acts 1992 to 2007 and the associated licensing regulations.

IPPC licences aim to prevent or reduce emissions to air, water and land, reduce waste and use energy/resources efficiently. An IPPC licence is a single integrated licence which covers all emissions from the facility and its environmental management. All related operations that the licence holder carries in connection with the activity are controlled by this licence. Before a licence is granted, the EPA must be satisfied that emissions from the activity do not cause a significant adverse environmental impact.

There are fifteen IPPC licensed facilities located within the County. Industries for which licences have been granted include those relating to wood treatment, metal manufacturing, chemical manufacture, animal carcass and animal waste recycling/disposal, energy production from combustion, pesticide formulation, electroplating operations and the manufacture or use of coating materials.

The locations of IPPC licensed facilities in the County are mapped on Figure 3.29.

3.7.2.2 Waste Licensed Facilities

In 1996 the EPA began licensing certain activities in the waste sector. These include landfills, transfer stations, hazardous waste disposal and other significant waste disposal and recovery activities.

A waste licence is a single integrated licence dealing with emissions to all environmental media and the environmental management of the facility. All related waste operations connected to the activity are considered in determining a licence application. The EPA must be satisfied that the activity will not cause environmental pollution when carried on in accordance with the licence conditions. Detailed procedures on processing waste licence applications are set out in the Waste Management Act, 1996 which was amended by the Protection of the Environment Act, 2003 and associated regulations.

There are five waste licensed facilities located within the Galway County Council area - three Landfills, a Dredging Facility and a Waste Transfer Station - and one licensed facility located within the Galway City Council area - a Waste Transfer Station. These facilities are mapped on Figure 3.29.

3.7.2.3 Seveso Sites

The control of major accident hazards involving dangerous substances Directive - also referred to as the Seveso II or COMAH Directive - aims to ensure that, at locations where dangerous substances are handled in quantities above specified thresholds; there will be a high level of protection for people, property and the environment. This is to be achieved by: preventing or minimising the risk of a major accident; and, taking all the necessary measures to limit the consequences of such an accident, should it occur. The Directive is transposed into Irish law through the European Communities (control of major accident hazards involving dangerous substances) Regulations 2006 (SI No. 74 of 2006) implement Council Directive 2003/105/EC (amending Directive 96/82/EC).

The Seveso II Directive includes provisions in relation to land use planning. Article 12 of the Directive requires member states to ensure that the objectives of preventing major accidents and limiting the consequences of such accidents are taken into account in land use policies and/or other relevant policies. These objectives must be pursued through controls on the following:

- The siting of new establishments;
- Modifications to existing establishments;
- Development in the vicinity of an establishment which, by virtue of its type or siting, is likely to increase the risk or consequences of a major accident.

There are two Seveso II sites within Galway City both of which have their locations and buffers in Galway Port:

- Topaz Terminal; and,
- Leeside Oil Terminal

Where appropriate, the Health and Safety Authority provides advice in respect of planning applications within a certain distance of the perimeter of Seveso sites. The areas covered by these buffers vary depending on the nature of activity at the site. Galway County Council takes such technical advice into account in the consideration of applications for planning permission.

Also it is the policy of Galway County Council to facilitate the implementation of the Seveso II Directive and in doing so; the Council will have

regard to major infrastructure projects including Carnmore Airport and its safety zone, other airstrips throughout the County, harbours, the gas distribution network, power generation facilities, rail links and major roads.

3.7.3 Noise

Noise is unwanted sound. It can seriously harm human health and interfere with daily activities at school, at work, at home and during leisure time. Areas within the County which are commonly affected by noise are urban areas and areas along roadsides.

Generally, the main noise source in the County is from traffic. Streets in low lying areas that have high traffic counts as well as enclosing taller buildings are likely to have harsh sensory environments with regard to noise levels with regard to this source. As mentioned below, traffic hotspots, such as intersections, are likely to have higher noise levels.

Traffic noise alone is harming today the health of almost every third European[25]. The main health risks of noise identified by the WHO include: pain and hearing fatigue; hearing impairment; annoyance; interferences with social behaviour; interference with speech communication; sleep disturbance and all its consequences; and performance at work and school. Any of these can lead to annoyance and possibly more overt reactions, including complaints. *Traffic hotspots* within some of the County's towns are likely to have elevated levels of air pollution and noise due to traffic congestion. These hotspots are located along the main road routes - especially at intersections - and provide for a harsh sensory environment which may impact upon human health.

Localised noise pollution is likely to occur when demolition/construction takes place and when traffic is queuing for long periods of time. In addition, there are localised noise sources which include air conditioning equipment, marine traffic, port activities, train movements and night clubs.

Certain parts of the County lie below the approaches to Carnmore Airport and are subjected to intermittent levels of noise from that source.

The Noise Directive requires Galway County Council to produce a noise map and to reduce noise levels to acceptable noise dose levels.

3.7.4 Climatic Factors

3.7.4.1 Greenhouse Gases

In order to reduce greenhouse gas emissions the internationally agreed Kyoto Protocol established emissions reduction targets for developing countries. Ireland's emission target for greenhouse gases is to limit the increase in their combined emissions during the five-year period 2008-2012 to 13 per cent above 1990 levels.

Based on the inventory figures for 2006[26], the EPA estimates that Ireland's emissions in 2006 were 25.5 per cent higher than the baseline estimate that underlies Ireland's allowable emissions for the period 2008-2012, as agreed in the peer review of Ireland's 2006 submission to the United Nations Framework Convention on Climate Change.

With regard to overall emissions, *Agriculture* is the single largest contributor, at 27.7% of the total, followed by *Energy* (power generation & oil refining) at 22.3% and *Transport* at 19.7%. The remaining 30% is made up by the Residential sector at 10.4%, *Industry and Commercial* at 17.2%, and *Waste* at 2.6%.

Transport continues to be the dominant growth sector with emissions at 682,000 tonnes higher in 2006 than in 2005. This represents a 5.2% increase on 2005 levels and 165% increase on the 1990 transport emissions. Road transport accounts for 97% of the transport sector emissions. The increase in the GHG emissions from the transport sector reflects sustained increases in fuel consumption with petrol usage up 3.4% and diesel consumption up 7.9% from the previous year.

3.7.4.2 Climate Change

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. The release of greenhouse gases into the atmosphere as a result of human activities adds to natural climate variability by increasing the naturally occurring greenhouse effect. This greenhouse effect occurs in the atmosphere and is caused by greenhouse gases which exist naturally in the atmosphere. The greenhouse gases retain the radiation which

[25] World Health Organization Regional Office for Europe (2003) T*echnical meeting on exposure-response relationships of noise on health 19-21 September 2002* Bonn, Germany Bonn: WHO

[26] EPA (2008) *Ireland's Emissions of Greenhouse Gases for the period 1990-2006* Wexford: EPA

is released from the earth as a result of heating by the sun. This retention maintains a global temperature which is suitable for ecosystems and life.

Climate change is not limited to changes in temperatures or weather - it can also mean changes in the occurrence of extreme and unstable weather conditions, storms and floods, droughts and coastal erosion.

3.7.4.3 Potential Effects of Changed Climate

The EPA's 'Climate Change: Regional Climate Model Predictions for Ireland' (2005)[27] report provides an analysis of future Irish climate conditions for the period 2021–2060 based on the outputs from a new regional climate modelling facility located in Met Éireann.
As increased temperatures will lead to greater amounts of water vapour in the atmosphere and an accelerated global water cycle, it is reasonable to expect that river catchment areas will be exposed to a greater risk of flooding. The increase in winter precipitation will be likely to produce a significant increase in the more intense discharge episodes, raising the risk of future flooding.

The report identifies that although it is not possible to comment on changes in flood magnitude and frequency, the increase in winter runoff indicated for many parts of the west of the country, especially under the scenario for the period 2061–2090, is likely to have significant implications. River flooding tends to be more common during the wetter winter months when soils are near saturation and can be exacerbated in coastal areas when interactions occur between high tides and high flows. Many of the rivers draining upland areas have a rapid or "flashy" response to rainfall enhanced by rising topography. Steep slopes and thin soils favour rapid flow pathways and water is rapidly transmitted to the channel network especially in urbanised catchments with extensive areas of impermeable surfaces.

3.7.5 Existing Problems

An air quality monitoring site at Mace Head monitors concentrations of ground level Ozone (O_3). The site's data identifies that ozone target values are currently being achieved. However the long term objectives for ozone are not currently being achieved - this is due to weather fluctuations and fluctuations of ozone being transported across the Atlantic Ocean, rather than local, county or national causes.

Although EPA air quality monitoring data apart from that generated at Mace Head does not exist for Galway County Council's area, it is likely that, given the rural nature of much of the County, that the Air Quality Standards Regulations 2002 are generally complied with and air quality is good relative to other European urban areas, despite the occurrence of traffic congestion and new development. It is noted however that *traffic hotspots* within some of the County's towns are likely to have elevated levels of air pollution and noise due to traffic congestion. Traffic hotspots are located along the main road routes - especially at intersections - and provide for a harsh sensory environment which may impact upon human health.

Localised air pollution incidences with regard to PM_{10} and $PM_{2.5}$ and noise pollution are both likely to occur when demolition/construction takes place - especially in relation to PM_{10} if suppression techniques are not introduced - and when traffic is queuing for long periods of time.

Ireland's current emissions are exceeding targets agreed in the peer review of Ireland's 2006 submission to the United Nations Framework Convention on Climate Change. It is unlikely that Ireland will meet these targets and it is likely therefore that financial penalties will be incurred. Transport related emissions continue to be the dominant growth sector.

Changes in sea level and/or changes in the occurrence of severe rainfall events as a result of climate change could adversely impact upon the County's human beings, its biodiversity and its economy.

[27] Community Climate Change Consortium for Ireland (2005) *Environmental RTDI Programme 2000–2006 Climate Change: Regional Climate Model Predictions for Ireland (2001-CD-C4-M2) Final Report* Wexford: Environmental Protection Agency

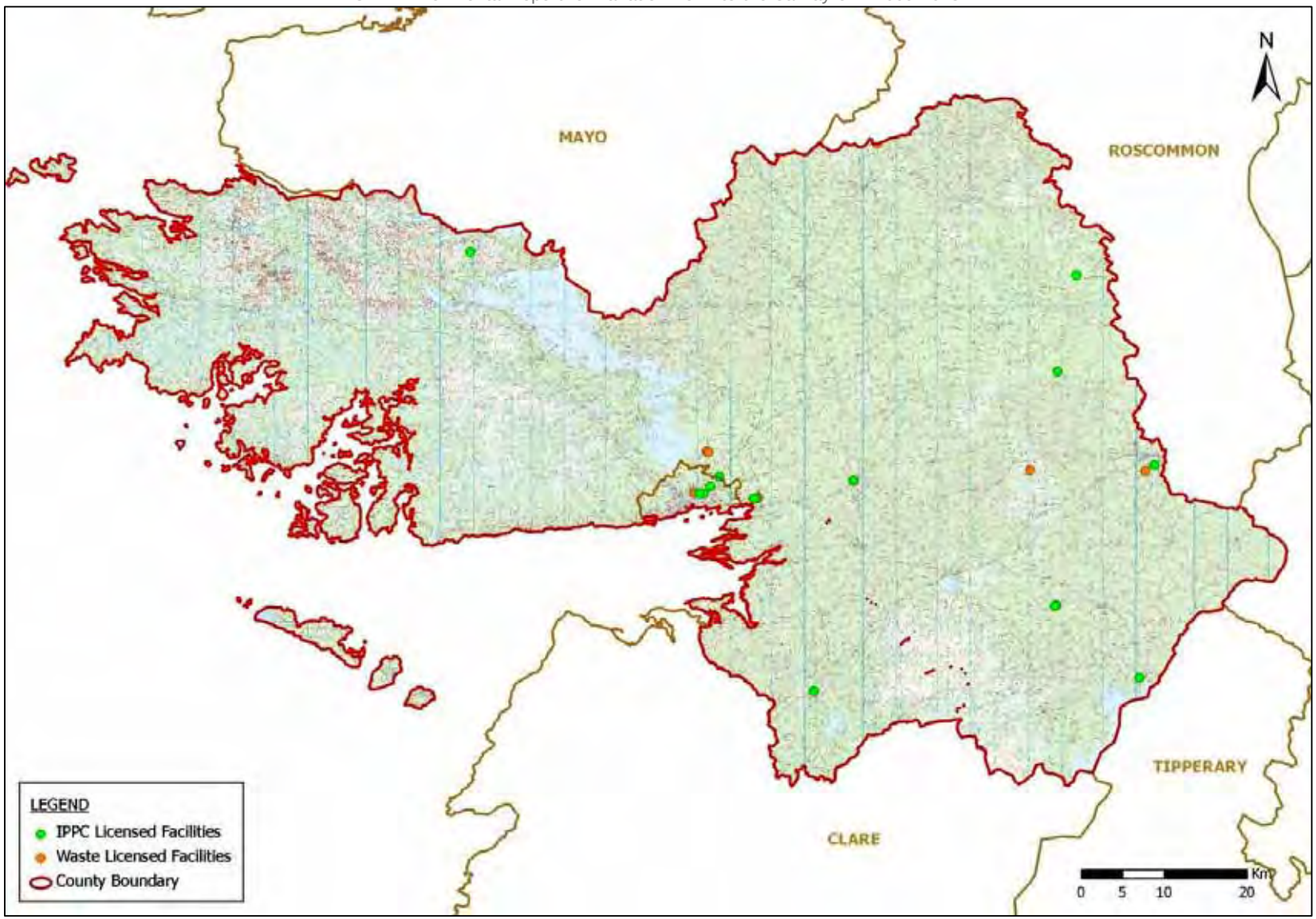

Figure 3.29 IPPC licensed facilities and Waste Licensed Facilities
Source: EPA (Various)

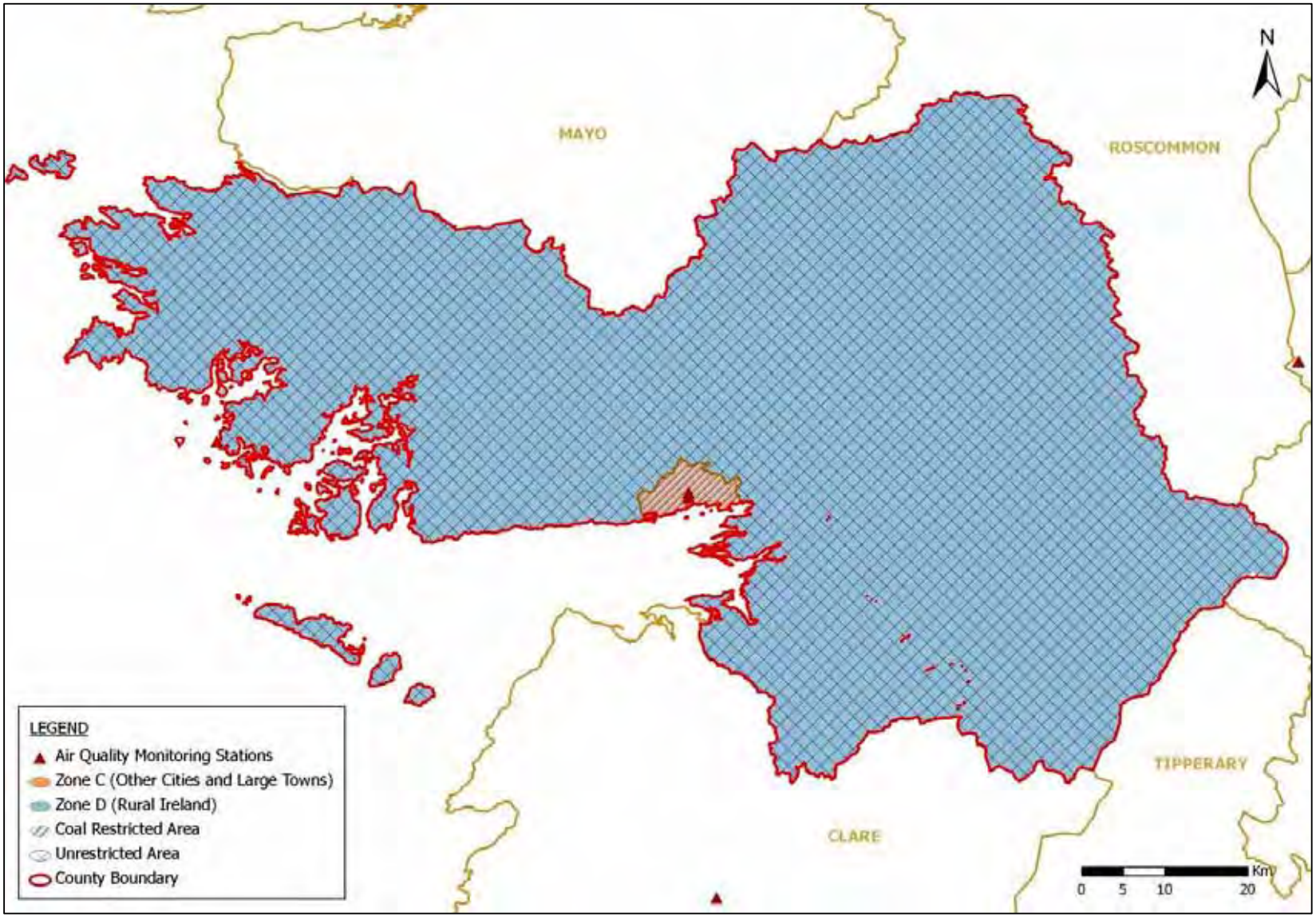

Figure 3.30 Air Quality Monitoring Sites, Air Zones and Coal Restricted Areas
Source: EPA (Various)

3.8 Material Assets

3.8.1 Waste Water

3.8.1.1 Relevant Legislation

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. The Regulations stipulate that sewage treatment facilities are in place in all towns by 2005. The treatment of wastewater is also relevant to the Water Framework Directive which requires all public bodies, including Galway 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 (see Section 3.5 Water).

3.8.1.2 Current and Future Capacity and Demand

Table 3.6 outlines the available information on waste water treatment capacity and demand in County Galway. Details on nineteen settlements are provided, however, six of the settlements have no schemes.

Three of these plants are currently overloaded and one has no spare capacity, as a result, they are not compliant with the provisions of the Urban Waste Water Treatment Directive. Waste water from two of the plants is pumped to Mutton Island WWTP which is the responsibility of Galway City Council. The remaining seven plants have spare capacity.

The overloading of the plants and the low level of treatment provided in some of the plants has significant potential to harm human health - through contamination and pollution of bathing water (see Section 3.6.6) and drinking water (see Section 3.8.2) - and biodiversity and contribute to failing Water Framework Directive objectives if unmitigated.

Five of the plants are in compliance with the Urban Waste Water Treatment Directive.

Information on predicted future waste water treatment capacity and demand is included on Table 3.7. Potential upgrades may occur at four of the settlements which would bring these settlements into compliance with the Urban Waste Water Treatment Directive. It is foreseen that the waste water treatment plants at Gort and Mountbellew will be overloaded by 2015, there are currently no plans to upgrade these plants.

Settlement	Water body that WWTP discharges to	Q Value of Receiving Water[28]	Current Population [CSO 2006 or latest est.]	Current Loading [p.e.[29]]	Current WWTP Capacity [p.e.]	Level of treatment currently provided	Current Spare Capacity or Shortfall[30]	Compliance with Urban waste water treatment Directive [Yes/No]	Significant potential of over loading to harm human health & biodiversity and contribute to failing WFD objectives [Yes/No]
Hub Town									
Tuam	River Clare	Q4	6,885	13,250	23,250	Primary, Secondary and tertiary	10,000	Yes	No
Ballinasloe	River Suck	Q3	6,158	5,667	18,000	Primary, Secondary and ferric	12,333	Yes	No
Key Towns (>1500)									
Loughrea	Dunkellin River - Kilcolgan River	Q4	4,532	4,800	9,750	Primary, Secondary and ferric	4,950	No	No
Oranmore	No WWTP[31]		3,513	-	No WWTP	-	Mutton Island	N/A	No
Athenry	Clarinbridge River	Q2	3,205	3,639	6,000	Primary and Secondary	2,361	No	No
Gort	Cournahowna River		2,734	4,836	4,310	Primary and Secondary	none	No	N0
Metropolitan Satellites									
Barna	No WWTP[31]		2,100	ongoing connections	No WWTP	-	Mutton Island	N/A	No
Claregalway	No WWTP		741	No Data	-	No Scheme	-	No	No
Moycullen	Stream to Ballycuirke Lake		1,237	2,500	4,000	Primary, Secondary and ferric	1,500	Yes	N0
Lower Tier Towns/Villages (<1500)									
Headford	Headford River		760	1,400	3,000	Primary and Secondary	1,600	Yes	N0
Craughwell	No WWTP		414	No Data	-	No scheme	-	No	No
Clifden	Sea (Estuarine)	Q3	1,497	4,063	1,875	Primary	2,188	No	No
Portumna	Lough Derg	Q4	1,377	2,842	7,760	Primary, Secondary and ferric	4,918	Yes	No
Carraroe	-		627	No Data	-	No scheme	-	No	No
Kinvara	-		563	No Data	-	No scheme	-	No	No
Spiddal	-		247	No Data	-	No scheme	-	No	No
Oughterard	Owenriff River	Q4	1,305	2184	500	Primary and Secondary	1,684	No	No
Clarinbridge	-		257	No Data	-	No scheme	-	No	No
Mountbellew	Castlegar River	Q3	746	1,033	700	Primary and Secondary	333	No	No

Table 3.6 Available Information on Waste Water Treatment Capacity and Demand in certain Settlements in County Galway[32]

[28] Source: EPA (various) Water Quality in Ireland Wexford: EPA

[29] Population equivalent (in waste-water monitoring and treatment) refers to the amount of oxygen-demanding substances whose oxygen consumption during biodegradation equals the average oxygen demand of the waste water produced by one person.

[30] Shortfall indicates unlikely to be compliance with Urban Waste Water Treatment Directive

[31] Waste water from Oranmore and Barna is collected and sent to a pumping station where it is pumped to Mutton Island WWTP which is the responsibility of Galway City Council. Details of existing/planned capacities for this plant are not available for this plant.

[32] Information on waste water treatment has been provided by the Water Services Department of Galway County Council, 18th April 2011

Settlement	Water body that WWTP discharges to	Q Value of Receiving Water[33]	Predicted Population in 2016	Predicted Loading in 2016[34] [p.e.]	Planned WWTP Capacity in 2016 [p.e.]	Predicted Spare Capacity or Shortfall in 2016	Compliance with Urban waste water treatment Directive [Yes/No]	Significant potential of over loading to harm human health & biodiversity and contribute to failing WFD objectives [Yes/No]
Hub Town								
Tuam	River Clare	Q4	8,964	17,251	23,250	5,999	Yes	No
Ballinasloe	River Suck	Q3	7,698	7,084	18,000	10,916	Yes	No
Key Towns (>1500)								
Loughrea	Dunkellin River - Kilcolgan River	Q4	5,665	6,000	9,750	3,750	No	No
Oranmore	No WWTP[35]		4,743	-	No WWTP	Mutton Island	N/A	No
Athenry	Clarinbridge River	Q2	4,327	4,913	6,000	4,587	No	No
Gort	Cournahowna River		3,554	6,286	4,310	1,976	No	No
Metropolitan Satellites								
Barna	No WWTP[31]		2,520	2,000	No WWTP	Mutton Island	N/A	No
Claregalway	No WWTP		986	-	6,000 potential scheme	-	Maybe	No
Moycullen	Stream to Ballycuirke Lake		1,645	3,325	4,000	675	Yes	No
Lower Tier Towns/Villages (<1500)								
Headford	Headford River		1,011	1,849	3,000	1,151	Yes	No
Craughwell	No WWTP		497	-	No Scheme	-	No	No
Clifden	Sea (Estuarine)	Q3	1,747	4,742	9,470 potential upgrade	2,867 (or 6,604 with upgrade)	Maybe	No
Portumna	Lough Derg	Q4	1,607	3,317	7,760	4,443	Yes	No
Carraroe	-		732	-	No Scheme	-	No	No
Kinvara	-		619	-	No Scheme	-	No	No
Spiddal	-		272	-	1,200 potential scheme	-	Maybe	No
Oughterard	Owenriff River	Q4	1,436	2,403	3,000 potential upgrade	1,903	Maybe	No
Clarinbridge	-		283	-	No Scheme	-	No	No
Mountbellew	Castlegar River	Q3	821	1,137	700	437	No	No

Table 3.7 Available Information on Predicted Waste Water Treatment Capacity and Demand in certain Settlements in County Galway

[33] Source: EPA (various) Water Quality in Ireland Wexford: EPA

[34] Predictions have been calculated by extrapolation of PE from Plans' target populations (for the year 2016) at same ratios as current populations (Current (2006) Population (est.)) to current PE figures

[35] Waste water from Oranmore and Barna is collected and sent to a pumping station where it is pumped to Mutton Island WWTP which is the responsibility of Galway City Council Details of existing/planned capacities for this plant are not available for this plant

3.8.2 Drinking Water

3.8.2.1 Water Supply

Drinking water is supplied in County Galway via a range of public and private schemes. Galway County Council is responsible for the operation of 38 Public Water Supplies (PWS) serving a population of 133,210.

Around 40% of the County's population are served by 'Public Water Supplies'. These are sanitary authority operated schemes (though these may be run by a private contractor on behalf of the sanitary authority) and they supply water to the majority of households in Ireland.

Around 20% of the County's population are served by 'Public Group Water Schemes' - schemes where the water is provided by the sanitary authority but responsibility for distribution of the water rests with the group scheme. These schemes tend to be supplied off larger public water supplies.

Around 40% of the County's population are served by either:

'Private Group Water Schemes' (where the owners of the scheme - usually representatives of the local community - source and distribute their own water). Combined; the 'public' and 'private' group water schemes supply water to around 10% of the population of Ireland; or,

'Small Private Supplies' (a large group of different types of supplies comprising industrial water supplies (such as those used in the brewing industry) to boreholes serving single houses. The majority of these supplies are exempt from the requirements of the Regulations, except where the water is supplied as part of a public or commercial activity) identified.

Water supply and demand figures for eighteen settlements in the County are included in Table 3.8. There is no spare supply at Gort, Portumna and Clifden and there is limited supply at Loughrea, Barna and Moycullen, Craughwell, Carraroe and Kinvara. The remaining ten settlements have adequate supply.

Predicted water supply and demand figures are set out in Table 3.9. Predictions show that all settlements, apart from those supplied by the Luimnagh supply and two settlements for which figures are unknown, will have shortfalls in capacity. Upgrades may occur at the plants in Loughrea, Craughwell and Galway City West Water Supply Scheme which would result in greater capacities.

3.8.2.2 EPA Monitoring

Drinking water must be clean and wholesome. That means it must meet the relevant water quality standards and must not contain any other substance or micro-organism in concentrations or numbers that constitute a potential danger to human health.

An assessment of the safety of drinking water can be carried out by assessing compliance with the requirements of the drinking water quality standards. Compliance with the drinking water requirements is determined by comparing the results of analyses submitted by water suppliers to the standard for 48 parameters specified in the European Communities (Drinking Water) Regulations (No. 2), 2007. To ensure that these standards are met each water supply must be monitored on a regular basis.

Under Section 58 of the Environmental Protection Agency Act 1992 the EPA is required to collect and verify monitoring results for all water supplies in Ireland covered by the European Communities (Drinking Water) Regulations, 2000. The EPA publishes their results in annual reports. Drinking water quality in County Galway is discussed under the sections below with reference to the most recent EPA report on the subject[36].

3.8.2.3 Overall Compliance

For the years 2008 and 2009 microbiological compliance levels decreased in PWSs in Co. Galway from 100% in 2008 to 98.8% in 2009 whilst chemical compliance levels improved from 98.5% in 2008 to 99.0% in 2009. Non-compliances with E.coli levels were recorded at Inismore, Kilconnell, Mid-Galway(2) and Tully-Tullycross in 2009 along with one in Balygar for Enterococci.

Non-compliance with chemical parametric values occurred at 48 locations in the county in 2008 but reduced to 23 locations in 2009.

[36] EPA (2007) *The Provision and Quality of Drinking Water in Ireland: A Report for the Years 2006-2007* Wexford: EPA

3.8.2.4 EPA Remedial Action List of Public Water Supplies

The EPA identified[37] 31 County Galway water supplies on a remedial action list that require detailed profiling to ensure that the supply is providing clean and wholesome drinking water.

3.8.2.5 Note on Galway City Cryptosporidium Outbreak[38]

A large outbreak of cryptosporidiosis in Galway was detected as a result of the increased number of cases of cryptosporidiosis observed in the Galway area in the first three months of 2007. These cases were predominantly clustered around an area supplied by the Luimnagh, Headford, Terryland Old and Terryland New treatment plants. These plants serve a population of approximately 90,000.

As a consequence, in March 2007, the level of monitoring was increased for the parasite Cryptosporidium. The results indicated that the parasite was not being removed by the treatment plants in Headford and Terryland Old and as a consequence on the 15th of March 2007, the local authorities in consultation with the Health Service Executive, placed a boil water notice on the affected supplies. Since this outbreak occurred the Headford and Terryland Old plants have shut down while further treatment barriers in the form of UV treatment were installed at the Terryland New treatment plant.

The treatment plant at Luimnagh has been upgraded and the capacity increased to replace the production of drinking water at Headford and Terryland Old. The outbreak of cryptosporidiosis in Galway during 2007, caused illness in over 240 people, and led to the imposition of a boil water notice in Galway for a period of 5 months during the peak tourist season.

Following confirmation that the Galway outbreak was as a result of drinking water contamination the EPA carried out inspections of the Terryland New, Terryland Old and Luimnagh plants. As a result of these inspections, the EPA issued a direction to Galway City Council requiring specific actions to be taken within a specific timeframe.

These actions were completed by Galway City Council though the works were not finished with the timeframes directed. The delays experienced by Galway City Council were assessed by the EPA and were deemed valid.

The EPA considers that the direction achieved its aim of improving the safety and security of the water supply in Galway City into the medium term. In view of this, and in light of the powers granted under the Drinking Water Regulations, the EPA is not considering further enforcement action at this time.

Arising from ongoing monitoring in County Galway there are a number of improvements which should be made in order to supply water that is both wholesome and clean.

3.8.3 Traffic

County Galway is well served in terms of vehicular access. Bus, train and air services exist to serve the County.

Traffic hotspots are found within the County along the main road routes - especially at intersections - and provide for a harsh sensory environment which may impact upon human health (see Section 3.7).

3.8.4 Existing Problems

Table 3.6 and Table 3.7 identify certain current and future waste water treatment shortfalls in the County. The overloading of the identified waste water treatment plants and the low level of treatment provided in some of the plants has significant potential to harm human health - through contamination and pollution of bathing water (see Section 3.6.6) and drinking water (see Section 3.8.2) - and biodiversity and contribute to failing Water Framework Directive objectives if unmitigated.

There are existing problems relating to drinking water treatment in 31 public water supplies in the County.

There is no spare supply at three of the Counties 18 water treatment plants and there is limited supply at 5. If new development was not accompanied by appropriate waste water infrastructure /capacity then it is likely that adverse impacts upon a number of environmental components would arise.

[37] EPA (2007) *The Provision and Quality of Drinking Water in Ireland: A Report for the Years 2006-2007* Wexford: Environmental Protection Agency

[38] EPA (2007) *The Provision and Quality of Drinking Water in Ireland: A Report for the Years 2006-2007* Wexford: Environmental Protection Agency

Settlement	Current Population [latest est.]	Current Demand [m^3/day-approx.]	Current Supply Capacity [m^3/day-approx.]	Current Spare Capacity or Shortfall (based on highest available current loading)
Hub Town				
Tuam	6,885	5,710	Luimnagh[39]	15,600
County Town				
Ballinasloe	6,158	4,100	4,560	460
Key Towns (>1500)				
Loughrea	4,532	3,050	3,050	limited
Orranmore/Garraun	3,513	4,300	Luimnagh[39]	15,600
Athenry	3,205	1,960	Luimnagh[39]	15,600
Gort	2,734	1,480	1,480	none
Metropolitan Satellites				
Barna & Moycullen (Galway City West Water Supply Scheme)	2,100	3,200	unknown	limited – tonabrucky. Info available from Galway City Council
Claregalway	741	2,650	Luimnagh[39]	15,600
Lower Tier Towns/Villages (<1500)				
Headford	760	1,230	Luimnagh[39]	15,600
Craughwell	414	170	170	limited
Clifden	1,497	950	950	none
Portumna	1,377	1,025	1,025	none
Carraroe	627	1,700	1,700	limited
Kinvara	563	1,550	1,550	limited
Spiddal	247	3,300	3,300	adequate
Oughterard	1,305	2,520	2,520	adequate
Clarinbridge/Kilcolgan	257	1,500	Luimnagh[39]	15,600
Mountbellew	746	1,820	1,820	adequate

Table 3.8 Existing Water Supply Information[40]

[39] These schemes have ample spare capacity and the current supply can be increased if required. Overall Luimnagh has the potential to supply an additional 15,600m^3 of treated water. It currently supplies 32,400m^3 to the various schemes throughout the County.

[40] Information on water supply has been provided by the Water Services Department of Galway County Council.

Settlement	Predicted Population in 2016	Predicted Demand in 2016 [m^3/day-approx.]	Planned Supply Capacity in 2016 [m^3/day-approx.]	Predicted Spare Capacity or Shortfall (based on highest predicted loading)	Water Supply Infrastructure priorities
Hub Town					
Tuam	8,964	7,434	ditto	Luimnagh[39]	
County Town					
Ballinasloe	7,698	5,125	ditto	565	
Key Towns (>1500)					
Loughrea	5,665	unknown	ditto	unknown	Potential upgrade resulting in increased capacity
Orranmore/Garraun	4,743	5,805	ditto	Luimnagh[39]	
Athenry	4,327	2,646	ditto	Luimnagh[39]	
Gort	3,554	1,923	ditto	443	
Metropolitan Satellites					
Barna & Moycullen (Galway City West Water Supply Scheme)	2,520	3,840	ditto	unknown	New Reservoir proposed- potential increase in capacity
Claregalway	986	3,526	ditto	Luimnagh[39]	
Lower Tier Towns/Villages (<1500)					
Headford	1,011	1,636	ditto	Luimnagh[39]	
Craughwell	497	204	ditto	34	Possible increase in capacity depending on Loughrea upgrade
Clifden	1,747	1,108	ditto	158	
Portumna	1,607	1,196	ditto	171	
Carraroe	732	1,984	ditto	284	
Kinvara	619	1,704	ditto	154	
Spiddal	272	3,634	ditto	334	
Oughterard	1,436	2,772	ditto	252	
Clarinbridge/Kilcolgan	283	1,651	ditto	Luimnagh[39]	
Mountbellew	821	2,002	ditto	182	

Table 3.9 Predicted[41] Water Supply Information

[41] Predictions have been calculated by extrapolation of demand from Plans' target populations (for the year 2016) at same ratios as current populations (Current (2006) Population (est.)) to current demand figures

3.9 Cultural Heritage

3.9.1 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.

The heritage of County Galway 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 localities and communities within the County and can become a focus of community identity and pride. An historic church or park, for example, can help define a neighbourhood and create a sense of local cohesion.

Human interaction with the land and sea is evident from the earliest of times up to the present in County Galway, from agricultural landscapes to archaeological remains to growing urban centres.

The urban streetscape, estate houses, megalithic tombs, castles, ecclesiastical remains, and vernacular buildings, field fences and gates, are some of the aspects of the built heritage that add to the character of the County. The dry stonewalls that delineate fields are another feature that contribute the County's sense of identity.

3.9.2 Archaeological Heritage

3.9.2.1 Introduction

Archaeology is the study of past societies through the material remains left by those societies and the evidence of their environment. Archaeological heritage consists of such material remains (whether in the form of sites and monuments or artefacts in the sense of moveable objects) and environmental evidence. As archaeological heritage can be used to gain knowledge and understanding of the past it is of great cultural and scientific importance.

Archaeological sites and monuments vary greatly in form and date; examples include earthworks of different types and periods, (e.g. early historic ringforts and prehistoric burial mounds), megalithic tombs from the Prehistoric period, medieval buildings, urban archaeological deposits and underwater features such as wrecks.

Archaeological sites may have no visible surface features; the surface features of an archaeological site may have decayed completely or been deliberately removed but archaeological deposits and features may survive beneath the surface.

County Galway contains various types of archaeological heritage which are protected as monuments. Multiple remains of prehistoric settlements, burial sites, holy wells, standing stones, earthen mounds and areas containing medieval field bank systems are found across the County.

A number of towns are rich in archaeology - the town of Tuam is listed on the Record of Monuments and Places, an entry which includes most of what is understood to be the historic core of the town.

Burial Grounds are an important part of the local heritage of certain areas within the County and often contain the standing remains or sites of earlier structures.

There are a number of castles located across the County: Aughnanure Castle, situated close to the shores of Lough Corrib, was built in the 16th century and is a particularly well-preserved example of an Irish tower house; Dunguaire Castle is a 16th-century tower house on the south-eastern shore of Galway Bay near Kinvarra; and, Kilcolgan Castle which was completed c.1250 is located on the banks of the Kilcolgan river overlooking Galway Bay.

The Aran Island Inishmaan has supported a community since prehistoric times - its bare limestone surface is divided by dry stone walls, reflecting the dense settlement which previously existed on the island.

The County contains a number of forts which were used for settlement and protection in the past - Dún Aonghasa, for example, is the largest of the prehistoric stone forts of the Aran Islands and is situated on a cliff overlooking the Atlantic Ocean.

3.9.2.2 Record of Monuments and Places

County Galway's archaeological heritage is protected under the National Monuments Acts (1930-2004), Natural Cultural Institutions Act

1997 and the Planning Acts. The Record of Monuments and Places (RMP) is an inventory, put on a statutory basis by amendment to the National Monuments Act 1994, of sites and areas of archaeological significance, numbered and mapped. The RMP includes all known monuments and sites of archaeological importance dating to before 1700 AD, and some sites which date from after 1700 AD.

Figure 3.31 shows the spatial distribution of entries to the RMP.

The majority of the monuments are located to the east of Lough Corrib, in the eastern half of the County, along the coastline, along river and lake banks and within and surrounding settlements such as Galway City, Headford, Tuam, Oranmore, Athenry, Loughrea and Gort - showing that most people have always lived in the same parts of Galway as they do today.

In the western half of the County clusters of monuments are found near the banks of Lough Corrib, within and surrounding Oughterard and in coastal areas to the east of Connemara. A high proportion of monuments are to be found on the Aran Islands.

3.9.3 Architectural heritage

3.9.3.1 Introduction

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 structures and buildings; and, sites which are of technical, historical, archaeological, artistic, cultural, scientific, social, or technical interest.

The physical form of the individual structures in the countryside and in the towns and villages of County Galway has evolved through many periods. The built heritage which has developed has attained a character that contributes to varied, locally distinctive areas in the County.

3.9.3.2 Record of Protected Structures

The Record of Protected Structures (RPS) included in the Development Plan is legislated for under Section 51 of the Planning and Development Act 2000.

Protected Structures are defined as structures, or parts of structures that are of special interest from an architectural, historical, archaeological, artistic, cultural, scientific, social or technical point of view.

In relation to a protected structure or proposed protected structure, the following are encompassed:

(i) the interior of the structure;
(ii) the land lying within the curtilage[42] of the structure;
(iii) any other structures lying within that curtilage and their interiors; and,
(iv) all fixtures and features which form part of the interior or exterior of any structure or structures referred to in subparagraph (i) or (iii).

County Galway's rich architectural heritage is reflected in the RPS for the County which currently lists 821 structures.

The Record of Protected Structures includes entries for many types of buildings including: castles, such as Claregalway Castle which guarded a crossing over the River Clare; large country houses set within demesne landscapes, such as the Gothic style Kilcornan which is set within a demesne with access provided via a gateway; vernacular structures within towns; mills, which reflect past industrial activities in certain areas; canal structures, reflecting past transport needs; bridges; railway stations; churches; and abbeys.

As is the case with archaeological monuments, the majority of Protected Structures are located to the east of Lough Corrib, in the eastern half of the County. Large clusters of the structures are found within the County's settlements while smaller clusters or individual structures are found in more rural areas. The majority of structures are located in areas where most of the County's existing development exists and where most new development is likely to occur.

[42] Curtilage is normally taken to be the parcel of ground immediately associated with the Protected Structure, or in use for the purposes of the structure. Protection extends to the buildings and land lying within the curtilage. While the curtilage sometimes coincides with the present property boundary, it can originally have included lands, features or even buildings now in separate ownership, e.g. the lodge of a former country house, or the garden features located in land subsequently sold off. Such lands are described as being attendant grounds, and the protection extends to them just as if they were still within the curtilage of the Protected Structure.

3.9.3.3 Architectural Conservation Areas

In addition to these Protected Structures, there are nine Architectural Conservation Areas (ACAs) adopted in the current County Development Plan. These ACAs are found in the following settlements:

- Oughterard;
- Headford;
- Tuam;
- Oranmore;
- Athenry;
- Clarinbridge;
- Loughrea;
- Gort; and
- Portumna.

An ACA is a place, area or group of structures or townscape which is of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest or value, or contributes to the appreciation of protected structures, whose character it is an objective to preserve in a development plan. The ACA designation requires that planning permission must be obtained before significant works can be carried out to the exterior of a structure in the ACA which might alter the character of the structure or the ACA.

ACAs enable the protection of the existing character of areas within the settlements listed above throughout the County. This character is a combination of the various layers of development from earliest times to the present. Though often not individually very important, vernacular buildings contribute to the acknowledged distinctive character of many of the County's towns. Collectively, if properly used and maintained, they can make a significant impact on the retention and enhancement of that character which is important in maintaining local distinctiveness for both inhabitants and visitors.

Figure 3.32 shows indicative locations of ACAs within the County.

3.9.4 Existing Environmental Problems

No existing problems have been identified with regard to cultural heritage within County Galway; however, although many aspects of the heritage are protected under legislation, impacts can still occur as a result of development.

Archaeology can be previously unknown but can be damaged through development causing ground disturbance. This is particularly relevant whereby development encroaches onto areas within the Zones of Archaeological Potential of certain monuments.

Developments which involve material alteration or additions to protected structures can detract from the special character of structures and their settings, and have the potential to result in the loss of features of architectural or historic interest and the historic form and structural integrity of structures.

Development on sites adjoining protected monuments, places or structures can also impact upon the setting of these cultural heritage items.

Encouraging and facilitating the accommodation of growth on brownfield sites will contribute to mitigating a number of the adverse impacts associated with greenfield development, however, brownfield development has the potential to significantly adversely impact upon cultural heritage - both archaeological and architectural - if unmitigated against. These impacts are most likely in the oldest settlements within the County.

The cumulative accommodation of large scale development in the County's various settlements has the potential to cumulatively impact upon cultural heritage.

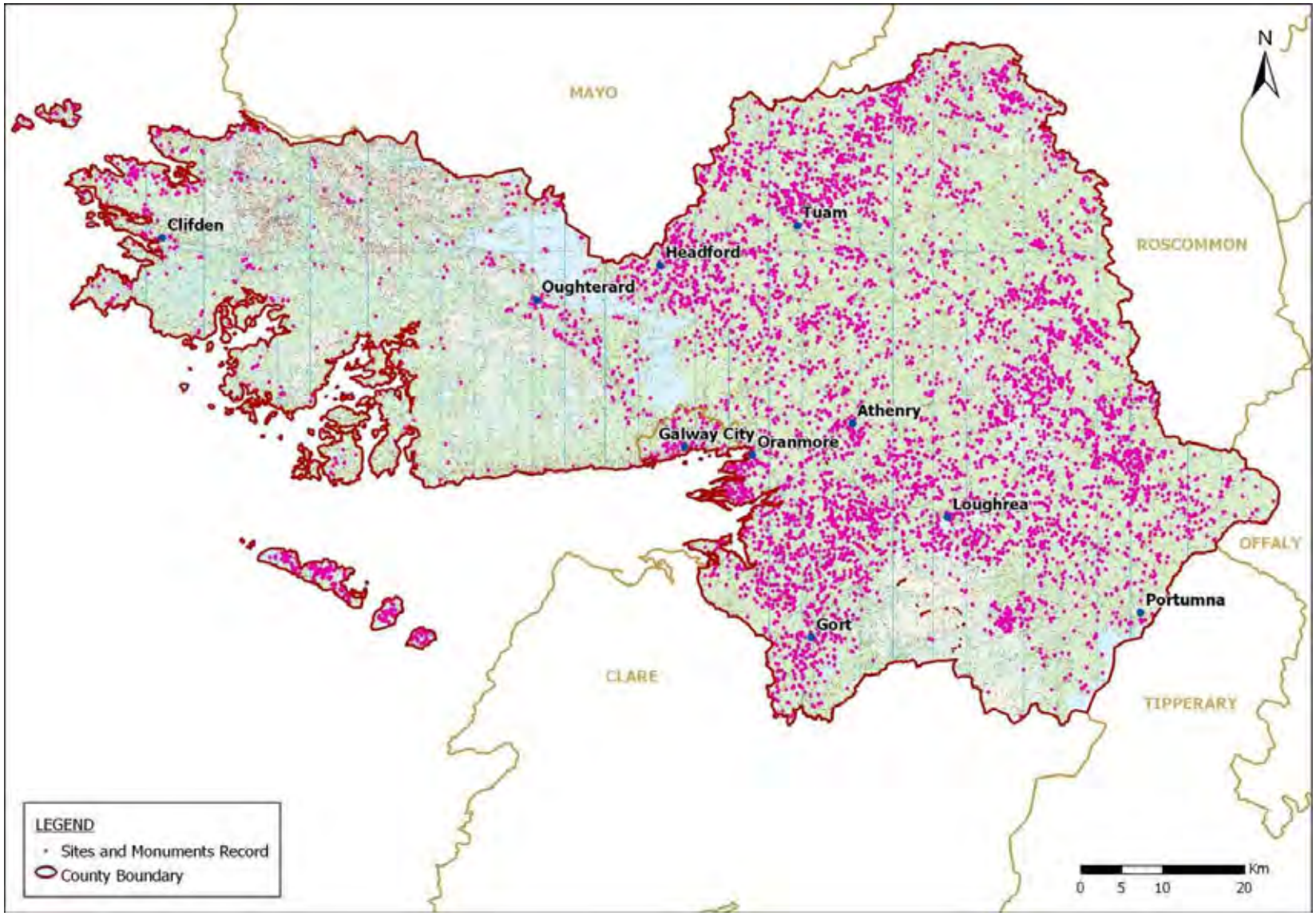

Figure 3.31 Entries to the Record of Sites and Monuments
Source: Galway County Council (Unknown)

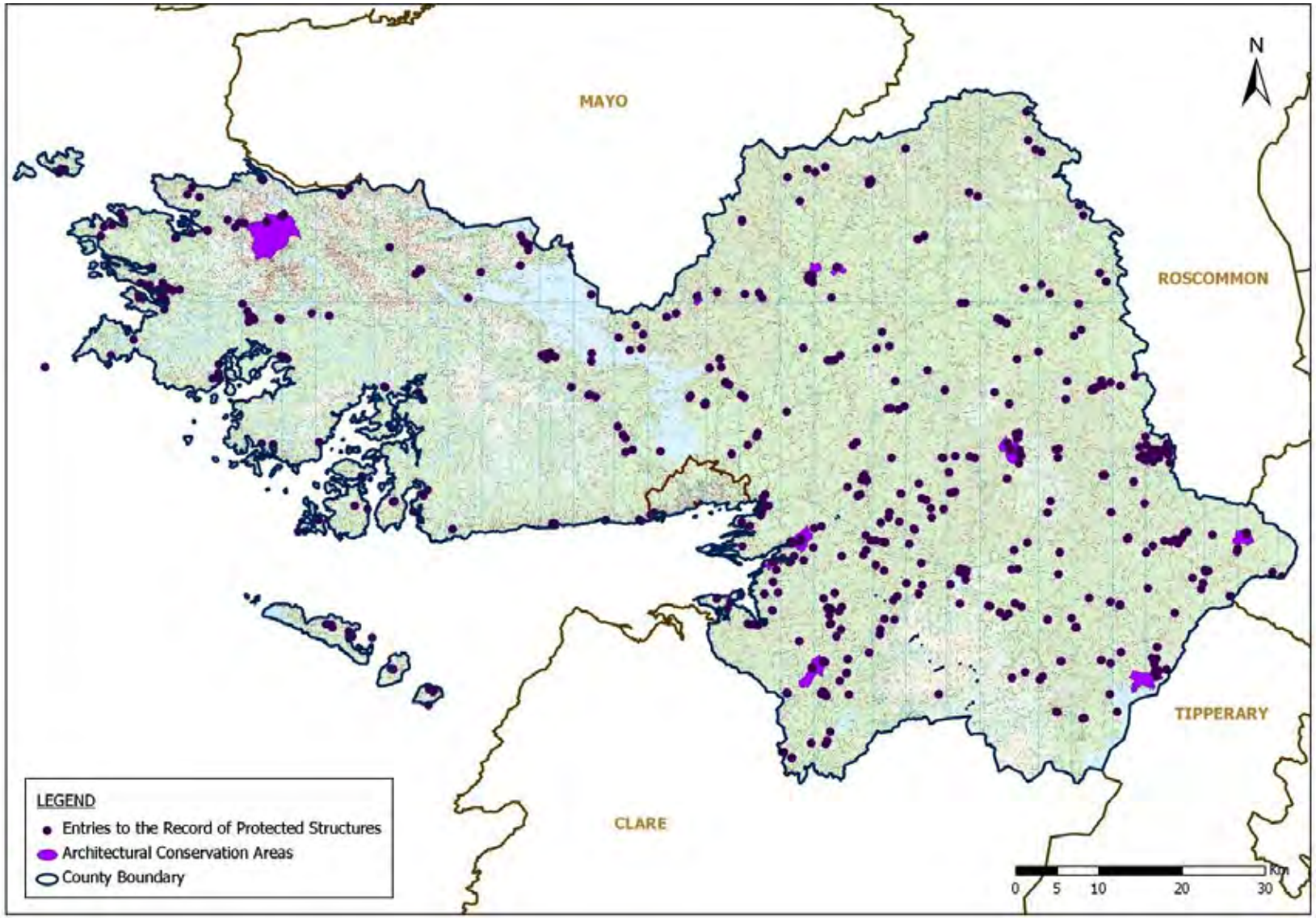

Figure 3.32 Architectural Heritage - Entries to the Record of Protected Structures and Architectural Conservation Areas
Source: Galway County Council (Unknown)

3.10 Landscape

3.10.1 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; landcover, which includes vegetation, water, human settlements, and; human values which are a result of historical, cultural, religious and other understandings and interactions with landform and landcover.

Human interaction with the natural heritage has produced a variety of characteristic landscapes and landscape features. The natural diversity of the landscapes of the County coupled with cultural features such as the archaeological monuments, stonewalls, hedgerows, woodlands, field patterns, settlements and buildings has given the County its distinctive character.

County Galway is richly endowed with a variety of landscape types ranging from the quartzite mountain ranges and blanket bogs of Conamara to the fertile patchwork of farmland in east Galway and the bare karst pavements of the Aran Islands and South Galway.

West Galway is a rugged landscape with mountains, bogs, rivers and lakes. Galway is bounded to the west by an extensive and varied Atlantic coastline, which ranges from cliffs to sand dunes and rocky shores to salt marshes.

East Galway is characterised by a low-lying rolling topography of a fertile limestone plain, rich pasturelands, bog, and the Shannon system with its Callows and Lough Derg.

The County is dissected by many rivers and lakes with Lough Corrib, Ireland's second largest lake at its centre.

A multitude of dry stone walls typifies the landscape of the Aran Islands. Seascapes vary from the steep cliffs of the Aran Islands to sandy beaches and the famous Coral Strand, west of Carraroe, to the long fjord-like inlet of Killary harbour.

3.10.2 Legislation

The importance of landscape and visual amenity and the role of its protection are recognised in the Planning and Development Act 2000, which requires that Development Plans include objectives for the preservation of the landscape, views and the amenities of places and features of natural beauty.

The increasing development pressure of recent years has caused changes in the national landscape, which are unprecedented in scale and nature. The DEHLG have set out guidelines[43] for landscape assessment in order to help ensure that landscapes are maintained in a sustainable manner, while at the same time enabling a proactive approach to development.

Galway County Council has prepared a Landscape Character Assessment for the County which classifies the different landscapes of the County in relation to their different characteristics and values and their degree of sensitivity to various kinds of development.

3.10.3 Landscape Character Assessment[44]

3.10.3.1 Introduction

Galway County Council's (2003) Landscape Character Assessment classifies landscapes in Galway according to their:

- Character (see Figure 3.33);
- Values (see Figure 3.34); and,
- Sensitivity (see Figure 3.35).

Each of these classifications is described below with an overall summary provided on Table 3.10.

3.10.3.2 Landscape Character Areas

Landscape character is a combination of landform, land cover and visual units, which are attractive in the landscape.

Landscape character areas were defined by a combination of professional judgement relating to the physical elements which make up the landscape of an area and the following aspects taken from the DEHLG landscape assessment methodology:

- Physical units i.e. the combination of land form and land cover comprising: - visual

[43] DEHLG (2000) *Landscape and Landscape Assessment Guidelines* Dublin: Government of Ireland

[44] Text in this section is sourced from the Galway Landscape Character Assessment (Galway County Council, 2003)

units i.e. physical limits of a view and image units i.e. physical features such as focal points.

25 character areas were identified as follows:

Area 1:
North east Galway (Ballinasloe to Ballymoe)

The landscape is flat to undulating open pastoral land is bound by field hedgerows, with small scattered coniferous plantations of 1-6 km² in size. There are no areas of particular scenic value. This area is primarily rural and includes the settlements of Ballinasloe, Mountbellew Bridge, Glennamaddy, Ballymoe and Dumore.

Area 2:
Shannon and Suck River Valley between Portumna and Ballinasloe

The landscape of the river valley is flat bordered by deciduous trees and water-edge planting. Also along the riverbank are recreational facilities for fishing, bird watching and boating. There are local scenic views along the river and to the local heritage sites. Long distant views are to the Aughty Mountains.

Area 3:
East central Galway (Athenry, Ballinasloe to Portumna)

The landscape is flat, coarse grassland, occasional clumps of coniferous forestry between 1-3 km² in size, fields defined principally by stone walls. There are no areas of particular scenic value although the stone walls are quite distinct.

Area 4:
Southeast Galway (Clarinbridge to Gort)

The landscape is undulating scrubby grassland, bound by field hedgerows without mature trees. The landscape is scenic without being remarkable and there are long distance views of the Slieve Aughty Mountains to the east.

Area 5:
Northeast Galway (Tuam environs)

Landscape is flat, fertile pastoral land bound with field hedgerows. There is little or no coniferous forestry or deciduous woodland. There are no areas of particular scenic value.

Area 6:
Slieve Aughty Mountains

The landscape is mountainous with areas of both coniferous and deciduous woodland. The landscape is wild, natural and scenic. Long distant glimpse views are available through the trees towards the lower ground in the surrounding areas.

Area 7:
Northwest Lough Derg

This is an enclosed, intimate landscape surrounding the northwestern portion of the Lough. The northern and western water edge within County Galway includes many recreational facilities including forest walks, golf, access to heritage sites and picnic areas. The area is scenic and semi natural.

Area 8:
Lower Burren

The landscape is flat to undulating, with poor quality grassland around an abundance of stones and large rocks. The land is open with no hedgerows or trees or built elements and is quite barren yet scenic in a wild natural sense.

Area 9:
Inveran to Galway City coastline

The coast is flat, comprising rocks and sand merging with natural grassland towards the R336. The coast line commands striking views of County Clare and the Aran Islands. Further inland from the R336 route, there are residential and some light industrial developments which have lowered the scenic value in this area.

Area 10:
East Connemara Mountains (Moycullen, Recess to Glinsk)

The landscape is largely mountainous with slopes covered with coniferous forestry. The lower areas comprise rocky out crops and areas of rough grassland around the many small loughs and turloughs. The landscape is scenic although not remarkable.

Area 11:
Lough Corrib and environs

Lough Corrib is a wide, dramatic expanse of water including many islands supporting deciduous woodland. The land around the northern part of the Lough is undulating heath, bog and coniferous

forestry where as the land surrounding the southern section is flat, open grassland. The landscape of the Lough and its surrounds is highly scenic and includes many facilities for visitors.

Area 12:
South foothills of east Connemara Mountains

The landscape of the foothills is undulating heath and scrubland with regular rocky outcrops. The area is generally undeveloped and has expansive views in a southerly direction across Galway Bay towards County Clare.

Area 13:
East Galway Bay
(Oranmore to Kinvarra Bay and inland to N18 road)

The coastline is intimate and sinuous with many sheltered inlets. The coast is scenic and relatively undeveloped. The landscape adjacent to the coast comprises pastureland in large fields bordered by mature hedgerows. The existing vegetation screens the coastline from roads and properties inland of the N18 road.

Area 14:
West Connemara

The landscape is flat low lying bog and heath with many scattered lakes and turloughs. There is very little development and the landscape is atmospheric and quite distinct although not highly scenic.

Area 15:
Lettermore and Gorumna Islands

The landscape is flat, open, rough grass and scrub with frequents rocky out crops. There are many small scale residential and community developments within this area most with south and west facing views towards Galway Bay. The landscape is developed yet not spoilt and the overall setting of the low-lying islands and the sea is quite scenic.

Area 16:
West foothills of east Connemara Mountains (Glenicmurrin Lough environs)

This landscape is flat to undulating, open with little vegetation and comprises lakes and bog land. There is very little development in this area yet it is not of high scenic value.

Area 17:
Carraroe (Cashla Bay to Glencoh)

This area is flat, open and exposed. The landscape comprises wetland and rocky outcrop in-between the many scattered residential dwellings. The landscape is developed yet not spoilt and the overall setting of the coastal inlet and Kilkieran Bay is quite scenic.

Area 18:
Bertraghboy bay and eastern banks

The landscape around Bertraghboy bay is undulating and rises to meet Cnoc Mordain Mountain. The land comprises rough grass and bog in amongst the scattered residential and light industrial developments. The landscape is not particularly scenic although views towards the bay from the many dwellings are expansive and quite dramatic.

Area 19:
West Coast (Gorteen bay to Clifden)

The coastline from Gorteen Bay to Clifden is low lying, harsh and exposed and the adjacent land is rough grassland with rocky outcrops. There is very little development within this area and the landscape is generally dramatic and scenic.

Area 20:
West Coast (Clifden to mouth of Killary Harbour)

The landscape varies from undulating to mountainous with scattered coniferous forestry up to 1km² in size. There are many residential developments within this area particularly in the Cleggan area, which have reduced the scenic value of the rural landscape land however westerly sea views are expansive and dramatic.

Area 21:
Killary Harbour and southern banks

The landscape along the southern banks of the Killary Harbour is steep heath land with no tree cover. There are no developments along this stretch of land except for a visitor center and several parking areas. The scenic value of the landscape is high due to the dramatic aerial views along the Harbour and to the Mweelrea Mountains beyond.

Area 22:
Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)

This area comprises a diverse range of natural landscapes from mountains, valleys, and loughs to coniferous and deciduous woodlands. Integrated within this area are visitor facilities sensitively located so as to avoid visual intrusion. The area is unspoiled and highly scenic with outstanding views throughout.

Area 23:
Joyces Country (including Lehanagh Loughs and south Lough Mask)

The landscape of this area includes steep mountains, heath and bog land and rough grass. Within this area woodland is confined to the valley bottom between Maumturk and Bunnacunneen Mountains. In spite of the scattered development and the many parking areas and viewing points this area is highly scenic with dramatic views throughout.

Area 24:
Aran Islands

The landscape of the Aran Islands is flat stony and without tree cover. Small fields used for pasture are bound by stone walls. The coast is steep and rocky along the southern side and flat and stony along the northern side. In spite of the many new residential developments on the Aran Islands, the open character of the landscape is highly scenic with expansive dramatic views in all directions.

Area 25:
Lough Rea

The landscape of Lough Rea is flat, enclosed and intimate. The Lough is screened to the north and the northeast by the town of the same name and to the south by the wooded slopes of the Slieve Aughty Mountains. There are many small vegetated islands in the Lough which add to its high scenic value. Around the banks of the Lough are many recreational facilities including boating, parking and picnic areas, which sit sensitively within the landscape and do not detract from the intimate landscape setting.

3.10.3.3 Landscape Values

Landscape values were derived for each landscape character area by consideration of environmental and cultural benefits such as visual beauty, ecology, archaeology, social history, religious sites and mythology. Landscape values combining all environmental and cultural benefits were decided through liaison with Galway County Council's Forward Planning Department.

The values were given a score ranging from low to medium to high to outstanding.

The landscape value attributed to each of the landscape character areas identified in Section 3.10.3.2 is shown on Table 3.10.

3.10.3.4 Landscape Sensitivity Classes

Landscape sensitivity is a measure of the ability of the landscape to accommodate change or intervention without suffering unacceptable effects to its character and values. Sensitivity ratings are derived from a combination of landscape values and landscape character.

The following five sensitivity classes were established by the Landscape Character Assessment:

- Class 1 – Low sensitivity;
- Class 2 – Moderate sensitivity;
- Class 3 – High sensitivity;
- Class 4 – Special; and,
- Class 5 – Unique.

The most sensitive landscapes are 'Class 5 - Unique', 'Class 4- Special' and 'Class 3- High sensitivity' while landscapes of lesser sensitivity are 'Class 2- Moderate sensitivity' and 'Class 1- Low sensitivity'.

The landscape sensitivity class attributed to each of the landscape character areas identified in Section 3.10.3.2 is shown on Table 3.10.

3.10.4 Focal Points / Views

Focal points and views were identified as part of the Landscape Character Assessment and these are provided a degree protection from the effects of development under the current County Development Plan. There are 122 protected focal points and views in total. They include: long distant views of areas such as Connemara, Lough Corrib, Galway Bay, the Burren, the Slieve Aughty Mountains, the coasts of Galway and North Clare; and, local focal points such as castle ruins, church spires, cemeteries and old mills. Focal points and views are mapped on Figure 3.36.

Area No.	Landscape Character Area	Value	Sensitivity
1	Northeast Galway (Balinasloe to Ballymoe)	Low	Class 1 - Low, with pockets of Class 2 - Moderate
2	Shannon and Suck River Valley between Portumna and Ballinasloe	Medium	Class 4 - Special
3	East central Galway (Athenry, Ballinasloe to Portumna)	Low	Class 1 - Low, with pockets of Class 2 - Moderate
4	Southeast Galway (Clarinbridge to Gort)	Medium	Class 2 - Moderate, with pockets of Class 3-High
5	Northeast Galway (Tuam environs)	Low	Class 1 - Low, with pockets of Class 2-Moderate
6	Slieve Aughty Mountains	Medium	Class 3 - High
7	Northwest Lough Derg	Medium	Class 4 - Special
8	Lower Burren	Outstanding & Medium	Class 4 - Special, with pockets of Class 2 - Moderate
9	Inveran to Galway City coastline	High	Class 3 - High, with a parallel strip of Class 4-Special
10	East Connemara Mountains	High	Class 3 - High, with pockets of Class 4 - Special
11	Lough Corrib and environs	Outstanding	Class 5 - Unique, with pockets of Class 3 - High & Class 4 - Special
12	South foothills of east Connemara Mountains	Medium	Approximately half Class 4 - Special, and half Class 3 - High
13	East Galway Bay (Oranmore to Kinvarra Bay and inland to N18 road)	High	Class 3 - High with a coastal edge of Class 4 - Special
14	West Connemara	Outstanding	Class 4 - Special
15	Lettermore and Gorumna Islands	High	Class 3 - High, with a coastal edge of Class 4 - Special
16	West foothills of east Connemara Mountains (Glenicmurrin Lough environs)	High	Class 3 - High
17	Carraroe (Cashla Bay to Glencoh)	High	Class 3 - High, with a coastal edge of Class 4 - Special
18	Bertraghboy bay and eastern banks	High	Class 4 - Special
19	West Coast (Roundstone to Clifden).	Outstanding	Class 4 - Special
20	West Coast (Clifden to mouth of Killary Harbour)	Outstanding	Class 3 - High, with a coastal edge of Class 4 - Special
21	Killary Harbour and southern banks	Outstanding	Class 5 - Unique, with pockets of Class 4 - Special
22	Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)	Outstanding	Class 5 - Unique
23	Joyces Country (including Lehanagh Loughs and south Lough Mask)	Outstanding	Class 5 - Unique, with pockets of Class 4 - Special
24	Aran Islands	Outstanding	Class 5 - Unique, with pockets of Class 4 - Special
25	Lough Rea	High	Class 4 - Special

Table 3.10 Landscape Character Areas and their Values and Sensitivity

3.10.5 Existing Environmental Problems

Housing development has the potential to threaten valuable and sensitive landscapes in coastal areas throughout the County; and, wind energy development in the west of the County potentially poses the greatest threat to valuable and sensitive landscapes in the west of the County, where wind energy potential is at its greatest.

Individual one-off housing developments often do not have significant adverse impacts, however cumulatively they have the potential to cumulatively and adversely significantly impact upon sensitive landscapes.

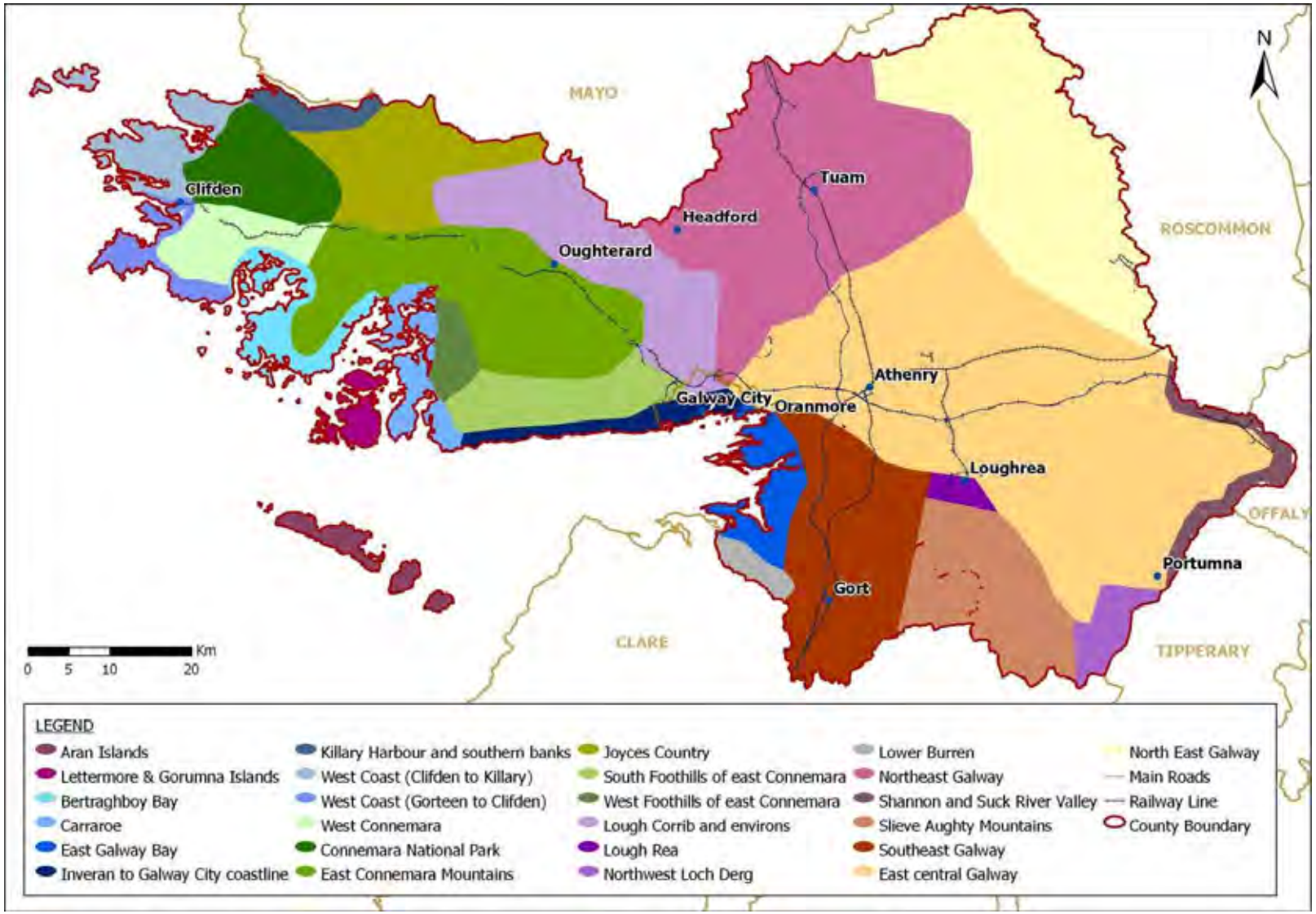

Figure 3.33 Landscape Character Areas
Source: Galway County Council (2009)

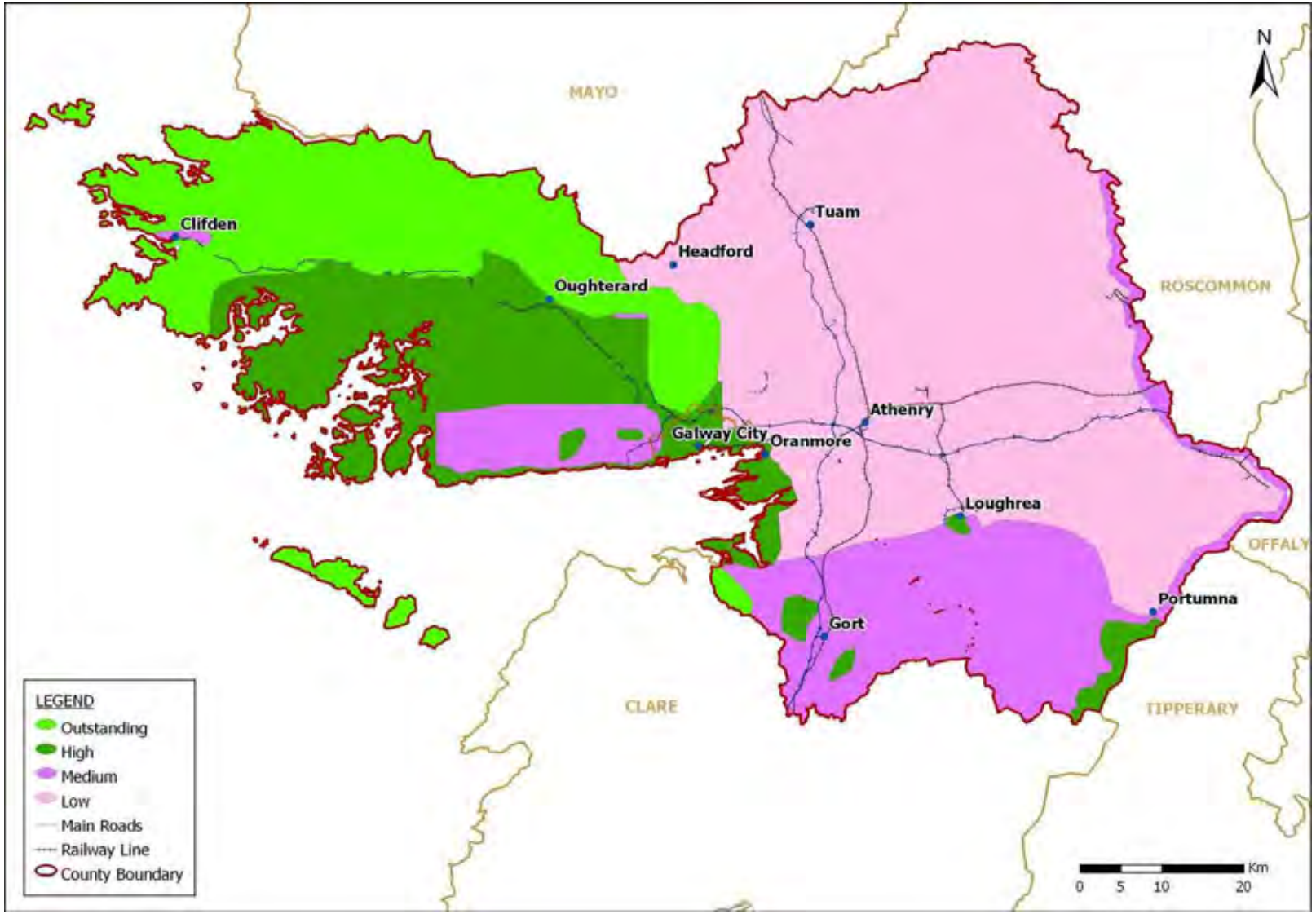

Figure 3.34 Landscape Values
Source: Galway County Council (2009)

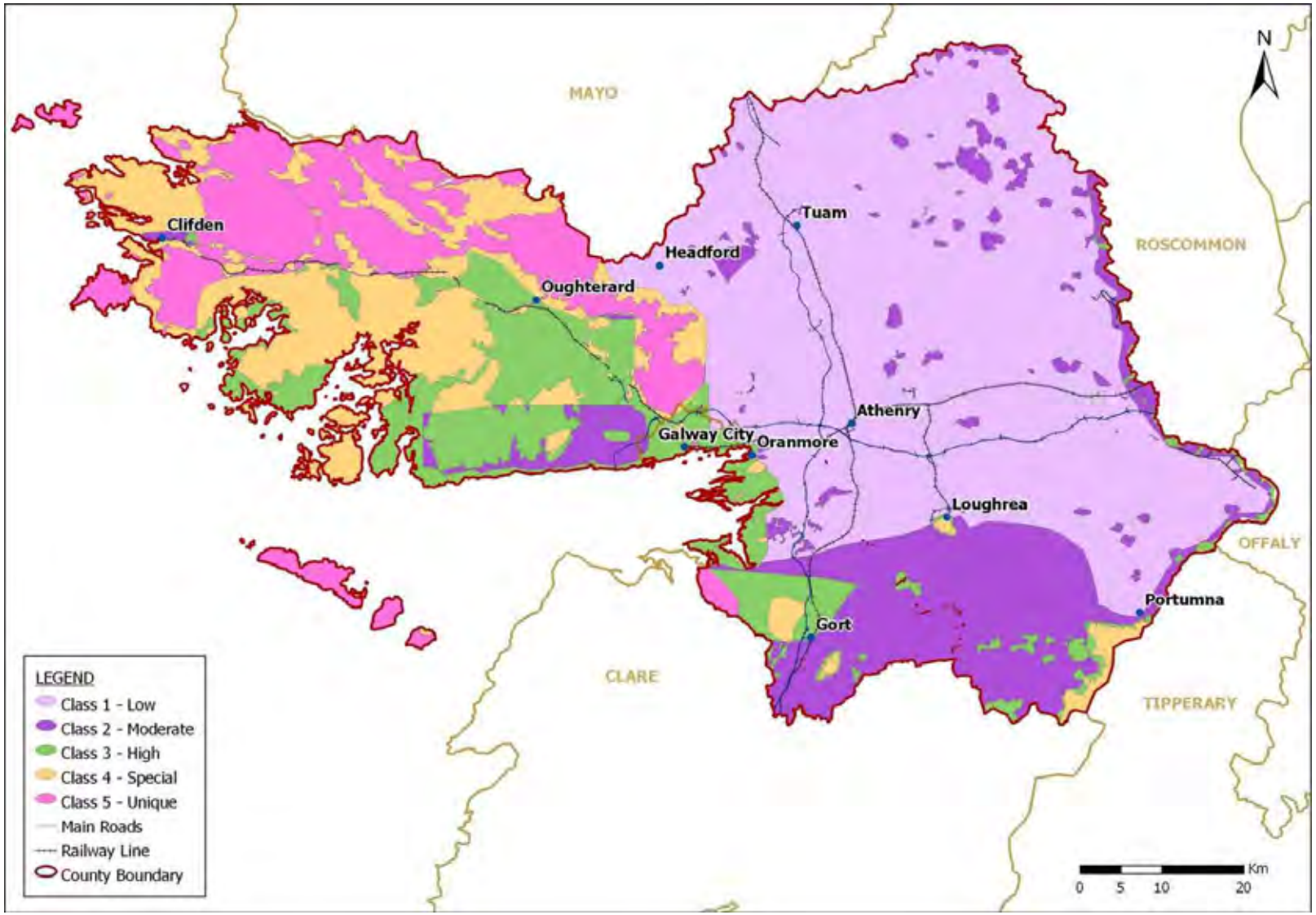

Figure 3.35 Landscape Sensitivity Classification
Source: Galway County Council (2009)

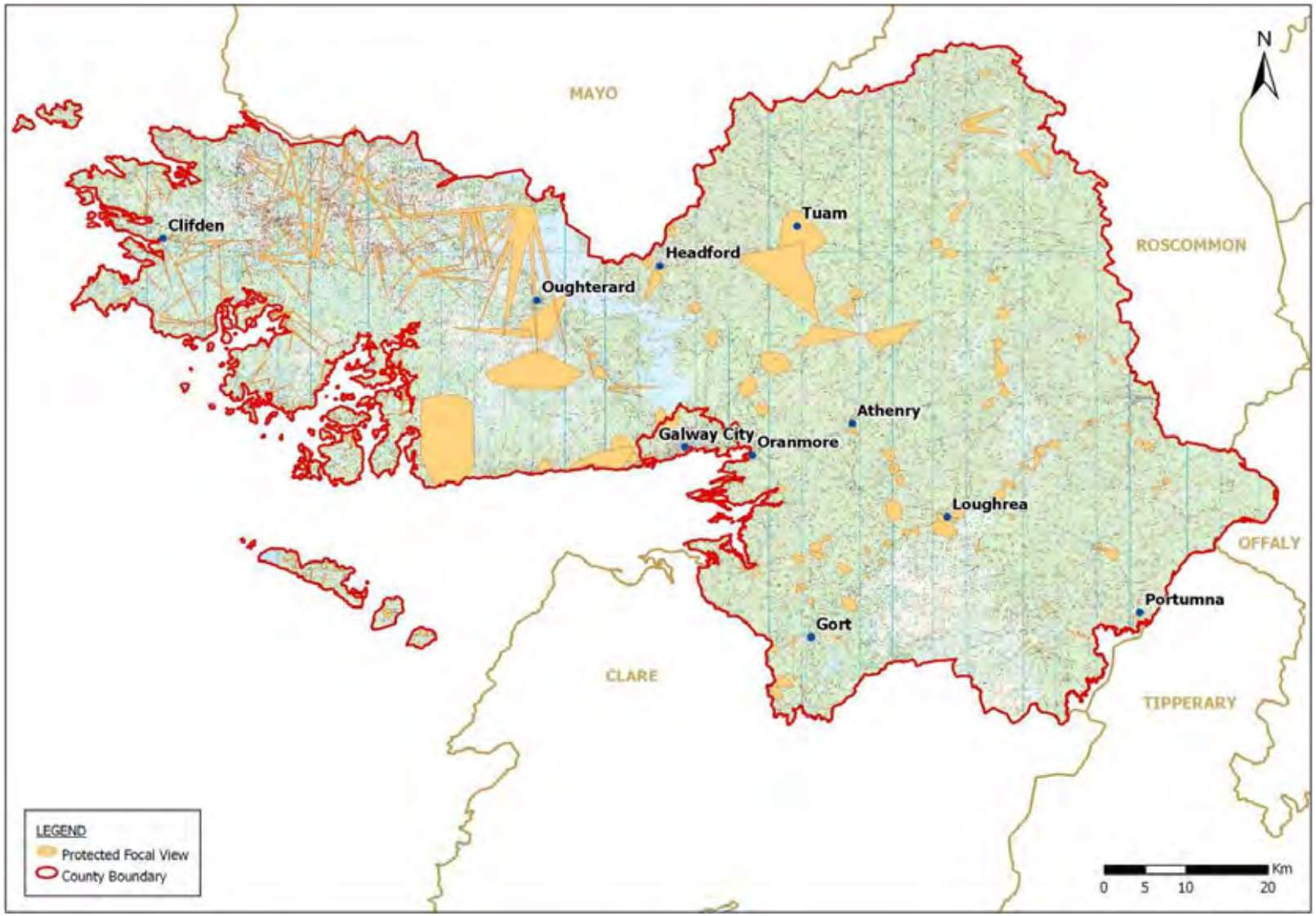

Figure 3.36 Focal Points and Views
Source: Galway County Council (2009)

Section 4 Strategic Environmental Objectives

4.1 Introduction

Strategic Environmental Objectives (SEOs) are methodological measures against which the environmental effects of the Variation can be tested. If complied with in full, SEOs would result in an environmentally neutral impact from implementation of the Variation. The SEOs are set out under a range of topics and are used as standards against which the provisions of the Variation can be evaluated in order to help identify areas in which significant adverse impacts are likely to occur, if unmitigated.

SEOs are distinct from the objectives of the Variation - although they will often overlap - and are developed from international, national and regional policies which generally govern environmental protection objectives. Such policies include those of various European Directives which have been transposed into Irish law and which are required to be implemented.

The SEA Directive requires that the evaluation of plans and programmes be focused upon the relevant aspects of the environmental characteristics of areas likely to be significantly affected. In compliance with this requirement, the SEA has focused upon the most relevant aspects of the environmental characteristics within and surrounding the County. SEOs relating to these environmental characteristics have been identified and developed for the SEA.

A number of SEOs are linked to indicators which can facilitate monitoring the environmental effects of implementing the Variation when made to the Development Plan, as well as to targets which the Variation can help work towards.

The primary source used in formulating the SEOs was Table 4B of the SEA Guidelines (DEHLG, 2004)[45]. This list has been amended to give affect to objectives that are considered relevant to the Variation. The use of SEOs, although not a statutory requirement, does fulfil obligations set out in Schedule 2B of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI No. 436 of 2004).

4.2 Biodiversity, Flora and Fauna

4.2.1 International, European and National Strategic Actions

4.2.1.1 UN Convention on Biological Diversity 1992

The United Nations Convention on Biological Diversity 1992 requires the promotion of the conservation and sustainable use of biodiversity.

4.2.1.2 National Biodiversity Plan 2002

The preparation and implementation of Ireland's National Biodiversity Plan 2002[46] complies with an obligation under the UN Convention on Biological Diversity. The overall goal of the Plan 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. Objectives following on from this goal are to:

- Conserve habitat diversity, including all sites of special biodiversity importance;
- Conserve species diversity;
- Conserve genetic diversity, both wild and domesticated; and
- Contribute to the conservation and sustainable use of biodiversity and to advancing other obligations of the CBD in the EU, regionally and internationally.

[45] DEHLG (2004) Implementation of SEA Directive (2001/42/EC): *Guidelines for Regional Authorities and Planning Authorities* Dublin: Government of Ireland.

[46] Department of Arts, Heritage, Gaeltacht and the Islands (2002) *National Biodiversity Plan* Dublin: Government of Ireland

4.2.1.3 Birds Directive 1979

The 1979 European Council Directive on the Conservation of Wild Birds (79/409/EEC), referred to as the Birds Directive, - as well as its amending acts - seeks to: protect, manage and regulate all bird species naturally living in the wild within the European territory of the Member States, including the eggs of these birds, their nests and their habitats; and regulate the exploitation of these species.

Special Protection Areas (SPAs) are provided protection under the Directive and have been designated by the DEHLG due to their conservation value for birds of importance in the European Union.

4.2.1.4 Habitats Directive 1992

The European Council Directive on the Conservation of natural habitats and of wild fauna and flora (92/43/EEC), referred to as the Habitats Directive, aims to ensure the conservation of certain natural habitats and species which are at favourable conservation status. 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. The 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.

The obligation to undertake Appropriate Assessment derives from Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. Appropriate Assessment is a focused and detailed impact assessment of the implications of a plan or project, alone and in combination with other plans and projects, on the integrity of a Natura 2000 site in view of its conservation objectives.

The Habitats Directive seeks to establish Natura 2000, a network of protected areas throughout the EU. SACs together with SPAs - which are designated under the 1979 Birds Directive - form Natura 2000.

4.2.1.5 Wildlife Act 1976 and Wildlife (Amendment) Act 2000

The basic designation for wildlife is the Natural Heritage Area (NHA). They cover nationally important semi-natural and natural habitats, landforms or geomorphological features, wildlife plant and animal species or a diversity of these natural attributes. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation.

Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated - designation will proceed on a phased basis over the coming years.

Prior to statutory designation, pNHAs are subject to limited protection, in the form of:

- Rural Environment Protection Scheme (REPS) plans which require conservation of pNHAs and operate for a period of 5 years;
- Forest Service requirement for NPWS approval before they will pay afforestation grants on pNHA lands; and/or,
- Recognition of the ecological value of pNHAs by Planning and Licensing Authorities.

4.2.2 SEOs, Indicators and Targets

The following SEOs, Indicators and Targets have been identified and developed with regard to the objectives of the above strategic actions and the environmental baseline described in Section 3.

SEO B1:	To ensure compliance with the Habitats Directive with regard to the protection of Natura 2000 Sites and Annexed habitats and species[47]
Indicator B1:	Conservation status of habitats and species as assessed under Article 17 of the Habitats Directive
Target B1:	Maintenance of favourable conservation status for all habitats and species protected under national and international legislation to be unaffected by implementation of the Plan as varied[48]

SEO B2:	To ensure compliance with Article 10 of the Habitats Directive with regard to the management of environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species
Indicator B2:	Percentage loss of functional connectivity to environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species without remediation as a result of implementation of the Variation
Target B2:	No significant environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species to be lost without remediation as a result of implementation of Variation

SEO B3:	To avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites
Indicator B3:	Number of significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites resulting from implementation of the Variation
Target B3:	Avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites resulting from implementation of the Variation

Note: the impact of implementing the Variation on aquatic biodiversity and flora and fauna is also influenced by both impacts upon the quality of surface water bodies - which relates to SEO W1 - and the provision of appropriate levels of waste water treatment infrastructure - which relates to SEO M1.

4.3 Population and Human Health

4.3.1 Population

In order to promote sustainable development and allow for public transport systems to function more effectively - as promoted by higher level land use strategic actions including the National Spatial Strategy - it is essential to consolidate the physical growth of development of the County.

[47] 'Annexed habitats and species' refers to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.

[48] Except as provided for in Section 6(4) of the Habitats Directive, viz. There must be:
(a) no alternative solution available;
(b) imperative reasons of overriding public interest for the plan to proceed; and,
(c) adequate compensatory measures in place.

This can be achieved through the development of underutilised lands, in particular where they are in close proximity to public transport routes.

The DEHLG's Residential Density Guidelines 1999 and the DEHLG's Sustainable Residential Development in Urban Areas Guidelines 2008 recommend planning authorities to promote higher residential densities, particularly in redeveloping 'brownfield' sites and in proximity to public transport corridors.

The impacts of implementing the Variation on both the spatial distribution of population and the nature of development with regard to greenfield and brownfield development relates to SEO S1 which aims to maximise sustainable brownfield development and minimise greenfield development.

4.3.2 Human Health

4.3.2.1 Overview

The impact of implementing the Variation on human health is determined by the impacts which the Variation will have upon environmental vectors. Impacts would be influenced by the extent to which new development is accompanied by appropriate infrastructure - this relates to SEOs M1 and M2; Impacts upon the quality of water bodies - these relate to SEOs W1 and W2; and, the extent of development provided which would affect flood risk - this relates to SEO W3.

4.3.2.2 Emission Limits

Emission limits for discharges to air, soil and water are set with regards to internationally recognised exposure limit values. These are generally set to be many times the safe exposure limit - in order to provide protection. In the event that a land-use plan began to have adverse health effects on surrounding populations it is likely that it would have been identified as being in breach of such emission standards at a very early stage - and long before the manifestation of any adverse health effects in the population. Nonetheless for the sake of consistency with the requirements of the SEA Regulations this section includes an objective, indicator and target for health.

4.3.3 SEO, Indicator and Target

The following SEO, Indicator and Target have been identified and developed for the environmental components of population and human health.

SEO HH1:	To protect human health from hazards or nuisances arising from exposure to incompatible landuses
Indicator HH1:	Occurrence (any) of a spatially concentrated deterioration in human health arising from environmental factors as identified by the Health Service Executive and Environmental Protection Agency
Target HH1:	No spatial concentrations of health problems arising from environmental factors as a result of implementing the Variation

4.4 Soil

4.4.1 Proposal for a Soil Framework Directive

To date, there is no legislation which is specific to the protection of soil resources and soil protection is addressed indirectly and/or within sectoral policies such as water, waste, and nature protection.

However, there is currently an EU Thematic Strategy on the protection of soil which 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 suggests that this may be achieved through rehabilitating brownfield sites, thus reducing the depletion of greenfield sites. The proposed Directive also states 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.

4.4.2 SEOs, Indicators and Targets

SEO S1:	Maximise the sustainable re-use of brownfield lands, and maximise the use of the existing built environment rather than developing greenfield lands
Indicator S1:	Area of brownfield lands developed in the County over the lifespan of the Development Plan
Target S1:	Arising from increased levels of brownfield development, a reduced availability of brownfield land in the County (subject to availability on the open market, the demand for such land and the ability for such lands to be sustainably re-used) at the end of the Plan's lifespan

4.5 Water

4.5.1 The Water Framework Directive 2000

Since 2000, Water Management in the EU has been directed by the Water Framework Directive 2000/60/EC (WFD). The WFD has been transposed into Irish legislation by the European Communities (Water Policy) Regulations 2003 (SI No. 722 of 2003). The WFD requires that all member states implement the necessary measures to prevent deterioration of the status of all waters - surface, ground, estuarine and coastal - and protect, enhance and restore all waters with the aim of achieving good status by 2015.

4.5.2 Quality Standards for Surface Waters

The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009) is the final major piece of legislation needed to support the WFD and gives statutory effect to Directive 2008/105/EC on environmental quality standards in the field of water policy. The Surface Waters Regulations also give further effect to the WFD, establishing a framework for Community action in the field of water policy and Directive 2006/11/EC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community.

The Surface Waters Regulations apply to all surface waters - including lakes, rivers, canals, transitional waters, and coastal waters - and provide, inter alia, for:

- The establishment of legally binding quality objectives for all surface waters and environmental quality standards for pollutants;
- The examination and where appropriate, review of existing discharge authorizations by Public Authorities to ensure that the emission limits laid down in authorisations support compliance with the new water quality objectives/standards;
- The classification of surface water bodies by the EPA for the purposes of the Water Framework Directive;
- The establishment of inventories of priority substances by the EPA, and;
- The drawing up of pollution reduction plans by coordinating local authorities (in consultation with the EPA) to reduce pollution by priority substances and to cease and/or phase out discharges, emissions or losses of priority hazardous substances.

In addition, the Regulations require that a public authority shall not, in the performance of its functions, undertake those functions in a manner that knowingly causes or allows deterioration in the chemical status or ecological status (or ecological potential as the case may be) of a body of surface water.

In order to satisfy the overall WFD objective of 'good status', a surface water body must achieve the requirements of the good ecological[49] and chemical[50] status.

[49] Ecological status comprises: biological quality elements, physiochemical conditions and hyrdomorphological quality elements. The overall ecological status of the water body is determined by the lowest level of status achieved across all quality elements.

4.5.3 Quality Standards and Threshold Values for Ground Water

Detailed provisions to achieve the aims of the WFD for ground water have been presented in a Groundwater Daughter Directive (Directive 2006/118/EC on the protection of groundwater against pollution and deterioration).

This Directive sets up environmental objectives of good groundwater quantitative and chemical status, as well as ensuring a continuity to the 1980 Groundwater Directive (Directive 80/68/EEC on the protection of groundwater against pollution caused by dangerous substances) which is due to be repealed under the WFD by the end of 2013.

Article 3 of the 2006 Directive required that the assessment of the chemical status of groundwater use both quality standards identified in Annex I of the Directive and threshold values to be set by individual member states.

Groundwater quality standards are environmental quality standards expressed as the concentration of a particular pollutant, group of pollutants or indicator of pollution in groundwater, which should not be exceeded in order to protect human health and the environment. Annex I of the Directive sets standards for two pollutants: Nitrates - 50mg/l - and; Active substances in pesticides[51], including their relevant metabolites, degradation and reaction products - 0,1 µg/l and 0,5 µg/l (total[52]).

Irish groundwater threshold values[53] have been set by the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010).

4.5.4 Flooding

4.5.4.1 EU Floods Directive

European Directive 2007/60/EC on the assessment and management of flood risks aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU.

The Directive requires Member States to carry out a preliminary assessment by 2011 in order to identify the river basins and associated coastal areas at risk of flooding. For such zones flood risk maps are required to be drawn up by 2013. By 2015 flood risk management plans focused on prevention, protection and preparedness must be established by 2015.

The Directive is to be carried out in coordination with the Water Framework Directive and flood risk management plans and river basin management plans should be coordinated.

4.5.4.2 DEHLG Flood Risk Management Guidelines

In November 2009 the DEHLG issued *The Planning System and Flood Risk Management Guidelines* for Planning Authorities. These are aimed at ensuring a more consistent, rigorous and systematic approach which will fully incorporate flood risk assessment and management into the planning system.

The Guidelines require the planning system to, among other things:

- Avoid development in areas at risk of flooding, particularly flood plains,

[50] Chemical status assessment is based on compliance with the standards laid down for priority substances by Directive 2008/105/EC on environmental quality standards in the field of water policy (the Surface Waters Regulations give effect to the environmental standards established by this Directive).

[51] 'Pesticides' means plant protection products and biocidal products as defined in Article 2 of Directive 91/414/EEC and in Article 2 of Directive 98/8/EC, respectively.

[52] 'Total' means the sum of all individual pesticides detected and quantified in the monitoring procedure, including their relevant metabolites, degradation and reaction products.

[53] Threshold values are to be established by Member States for all pollutants and indicators of pollution which characterise groundwater bodies classified as being at risk of failing to achieve good groundwater chemical status under the WFD. Threshold values are required to be established in a way that, should the monitoring results at a representative monitoring point exceed the thresholds, this will indicate a risk that one or more of the conditions for good groundwater chemical status - with regard to the ability of groundwater to support human uses and with regard to waters used for the abstraction of drinking water - are not being met.

unless there are proven sustainability grounds that justify appropriate development and where flood risk can be reduced or managed to an acceptable level, without increasing flood risk elsewhere;
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

4.5.5 SEOs, Indicators and Targets

The following SEOs, Indicators and Targets have been identified and developed with regard to the objectives of the above strategic actions and the environmental baseline described in Section 3.

SEO W1:	To maintain and improve, where possible, the status of surface waters
Indicator W1:	Classification of Overall Status (comprised of ecological and chemical status) under the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009)
Target W1:	To achieve 'good status'[54] in all bodies of surface waters by 2015 and to not knowingly allow deterioration in the status of any surface water

SEO W2:	To prevent pollution and contamination of ground water
Indicator W2:	Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC
Target W2:	Compliance with Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC

SEO W3:	To manage areas that are currently at risk of flooding or are likely to pose a significant flood risk in the future
Indicator W3:	Number of incompatible developments granted permission on lands which pose - or are likely to pose in the future - a significant flood risk
Target W3:	Minimise developments granted permission on lands which pose - or are likely to pose in the future - a significant flood risk in compliance with *The Planning System and Flood Risk Management Guidelines* for Planning Authorities

4.6 Material Assets

4.6.1 Water Services Act 2007

The Water Services Act 2007 (SI No. 30 of 2007) incorporates a comprehensive review, update and consolidation of all existing water services[55] legislation, and facilitates the establishment of a comprehensive supervisory regime to ensure compliance with specified performance standards.

[54] Good status as defined by the WFD equates to approximately the following in the current national schemes of classification as set out by the EPA:
- *Q4* in the biological classification of *rivers*;
- *Mesotrophic* in the classification of *lakes*; and,
- *Unpolluted* status in the Assessment of Trophic Status of *Estuaries and Bays* in Ireland (ATSEBI).

[55] Services, including the provision of water intended for human consumption, which provide storage, treatment or distribution of surface water, groundwater or water supplied by a water services authority, or waste water collection, storage, treatment or disposal.

Section 36 of the Act provides for the making of 6-year Water Services Strategic Plans (WSSPs) in order to:

- to protect human health and the environment;
- to facilitate the provision of sufficient water services for domestic and non-domestic requirements in the area to which the plan relates; and,
- to support proper planning and sustainable development, including sustainable use of water resources.

WSSPs are to be made by Water Services Authorities for their functional areas. The Act allows for two or more Water Services Authorities to jointly make a WSSP in relation to all of their combined functional areas, or parts thereof.

WSSPs are required to include information on the following:

- drinking water quality;
- the prevention or abatement of risk to human health or the environment;
- current and projected need for water services;
- arrangements in place or planned for the provision of water services;
- shortfalls in the provision of water services;
- water conservation measures in place or planned;
- monitoring arrangements;
- asset management planning; and,
- income and expenditure.

Section 36 (9) of the Act allows for the making of regulations prescribing the manner in which any matter is to be set out or addressed in a water services strategic plan, notification or consultation requirements and procedures or associated time limits, prior to and after its making.

4.6.2 Urban Waste Water Treatment Directive 2001

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 No. 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. The Regulations stipulate that sewage treatment facilities are in place in all towns by 2005.

Appropriate treatment is essential in order to meet the requirements of the Water Framework Directive (see Section 4.5.1).

4.6.3 Drinking Water Regulations 2007

The environmental baseline with regard to drinking water demand and supply is identified in Section 3. Measures have been integrated into the Development Plan in order to help ensure a clean and wholesome water supply.

The European Communities (Drinking Water) Regulations (No. 2) 2007 require the compliance of water intended for human consumption with 48 parameters.

4.6.4 SEOs, Indicators and Target

The following SEOs, Indicators and Targets have been identified and developed with regard to the objectives of the above strategic actions and the environmental baseline described in Section 3.

SEO M1:	To serve new development with appropriate waste water treatment
Indicator M1i:	Number of new developments granted permission which can be adequately served with waste water treatment over the lifetime of the Plan
Target M1i:	All new developments granted permission to be connected to and adequately served by waste water treatment over the lifetime of the Plan
Indicator M1ii:	Preparation of a Water Services Strategic Plan - in compliance with the Water Services Act - for the functional area of the Council
Target M1ii:	For the Council to prepare a Water Services Strategic Plan in compliance with the Water Services Act

SEO M2:	To serve new development with drinking water that is both wholesome and clean
Indicator M2i:	Number of non-compliances with the 48 parameters identified in the European Communities (Drinking Water) Regulations (No. 2) 2007 which present a potential danger to human health
Target M2i:	No non-compliances with the 48 parameters identified in the European Communities (Drinking Water) Regulations (No. 2) 2007 which present a potential danger to human health as a result of implementing the Variation
Indicator M2ii[56]:	Preparation of a Water Services Strategic Plan - in compliance with the Water Services Act - for the functional area of the Council
Target M2ii:	For the Council to prepare a Water Services Strategic Plan in compliance with the Water Services Act

4.7 Air and Climatic Factors

4.7.1 Introduction

The impact of implementing the Variation on air quality and climatic factors will be determined by the impacts which the Plan has upon the traffic levels which relate to SEOs C1 and C2**.**

Travel is the source of most:

1. Noise;
2. Air emissions; and,
3. Energy use (41.4% oil equivalent of final energy consumption in 2006 was taken up by transport - sourced from Sustainable Energy Ireland's online Energy Statistics Data Bank).

Land-use planning contributes to what number and what extent of journeys occur. By

[56] Indicator and Target M2ii are the same as Indicator and Target M1ii

addressing journey time through land use planning, increases in greenhouse gases can be minimised. Furthermore, by concentrating populations, greenfield development - and its associated impacts - can be minimised and the cost of service provision can be reduced.

4.7.2 Air Quality

In order to protect human health, vegetation and ecosystems, EU Directives set down air quality standards in Ireland and the other Member States for a wide variety of pollutants. These pollutants are generated through fuel combustion, in space heating, traffic, electricity generation and industry and, in sufficient amounts, could affect the well being of the County's inhabitants. The EU Directives include details regarding how ambient air quality should be monitored, assessed and managed.

The principles to this European approach are set out under the Air Quality Framework Directive 1996 while four daughter Directives lay down limits or thresholds for specific pollutants.

4.7.3 Climatic Factors

In order to reduce greenhouse gas emissions the internationally agreed Kyoto Protocol established emissions reduction targets for developing countries. Ireland's emission target for greenhouse gases is to limit the increase in their combined emissions during the five-year period 2008-2012 to 13 per cent above 1990 levels.

4.7.4 Noise

Noise is unwanted sound. Traffic noise alone is harming today the health of almost one third of Europeans[57].

The Noise Directive - Directive 2002/49/EC relating to the assessment and management of environmental noise - is part of an EU strategy setting out to reduce the number of people affected by noise in the longer term and to provide a framework for developing existing Community policy on noise reduction from source.

The Directive requires competent authorities in Member States to:

- Draw up *strategic noise maps* for major roads, railways, airports and agglomerations, using harmonised noise indicators[58] and use these maps to assess the number of people which may be impacted upon as a result of excessive noise levels;
- Draw up action plans to reduce noise where necessary and maintain environmental noise quality where it is good; and,
- Inform and consult the public about noise exposure, its effects, and the measures considered to address noise.

The Directive does not set any limit value, nor does it prescribe the measures to be used in the action plans, which remain at the discretion of the competent authorities.

4.7.5 SEOs, Indicators and Targets

The following SEOs, Indicators and Targets have been identified and developed with regard to the objectives of the above strategic actions and the environmental baseline described in Section 3.

It is noted that - in addition to being addressed as part of this assessment - traffic issues will also be addressed by lower-tier plans and at the level of individual projects by the development management process and, for certain projects, by EIA.

SEO C1:	To reduce travel related greenhouse emissions to air
Indicator C1:	Percentage of population working within the County travelling to work by public transport or non-mechanical means
Target C1:	An increase in the percentage of the population travelling to work by public transport or non-mechanical means

[57] World Health Organization Regional Office for Europe (2003) T*echnical meeting on exposure-response relationships of noise on health 19-21 September 2002* Bonn, Germany Bonn: WHO

[58] [L_{den} (day-evening-night equivalent level) and L_{night} (night equivalent level)]

SEO C2:	To encourage modal change from car to more sustainable forms of transport

The use of the SEO C2 provides a qualitative directional measure which is used to evaluate the effects of implementing the Variation.

4.8 Cultural Heritage

4.8.1 Archaeological Heritage

4.8.1.1 Valletta Convention 1992

The European Convention on Protection of the Archaeological Heritage known as the Valletta Convention of 1992. This was ratified by Ireland in 1997 and requires that appropriate consideration be given to archaeological issues at all stages of the planning and development process.

4.8.1.2 National Heritage Plan for Ireland 2002

The core objective of the National Heritage Plan for Ireland 2002[59] is to protect Ireland's heritage. In this regard the polluter pays and the precautionary principle are operable.

4.8.1.3 National Monuments Acts

Archaeology in Ireland is protected under the National Monuments Acts 1930 to 2004.

Recorded monuments are protected by inclusion on the list and marked on the map which comprises the Record of Monuments and Places 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.

Direct impacts on national monuments in State or Local Authority care or subject to a preservation order require the consent of the Minister for the Environment, Heritage and Local Government under Section 14 of the National Monuments Act 1930 as amended by Section 5 of the National Monuments (Amendment) Act 2004.

4.8.2 Architectural Heritage

4.8.2.1 Planning and Development Acts 2000-2009

Records of Protected Structures (RPSs) are legislated for under Section 51 of the Planning and Development Acts 2000-2009 and include structures which form part of the architectural heritage and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

4.8.3 SEOs, Indicators and Targets

The following SEOs, Indicators and Targets have been identified and developed with regard to the objectives of the above strategic actions and the environmental baseline described in Section 3.

SEO CH1:	To protect the archaeological heritage of the County including entries to the Record of Monuments and Places and/or their context
Indicator CH1:	Percentage of entries to the Record of Monuments and Places - including Zones of Archaeological Potential - (and their context of the above within the surrounding landscape where relevant) protected
Target CH1:	Protect entries to the Record of Monuments and Places - including Zones of Archaeological Potential - (and their context of the above within the surrounding landscape where relevant)

[59] Department of Arts, Heritage, Gaeltacht and the Islands (2002) *National Heritage Plan for Ireland* Dublin: Government of Ireland

SEO CH2:	To preserve and protect the special interest and character of the architectural heritage of the County
Indicator CH2i:	Percentage of entries to the Record of Protected Structures (and/or their context within the surrounding landscape where relevant) protected
Indicator CH2ii:	Number of additions to the Record of Protected Structures and the number of additional ACAs
Target CH2i:	Protect entries to the Record of Protected Structures (and/or their context within the surrounding landscape where relevant)
Target CH2ii:	Make Additions to the Record of Protected Structures and make additional ACAs, where appropriate

4.9 Landscape

The SEO for landscape is guided by landscape designations within the County.

4.9.1 SEO, Indicator and Target

SEO L1:	To avoid significant adverse impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views.
Indicator L1:	Number of complaints received from statutory consultees regarding avoidable impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views - resulting from development which is granted permission under the Plan
Target L1:	No developments permitted which result in avoidable impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views - resulting from development which is granted permission under the Plan

Section 5 Context for the Variation

5.1 Background

Galway County Council have made a Statutory Variation to the Galway County Development Plan as adopted in 2009 to introduce a Core Strategy, in accordance with the provisions of the Planning and Development Act 2010.

5.2 Content

There are 2 components to the Variation.

The first is to replace Section 2 - *Spatial Planning Strategy* - of the County Development Plan 2009 to 2015 with a new Section 2 - *Core Strategy and Spatial Planning*.

This is necessary in order to give effect to the requirement under Section 7 of the Planning and Development Act 2010, to introduce a Core Strategy into the Galway County Development Plan 2009 to 2015. This is necessary to demonstrate that the County Development Plan and its objectives are consistent with national and regional development objectives as set out in the National Spatial Strategy and the West Regional Planning Guidelines 2010 to 2022, especially as regards:

- The hierarchy and role of Gateways, Hub towns, county towns, other towns and villages and rural areas; and,
- Giving effect to the hierarchy by setting regional and national population targets and associated requirements for housing land across the overall functional area of the planning authority.

The second component is to amend various parts of Section 3 - *Settlement Strategy* - of the County Development Plan 2009 to 2015 to ensure that the County settlement strategy is consistent with the settlement hierarchy set out in the Core Strategy of the County Development Plan 2009 to 2015, the Regional Planning Guidelines for the West Region 2010 to 2022 and the National Spatial Strategy.

5.3 Interactions with Relevant Policy, Plans or Programmes

5.3.1 National Development Plan 2007-2013

The National Development Plan 2007-2013 (NDP) is designed to underpin the development of a dynamic competitive economy over the period 2007 - 2013. It envisages a total investment of €184 billion over 7 years to 'secure the further transformation of our country socially and economically within an environmentally sustainable framework'.

It identifies investment funding for significant projects in sectors such as health services, social housing, education, roads, public transport, rural development, industry, and water and waste services. The NDP is designed to strengthen and improve the international competitiveness of the Country so as to support continued, but more balanced, economic and social development in line with the National Spatial Strategy.

5.3.2 National Spatial Strategy 2002-2020

The National Spatial Strategy 2002-2020 (NSS) is a 20-year planning framework for the entire Country to guide policies, programmes and investment. It seeks to promote a better balance of social, economic and physical development between the Regions.

The focus of the NSS is on fostering a closer match between where people live with where they work. The NSS established a detailed sustainable planning framework for strategic spatial planning to ensure development is targeted at the most appropriate locations. The NSS places emphasis on the creation of high quality living environments through urban design and the integration of social and community amenities.

5.3.3 Sustainable Development: A Strategy for Ireland 1997

This Strategy provides a framework for the achievement of sustainable development at local level and calls on planning authorities to incorporate the principles of sustainability into Development Plans.

5.3.4 West Regional Planning Guidelines 2010-2022

Ireland is divided into eight regional forward planning regions, Dublin, Midlands, Mid East, Mid West, South East, South West, West and Border, each with its own regional planning authority composed of Elected Members selected by the constituent local government councils. Regional planning authorities are required, under the Planning and Development (Regional Planning Guidelines) Regulations 2003 (SI No. 175 of 2003), to draw up regional planning guidelines (RPGs), long term strategic planning frameworks, for their relevant region.

Galway is located within the West Region. The West RPGs, prepared by the West Regional Authority, provide a broad canvas to steer the sustainable growth and prosperity of the region in line with the key principles of NSS. They set out a long-term strategy for the development of the region and identify the strategic priorities in terms of policy and development. The overall aim of the RPGs is to ensure the successful implementation of the NSS at the regional, county and local level. Planning Authorities must take account of the RPGs in the discharge of their functions. The West Region comprises of the city of Galway and the counties of Galway, Mayo and Roscommon.

5.3.5 Transport 21 & Smarter Travel, *A Sustainable Transport Future*

Transport 21 is the capital investment framework for the transport system over the period 2006-2015. It addresses the twin challenges of past investment backlogs and continuing growth in transport demand.

Smarter Travel, A Sustainable Transport Future is the new transport policy for Ireland for the period 2009-2020. The policy recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development, but it also sets out the necessary steps to ensure that people choose more sustainable transport modes such as walking, cycling and public transport.

5.3.6 Shannon International River Basin District Management Plan 2009-2015

In compliance with the EU Water Framework Directive, local authorities located in the Shannon International River Basin District (SIRBD), including Galway County Council, have prepared a River Basin Management Plan. The River Basin Management Plan includes a Programme of Measures which will be implemented in order to help achieve the objectives of the Water Framework Directive.

5.3.7 Shannon Catchment Flood Risk Assessment and Management Study (CFRAMS)

It is national flood policy that flood risk be managed in a catchment-based manner through a framework of Catchment Flood Risk Management Plans. In response to the new policy the OPW has developed, and is currently pilot testing, a method to meet these, and other, requirements though what are called Catchment Flood Risk Assessment and Management Studies (CFRAMS). The OPW has begun work on developing a CFRAMS for the Shannon catchment which will look at flood risk within the context of the whole catchment. The objectives of the study are to:

- Identify and map the existing and potential future flood hazard and risk areas within the catchment;
- Build the strategic information base necessary for making informed decisions in relation to managing flood risk;
- Identify viable structural and non-structural measures and options for managing the flood risks for localised high-risk areas and within the catchment as a whole; and,

- Prepare a Catchment Flood Risk Management Plan, and associated Strategic Environmental Assessment, that sets out prioritised measures and policies, that should be pursued by the OPW, Local Authorities and other Stakeholders to achieve the most cost-effective and sustainable management of flood risk within the catchment.

5.3.8 Lower Tier Plans

Plans for settlements within the County may need to be changed in order to take account of the change made to the County Development Plan by the Core Strategy Variation when.

5.4 Environmental Protection Objectives

The County Development Plan is subject to a number of high level national, international, regional and county environmental protection policies and objectives, including those which have been identified as Strategic Environmental Objectives in Section 4. Examples of Environmental Protection Objectives include the aim of the EU Habitats Directive - which is to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the European territory of Member States - and the purpose of the Water Framework Directive - which is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which, among other things, prevents deterioration in the status of all water bodies and protects, enhances and restores all waters with the aim of achieving good status by 2015.

Section 6 Alternatives

SEA Environmental Reports are required to provide an outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties encountered in compiling the required information [SEA Directive Annex 1 (h) - Information referred to in Article 5 (1)].

In this case it refers to the range of alternative population projections - all of which envisage reducing populations - considered for the settlements identified in the previous plan. This was the subject of an SEA and a full consideration of alternatives [Sections 6 and 7, Environmental Report of the Galway County Development Plan 2009-2015, April 2009]. The downward population allocations mean that the intensity of potential adverse environmental effects will be reduced.

The distribution of population allocations are consistent with the strategic alternative scenario assessed and selected for the Galway County Development Plan 2009-2015 [Sections 6 and 7, Environmental Report of the Galway County Development Plan 2009-2015, April 2009]. This scenario was *Alternative Scenario 3: Centred Development Strategy (Strong Urban Centres and Rural Protection)* and focused on building strong urban centres and generating critical mass in the Galway Gateway, the Tuam Hub and a restricted number of towns to support enhanced infrastructure and services. These settlements would act as focal points for their rural catchments. Rural Settlements would be planned under the scenario in order to evolve into small mixed use urban centres, providing a range of services and employment to their local population. Scenario 3 was assessed as having the least amount of potential environmental conflicts.

Decisions relating to the overall downward revision of population projections which is provided for by the Variation, took account of a number of considerations - economic, technical, social and environmental. The environmental factors were those specifically and exhaustively assessed as the basis for the previous plan and SEA already referred to.

These considerations had particular regard to both the capacity of the settlement to contribute towards achieving the objectives of the new Core Spatial Strategy - these objectives are consistent with the objectives of the existing Spatial Planning Strategy - as well as opportunities for public or sustainable travel and the availability of existing and planned critical water and waste water infrastructure.

A difficulty arises due the objectives and scope of this phase of plan making. It is not feasible to provide more detailed ‘stand alone’ documentation of how environmental factors influenced the selection of alternatives because of the integrated and iterative nature of the process of considering alternatives.

As such this level of consideration of alternatives is all that is feasible or reasonable for this phase of plan making.

Section 7 Evaluation of Variation Provisions

7.1 Methodology

This section evaluates the relevant parts[60] of the Variation's provisions. Strategic Environmental Objectives (SEOs) are used for this purpose as outlined below. Use has also been made of the environmental baseline descriptions and the maps of the individual components provided in Section 3.

The interactions between the SEOs and the policies and objectives of the Variation determine the likely significant effects [if any] of implementing the various provisions of the Variation. These effects include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects.

In order to comply with the SEA Directive, SEOs have been grouped under relevant parent components such as *water* and *landscape*. Based on an understanding of the existing and emerging environmental conditions in County Galway a series of SEOs were identified and developed in order to assess the likely significant environmental effects. The provisions of the Variation are evaluated using compatibility criteria (see Table 7.1) in order to determine how the provisions are likely to affect the status of these SEOs. Table 7.2 brings together all the SEOs which have been developed from international, national, regional and county policies which generally govern environmental protection objectives.

The SEOs and the provisions of the Variation are arrayed against each other to identify which interactions - if any - would cause impacts on specific components of the environment. Where the appraisal identifies a likely conflict with the status of an SEO the relevant SEO code is entered into the conflict column - e.g. B1 which stands for SEO likely to be affected - in this instance 'to ensure compliance with the Habitats Directive with regard to the protection of Natura 2000 Sites and Annexed habitats and species[61]'. The evaluation also draws attention to the potential improvements to the protection of the environment outside of the urban centres which would be likely to occur as a result of providing for development within these centres.

Potential adverse effects of implementing the Galway County Development Plan 2009-2015 as varied will be mitigated by other provisions which have already been integrated into the County Development Plan and which are already in force. These measures are identified in Section 8.

The provisions of the Development Plan as varied will combine with the provisions of other planning and sectoral policies and objectives including those which are included in the following documents to provide for the development of County Galway and the wider Region and contribute towards the need for developments such as those relating to transport, water services or power infrastructure. Such planning and sectoral policies and objectives which have been used in the assessment when considering potential cumulative and indirect conflicts and effects include:

- National Spatial Strategy 2002-2020;
- National Development Plan 2007-2013;
- West Regional Planning Guidelines 2010-2022;
- Shannon International River Basin District Management Plan 2009-2015;
- Higher level Environmental Protection Objectives and related Plans which have been identified in Sections 3 and 4 of this report; and,
- Strategic Actions and related Plans and Programmes which have been identified within Plan provisions.

[60] Certain content of the Variation which does not comprise policies or objectives has been screened out of the SEA and therefore is not evaluated in this report.

[61] 'Annexed habitats and species' refers to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.

Other planning and sectoral policies and objectives - and projects arising - are subject to their own planning and environmental assessment processes. Potential cumulative and indirect conflicts and effects will be mitigated by measures which have already been integrated into the Development Plan (see Section 8) and they will be addressed by lower tier environmental assessment, as appropriate.

7.1.1 Note on Appropriate Assessment

Note that an Appropriate Assessment (AA) - which derives from the Habitats Directive 92/43/EEC - was carried out for the Variation. The AA concludes that the Variation will not give rise to effects on the integrity of any Natura 2000 sites[62].

7.1.2 Note on Strategic Flood Risk Assessment

The Galway County Development Plan 2009-2015 as varied contains policies and objectives regarding flood risk and flood management. A separate Strategic Flood Risk Assessment for the entire County is being undertaken at present.

[62] Except as provided for in Section 6(4) of the Habitats Directive, viz.There must be:
(a) no alternative solution available,
(b) imperative reasons of overriding public interest for the plan to proceed; and
(c) adequate compensatory measures in place.

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	**No Likely** interaction with status of SEOs

Table 7.1 Criteria for appraising the effect of Alternatives & Variation provisions on SEOs

SEO Code	SEO
B1	To ensure compliance with the Habitats Directive with regard to the protection of Natura 2000 Sites and Annexed habitats and species[63]
B2	To ensure compliance with Article 10 of the Habitats Directive with regard to the management of environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species
B3	To avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites
HH1	To protect human health from hazards or nuisances arising from exposure to incompatible landuses
S1	Maximise the sustainable re-use of brownfield lands, and maximise the use of the existing built environment rather than developing greenfield lands
W1	To maintain and improve, where possible, the status of surface waters
W2	To prevent pollution and contamination of ground water
W3	To manage areas that are currently at risk of flooding or are likely to pose a significant flood risk in the future
M1	To serve new development with appropriate waste water treatment
M2	To serve new development with drinking water that is both wholesome and clean
C1	To reduce travel related greenhouse emissions to air
C2	To encourage modal change from car to more sustainable forms of transport
CH1	To protect the archaeological heritage of the County including entries to the Record of Monuments and Places and/or their context
CH2	To preserve and protect the special interest and character of the architectural heritage of the County
L1	To avoid significant adverse impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views.

Table 7.2 Strategic Environmental Objectives (SEOs)[64]

[63] 'Annexed habitats and species' refers to those listed under Annex I, II & IV of the EU Habitats Directive and Annex I of the EU Birds Directive.

[64] Strategic Environmental Objectives (SEOs) are methodological measures which are developed from international, national and regional policies which generally govern environmental protection objectives and against which the environmental effects of the Variation can be tested. The SEOs are used as standards against which the provisions of the Variation can be evaluated in order to help identify areas in which significant adverse impacts are likely to occur, if unmitigated against.

7.2 Component 1 of the Variation: Introduction of Core Strategy

The first of two components comprising the Variation is to replace Section 2 - *Spatial Planning Strategy* - of the County Development Plan 2009 to 2015 with a new Section 2 - *Core Strategy and Spatial Planning*. The provisions in this replacement chapter comprise Core Aims, Strategic Spatial Planning Policies and amended Strategic Spatial Planning Objectives.

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Core Aims				
1. To provide for the growth of County Galway towards a long term target population of up to 198,500 by 2022 and to distribute that part of the population growth anticipated up to 2016 in line with the settlement strategy as indicated in the West Regional planning guidelines, focusing a greater rate of growth in the Galway Gateway and the Hub town of Tuam. The continuing support for appropriately scaled development in key service towns, local service towns and villages in a sequential manner will remain a priority while recognising the role that new infrastructure and public transportation links will play in their future and in maintaining the viability of rural communities in the hinterlands of these towns and villages.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: By focusing a greater rate of growth within the 2 main settlement centers and supporting appropriately scaled development elsewhere, this Aim would be likely to contribute towards environmental protection and sustainable mobility patterns. Potential conflicts with environmental components would include those relating to the provision of appropriate waste water capacity and associated effects. These conflicts would be mitigated by existing Plan policies and objectives.				
2. To build on the regional-level linkages between County Galway, the Galway Gateway and other parts of the West Region by supporting the implementation of regional spatial strategies as set out in the West Regional Planning Guidelines 2010 and co-operating on areas of mutual planning interest;	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comments under Aim 1 above. Note also the spatial strategies contained in the West RPGs have been subject to SEA and AA.				
3. To ensure a high level of environmental protection in the implementation of the strategic aims and objectives of the plan through the observance of all legal requirements with regard to Strategic Environmental Assessment, Habitats Directive Assessment, Water Framework Directive Assessment and Flood Directive as appropriate.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: This aim would improve the status of all environmental components.				

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Strategic Spatial Planning Policies				
Policy SP1: The promotion and development of the Galway Gateway and Tuam as a Hub Town – a nationally significant urban centre, whose location and scale support the desired critical mass necessary to sustain strong levels of economic growth and prosperity in the West and a strong, independent hub to support the spatial strategy at national, regional and local level, together with improved connectivity between the gateway and hub to enhance their complementary status and development.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The development of the Galway Gateway and Tuam would be likely to contribute towards environmental protection and sustainable mobility patterns. Potential conflicts with environmental components would include those relating to the provision of appropriate waste water capacity and associated effects. These conflicts would be mitigated by existing Plan policies and objectives.				
Policy SP2: Support the role of Ardaun, Garraun and the Galway Metropolitan Area as key elements in the future strategic growth of the Galway Gateway and Galway County in a plan led, sustainable manner focussed on integrated land uses and transportation opportunities.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: Supporting the role of Ardaun, Garraun, and the Galway Metropolitan Area as key elements in the future strategic growth of the Galway Gateway and Galway County in a plan led, sustainable manner focused on integrated land uses and transportation opportunities would be likely to contribute towards environmental protection (including that of biodiversity, flora and fauna, human health, soil, water, cultural heritage and the landscape) and sustainable mobility patterns. Potential conflicts with environmental components would include those relating to the provision of appropriate waste water capacity and associated effects. These conflicts would be mitigated by existing Plan policies and objectives.				
Policy SP3: The careful management of growth in the Galway Transportation and Land Use Study Area, in particular, the commuter zone of the greater Galway City area needs strong policies to shape and direct growth. This area corresponds with what the NSS describes as 'rural areas under strong urban influences'.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: The careful management of growth in this area would prevent sprawl and associated environmental effects and contribute towards sustainable mobility patterns.				

Policy SP4: The co-ordination of new growth within the emerging new transportation and economic corridors in the key towns identified in the Core Strategy throughout the County in order to create more sustainable development patterns and to optimise public and private investment. The development of the Western Rail Corridor and new commuter services, together with significant road network improvement during the plan period will have a major impact on development and settlement patterns.	**B1 B2 B3 HH1 S1 W1 W2 M1 M2 C1 C2**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: Potential conflicts with environmental components would occur as a result of the development within these corridors. These conflicts would be mitigated by existing Plan policies and objectives. The development of the corridors would facilitate the provision of appropriate water services infrastructure and would improve sustainable mobility patterns.				
Policy SP5: The development of Key Support Towns to serve rural areas. Throughout much of County Galway, there is a need to address the imbalance at County level and build on the strengths and scale of existing settlements and to assist in promoting, sustaining and diversifying the rural economy.	**B1 B2 B3 HH1 S1 W1 W2 M1 M2 C1 C2**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The development of Key Support Towns would contribute towards the sustenance of rural populations and land management practices that are essential for certain habitats. The development of Key support towns could also benefit the provision of appropriate water services - and associated effects - and sustainable mobility patterns. Potential conflicts arising from development would be mitigated by Plan policies and objectives.				
Policy SP6: The protection and strengthening of vulnerable rural communities and the promotion of diverse and sustainable rural areas and villages. Significant residential growth has taken place in the form of ribbonised development on rural roads, in the hinterland of the City. The more peripheral areas of the County have continued to experience depopulation and economic decline, which has resulted in continuing rural decline and the loss of community services in small towns and villages. Further residential growth must be deployed in a manner consistent with sustainable principles and the balanced development of the County.	**B2 S1 C1 C2**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The protection and strengthening of vulnerable rural communities and the promotion of diverse and sustainable rural areas and villages would contribute towards the sustenance of rural populations and land management practices that are essential for certain habitats. Provision of local services could benefit local sustainable mobility patterns. Potential conflicts arising from development would be mitigated by Plan policies and objectives.				
Policy SP7: The protection and management of the areas and assets of the County that contribute to the unique visual and environmental character and sense of identity of the County and which underpin tourism, heritage and quality of life.	**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**			**S1 C1 C2**
Comment: This policy would contribute towards environmental protection.				

Policy SP8: While it is accepted that gateway boundaries have been formally established, it is considered by Galway County Council, based on emerging patterns of development, settlement and economic and social ties, that the Galway Metropolitan Area associated with the Galway gateway is an important, spatially definable area which is supported by ongoing investment in critical infrastructure, e.g., road, rail, water, waste water, electricity and gas investment which has and is taking place and which has provided the economic infrastructure to support the gateway. A key element in the development of the Galway gateway and associated Galway Metropolitan Area will be the preparation of an overarching framework plan which will be integrated into the County and City settlement strategies and should incorporate plans for emerging development such as Ardaun, Briarhill and Garraun and the implementation of an integrated land use and transportation strategy (based on the Galway Transportation and Planning Study) and to incorporate balanced County development.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: Such a framework plan would provide an opportunity to improve the protection of the environment and sustainable mobility however the content of a such a plan is uncertain.				

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Strategic Spatial Planning Objectives				
Objective SP1 The Council will seek to direct development in such a manner as is appropriate to achieve the overall aims of the Core Strategy in line with the social, economic and environmental characteristics of the County and building on the strengths and attributes of the existing settlements, emerging transport patterns and communications and the distinctive characteristics of the identified rural areas of the County.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: This objective provides for the achievement of the overall aims of the Core Strategy. See commentary under Core Aims on previous page.				
Objective SP2 The Council will support and seek to secure investment in the necessary infrastructure to pursue the spatial and settlement strategies as set out herewith in this Plan.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 CH1 CH2 L1**	
Comment: This objective would contribute towards the achievement of infrastructure which could enable the protection of the environment. However it could also support infrastructure which would potentially conflict with certain environmental components. These conflicts would be mitigated by existing Plan policies and objectives.				

Objective SP3 The Council will support and seek to secure investment for the advancement of the East Galway Waste Water Treatment Plant and the completion of the Western Rail Corridor and other critical enabling infrastructure identified as necessary to achieve the objectives of the Core Strategy during the plan period.	**B1 B2 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 HH1 W1 W2 W3 CH1 CH2 L1**	
Comment: See commentary under Objective SP2.				
Objective SP4: The Council will investigate the potential for development of integrated transportation hubs at Tuam, Garraun and at Athenry to maximise the strategic integration of transport and rational land uses.	**C1 C2 S1**		**B1 B2 B3 HH1 W1 W2 W3 CH1 CH2 L1**	**M1 M2**
Comment: This Objective would contribute towards sustainable mobility patterns however the development of such hubs and indirect development arising could potentially conflict with environmental components. These conflicts would be mitigated by existing Plan policies and objectives.				
Objective SP5: The Council will seek to manage development and interact with the relevant state bodies and private investors, in order to achieve key strategic objectives, particularly those that relate to the development of the strategic economic corridor. The Council will seek to control inappropriate development or development which may be incompatible with the achievement of key strategic objectives, particularly in relation to the implementation of the Core Strategy and development in the strategic economic corridor.	**B1 B2 B3 HH1 S1 W1 W2 M1 M2 C1 C2**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: Potential conflicts with environmental components would occur as a result of the development of this corridor. These conflicts would be mitigated by existing Plan policies and objectives. The development of the strategic economic corridor would facilitate the provision of appropriate water services infrastructure and would improve sustainable mobility patterns.				
Objective SP6 The Council will have regard at all times to the environmental and ecological designations, characteristics and sensitivities in the pursuit of the proposed strategy.	**B1 B2 B3 W1 W2**			**HH1 S1 W3 M1 M2 C1 C2 CH1 CH2 L1**
Comment: This would improve the protection of ecology and ecological sustaining resources.				
Objective SP7 Consider the preparation of sub-county local area plans for geographically cohesive areas such as the coastal belt, the City/County interface areas, south-eastern uplands, etc to bring about greater social, economic and environmental connectivity between settlements and their rural hinterlands.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The preparation of such plans would provide an opportunity to improve the protection of the environment and sustainable mobility however the content such plans is uncertain. Local Area Plans are required to be screened for the need to undertake SEA and AA.				

Objective SP8 The Council shall seek to review the Galway Transportation and Land Use Study within the lifetime of the County Development Plan 2009-2015 subject to funding and in cooperation with Galway City Council.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The review of the Galway TLUPS would provide an opportunity to improve the protection of the environment and sustainable mobility however the content of a reviewed TLUPS is uncertain.				
Objective SP9 The council shall establish a monitoring and review mechanism to track the implementation of the Core Strategy through the various Local Area Plans and through key indicators for transportation, environmental monitoring and other factors relevant to the wider County Area.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: Monitoring enables 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 Development Plan is achieving environmental objectives and targets and whether these need to be re-examined.				
Objective SP10 The Council shall undertake a review of all statutorily required Local Area Plans within a year from the date of adoption of the Variation of the County Development Plan to ratify the Core Strategy and ensure that such Local Area Plans are adopted in line with the broad principles of the Core Strategy and the County Development Plan. Other Local Area Plans shall be reviewed in keeping with legislative requirements.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SP7.				

7.3 Component 2 of the Variation: Introduction of Core Strategy

The second component is to amend various parts of Section 3 - *Settlement Strategy* - of the County Development Plan 2009 to 2015 to ensure that the County settlement strategy is consistent with the settlement hierarchy set out in the Core Strategy of the County Development Plan 2009 to 2015, the Regional Planning Guidelines for the West Region 2010 to 2022 and the National Spatial Strategy.

The provisions in this chapter comprise Strategic Settlement Policies and Strategic Settlement Objectives both of which relate to downward revised population allocations. The downward population allocations mean that the intensity of potential adverse environmental effects will be reduced.

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Strategic Settlement Policies				
Policy SS1: It will be the policy of the Council to recognise the role of Galway city and the Gateway as key drivers of social and economic growth in the County and in the wider Western Region. The Council will support the growth of the strategic settlements, including Ardaun and Garraun, within the Galway Metropolitan Area.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: By supporting the growth of the strategic settlements within the Galway Metropolitan area, this Aim would be likely to contribute towards environmental protection and sustainable mobility patterns. Potential conflicts with environmental components would include those relating to the provision of appropriate waste water capacity and associated effects. These conflicts would be mitigated by existing Plan policies and objectives.				
Policy SS2: It will be a key policy of the Council to secure the development of Tuam to fulfil its potential as a hub town, catering for the residential, employment, educational, social and retail needs of its target population and for the population of its wider hinterland in north and east Galway.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See Commentary under Policy SS1.				
Policy SS3: It will be the policy of Galway County Council to secure the sustainable growth of the key service towns of the county to become self –sufficient settlements and act as service centres for the inhabitants of their rural hinterlands	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: By providing for sustainable growth this Policy would improve the status of all environmental components.				

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Policy SS4: It will be the policy of Galway County Council to encourage and facilitate where possible, the sustainable, sequential and balanced development of existing settlements along the strategic emerging road and rail corridors as identified in the Core Spatial Strategy.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: See Commentary under Policy SS3.				
Policy SS5: It will be the policy of Galway County Council to support the development of rural areas in a balanced, sustainable manner, having regard to the social, economic and environmental characteristics of the area and its residents and in accordance with the relevant policies and objectives set out elsewhere in the Plan.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: See Commentary under Policy SS3.				
Policy SS6: In the case of smaller settlements for which no specific plans are available, development shall be considered on the basis of its connectivity, capacity (social, cultural and economic) and compliance with the settlement strategy, good design, community gain (this requirement shall not apply to single houses) and proper planning and sustainable development.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**			
Comment: See Commentary under Policy SS3.				
Policy SS7: In order to control the scale of development, a deviation in the allocated population of up to 20% will generally be acceptable, between 20% and 30% will be assessed in the context of the group of settlements and the growth experienced by each, over 30% generally will not be accepted. Regard will also be had to the rate of growth in each settlement.			**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**	
Comment: Providing for new increases in populations would potentially conflict with environmental components. These conflicts would be mitigated by existing Plan policies and objectives.				

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Strategic Settlement Objectives				
Objective SS1: Masterplans and/or Local Area Plans for Briarhill, Ardaun and Garraun will be developed as a priority and brought forward for adoption by the Council at the earliest opportunity within the lifetime of the Plan.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The preparation of such plans would provide an opportunity to improve the protection of the environment and sustainable mobility however the content such plans is uncertain. Local Area Plans are required to be screened for the need to undertake SEA and AA.				
Objective SS2: Local Area Plans or Development Boundaries will be prepared for all Settlements designated as Lower Tier Towns.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SS1.				
Objective SS3: A Local Area Plan for the North Connemara area will be prepared.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SS1.				
Objective SS4: Settlement guidelines or Action Area Plans/Local Area Plans for other key settlements in the Galway Metropolitan Area and along strategic public transportation corridors will be prepared as needed during the lifetime of the Plan.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SS1.				
Objective SS5: An Action Area Plan for the off-shore Islands will be prepared.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: The preparation of such a plan would provide an opportunity to improve the protection of the environment and sustainable mobility however the content such plans is uncertain.				

	Likely to **Improve** status of SEOs	Probable **Conflict** with status of SEOs - unlikely to be mitigated	Potential **Conflict** with status of SEO s- likely to be mitigated	**No Likely** interaction with status of SEOs
Objective SS6: A Local Area Plan for Kilcolgan will be prepared based on the Bearna Local Area Plan template.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SS1.				
Objective SS7: To prepare a Local Area Plan as a guidance document for the Carnmore/Galway Airport area to guide future development.	**B1 B2 B3 HH1 S1 W1 W2 W3 M1 M2 C1 C2 CH1 CH2 L1**		**B1 B2 B3 HH1 W1 W2 W3 M1 M2 CH1 CH2 L1**	
Comment: See comment under Objective SS1.				

Section 8 Mitigation Measures

8.1 Introduction

Mitigation measures are measures envisaged to prevent, reduce and, as fully as possible, offset any significant adverse impacts on the environment. Potential adverse effects of implementing the Galway County Development Plan 2009-2015 as varied will be mitigated by other provisions which have already been integrated into the County Development Plan and which are already in force.

Likely significant beneficial effects of implementing the Development Plan to which the Variation relates have been and will be maximised and potential adverse effects have been and will be avoided, reduced or offset through:

- The consideration of alternatives for the Plan;
- Mitigation through Communication of Environmental Considerations throughout the Plan preparation process; and,
- Adherence to measures which have been integrated into the Plan.

8.2 Mitigation through Consideration of Alternatives

A range of potential alternative scenarios for the Development Plan were identified at an early stage in the process and evaluated for their likely significant environmental effects [Sections 6 and 7, Environmental Report of the Galway County Development Plan 2009-2015, April 2009].

The environmental baseline and the Strategic Environmental Objectives were used in order to predict and evaluate the environmental effects of implementing the alternatives.

Communication of the findings of this evaluation helped the Plan-making team to make an informed choice as to which alternative was to be put before the Elected Members as the proposed draft Plan.

Communication of this evaluation to the Elected Members through this report helped them to make an informed choice with regard to the making of the Plan.

8.3 Mitigation through Communication of Environmental Considerations throughout the Process

Environmental considerations were communicated to the Elected Members throughout the Plan preparation process through both Addenda to the Environmental Report [Environmental Report of the Galway County Development Plan 2009-2015, April 2009] and presentations. The environmental consequences of recommendations contained in submissions and the environmental consequences of Proposed Amendments were communicated to the Elected Members thereby enabling mitigation by avoidance.

8.4 Individual Mitigation Measures integrated into the Plan

Individual mitigation measures were integrated into the Development Plan for a variety of topics. These measures include those identified below. The reference codes are those which accompany the relevant measures in the Plan.

8.4.1 Biodiversity and Flora and Fauna

Policies HL4, HL5, HL45, HL46, HL47, HL48 HL49, HL50, HL82, HL92 and HL93.

Objective HL43.

DM Standard 39.

8.4.2 Water Protection

Policies HL88, HL89, HL90, HL91, HL63 and HL65.

Objective HL35.

8.4.3 Waste Water

Policy IS15, IS16, IS17 and IS18.

8.4.4 Drinking Water

Policies IS10, IS13 and IS14.

Objective IS1.

8.4.5 Flooding

Policies HL55, HL67 and HL70.

Objectives HL34, HL38, HL41, HL39, HL40 and HL66.

DC Standards 36 and 23.

8.4.6 Soil and Contamination

DM Standard 42.

8.4.7 Cultural Heritage

Policies HL22, HL23, HL24, HL27, HL28, HL30, ED32 and ED44.

Objectives HL7 and HL1.

DM Standard 43.

8.4.8 Landscape

Policies ED32 and ED44.

Objective HL44.

8.4.9 Air and Noise

Policies RT3, RT12, RT 13, RT15, RT19 and RT20.

8.4.10 Transportation

Policies RT1, RT3, RT12, RT13, RT15 and RT19 RT20

8.4.11 Waste Management

Objective IS13.

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 section details the measures which will be used in order to monitor the likely significant effects of implementing the Development Plan as varied.

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 Development Plan is achieving environmental objectives and targets - measures which the Plan can help work towards - whether these need to be re-examined and whether the proposed mitigation measures are being implemented.

9.2 Indicators and Targets

Monitoring is based around the indicators which were chosen earlier in the process. These indicators allow quantitative measures of trends and progress over time relating to the Strategic Environmental Objectives used in the evaluation. Each indicator to be monitored is accompanied by the target(s) which were identified with regard to the relevant legislation (see Section 4).

Table 9.1 below shows the indicators and targets which have been selected for monitoring the likely significant environmental effects of implementing the Development Plan as varied.

9.3 Sources

Measurements for indicators generally come from existing monitoring sources. Existing monitoring sources exist for each of the indicators and include those maintained by the Galway 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 the Council will provide passive monitoring of various indicators and targets on an application by application basis. Where significant adverse effects - including positive, negative, cumulative and indirect - 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 projects or multiple individual projects such instances should be identified and recorded and should feed into the monitoring evaluation.

9.4 Reporting

A monitoring evaluation report on the effects of implementing the Development Plan is to be prepared in advance of the beginning of the review of the Plan.

This report should address the indicators set out below.

9.5 Responsibility

The Council is responsible for collating existing relevant monitored data, the preparation of preliminary and final monitoring evaluation reports, the publication of these reports and, if necessary, the carrying out of corrective action. Indicators and targets will be reviewed during the preparation of the preliminary monitoring evaluation report. A Steering Committee should be established within the Council to oversee the monitoring process. This Steering Committee should also oversee the monitoring in this section.

9.6 Thresholds

Thresholds at which corrective action will be considered include:

- The occurrence of flood events;
- Court cases taken by the DEHLG regarding impacts upon archaeological heritage including entries to the RMP;
- Complaints received from statutory consultees regarding avoidable environmental impacts resulting from development which is granted permission under the Plan;
- Boil notices on drinking water; and,
- Fish kills.

Table 9.1 Selected Indicators, Targets and Monitoring Sources

Environmental Component	Selected Indicator(s)	Selected Target(s)	Source	Monitoring Frequency
Biodiversity, Flora and Fauna	B1: Conservation status of habitats and species as assessed under Article 17 of the Habitats Directive	B1: Maintenance of favourable conservation status for all habitats and species protected under national and international legislation to be unaffected by implementation of the Plan as varied[65]	a) DEHLG report of the implementation of the measures contained in the Habitats Directive - as required by Article 17 of the Directive; and, b) Consultations with the NPWS.	a) Every 6 years b) At monitoring evaluation - see Section 9.4
	B2: Percentage loss of functional connectivity to environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species without remediation as a result of implementation of the Variation	B2: No significant environmental features which - by virtue of their linear and continuous structure or their function act as stepping stones - are important at the County level for wild fauna and flora and essential for the migration, dispersal and genetic exchange of wild species to be lost without remediation as a result of implementation of Variation	a) CORINE mapping resurvey b) Development Management Process in the Council	a) Unknown b) Per granted permission; compile at monitoring evaluation - see Section 9.4
	B3: Number of significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites resulting from implementation of the Variation	B3: Avoid significant impacts on relevant habitats, species, environmental features or other sustaining resources in Wildlife Sites resulting from implementation of the Variation	a) CORINE mapping resurvey b) Development Management Process in the Council c) Consultations with the NPWS.	a) Unknown b) Per granted permission; compile at monitoring evaluation - see Section 9.4 c) At monitoring evaluation - see Section 9.4

[65] Except as provided for in Section 6(4) of the Habitats Directive, viz. There must be:
(a) no alternative solution available;
(b) imperative reasons of overriding public interest for the plan to proceed; and,
(c) adequate compensatory measures in place.

Environmental Component	Selected Indicator(s)	Selected Target(s)	Source	Monitoring Frequency
Population and Human Health	HH1: Occurrence (any) of a spatially concentrated deterioration in human health arising from environmental factors as identified by the Health Service Executive and Environmental Protection Agency	HH1: No spatial concentrations of health problems arising from environmental factors as a result of implementing the Variation	Consultations with EPA and Health Service Executive	At monitoring evaluation - see Section 9.4
Soil	S1: Area of brownfield lands developed in the County over the lifespan of the Development Plan	S1: Arising from increased levels of brownfield development, a reduced availability of brownfield land in the County (subject to availability on the open market, the demand for such land and the ability for such lands to be sustainably re-used) at the end of the Plan's lifespan	Development Management Process in the Council	Per granted permission; compile at monitoring evaluation - see Section 9.4
Water	W1: Classification of Overall Status (comprised of ecological and chemical status) under the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (SI No. 272 of 2009)	W1: To achieve 'good status' in all bodies of surface waters by 2015 and to not knowingly allow deterioration in the status of any surface water	Data issued under the Water Framework Directive Monitoring Programme for Ireland (EPA, 2006)	Unknown
	W2: Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC	W2: Compliance with Groundwater Quality Standards and Threshold Values under Directive 2006/118/EC	Data issued under the Water Framework Directive Monitoring Programme for Ireland (EPA, 2006)	Unknown
	W3: Number of incompatible developments granted permission on lands which pose - or are likely to pose in the future - a significant flood risk	W3: Minimise developments granted permission on lands which pose - or are likely to pose in the future - a significant flood risk in compliance with *The Planning System and Flood Risk Management Guidelines for Planning Authorities*	Development Management Process in the Council	Per granted permission; compile at preliminary monitoring evaluation - see Section 9.4

Environmental Component	Selected Indicator(s)	Selected Target(s)	Source	Monitoring Frequency
Material Assets	M1i: Number of new developments granted permission which can be adequately served with waste water treatment over the lifetime of the Plan	M1i: All new developments granted permission to be connected to and adequately served by waste water treatment over the lifetime of the Plan	Development Management Process in the Council	Per granted permission; compile at monitoring evaluation - see Section 9.4
	M1ii: Preparation of a Water Services Strategic Plan - in compliance with the Water Services Act - for the functional area of the Council	M1ii: For the Council to prepare a Water Services Strategic Plan in compliance with the Water Services Act	Galway County Council	Detail status of Plan preparation at monitoring evaluation - see Section 9.4
	M2i: Number of non-compliances with the 48 parameters identified in the European Communities (Drinking Water) Regulations (No. 2) 2007 which present a potential danger to human health	M2i: No non-compliances with the 48 parameters identified in the European Communities (Drinking Water) Regulations (No. 2) 2007 which present a potential danger to human health as a result of implementing the Plan	a) EPA The Provision and Quality of Drinking Water in Ireland reports (EPA); b) EPA Remedial Action List; and, c) Galway County Council	a) Annual/biannual; b) Annual/biannual; c) Council's Water and Waste Services Department to confirm - as appropriate - status of supplies listed on Remedial Action List.
	M2ii[66]: Preparation of a Water Services Strategic Plan - in compliance with the Water Services Act - for the functional area of the Council	M2ii: For the Council to prepare a Water Services Strategic Plan in compliance with the Water Services Act	Galway County Council	Detail status of Plan preparation at monitoring evaluation - see Section 9.4
Air and Climatic Factors	C1: Percentage of population working within the County travelling to work by public transport or non-mechanical means	C1: An increase in the percentage of the population travelling to work by public transport or non-mechanical means	Central Statistics Office	Next Census Figures 2011

[66] Indicator and Target M2i are the same as Indicator and Target M1

Environmental Component	Selected Indicator(s)	Selected Target(s)	Source	Monitoring Frequency
Cultural Heritage	CH1: Percentage of entries to the Record of Monuments and Places - including Zones of Archaeological Potential - (and their context of the above within the surrounding landscape where relevant) protected	CH1: Protect entries to the Record of Monuments and Places - including Zones of Archaeological Potential - (and their context of the above within the surrounding landscape where relevant)	a) Development Management/ Enforcement Processes in the Council; and, b) Consultation with DEHLG.	a) Per granted permission/ enforcement action; compile at monitoring evaluation - see Section 9.4 b) Compile at monitoring evaluation - see Section 9.4
	CH2i: Percentage of entries to the Record of Protected Structures (and/or their context within the surrounding landscape where relevant) protected	CH2i: Protect entries to the Record of Protected Structures (and/or their context within the surrounding landscape where relevant)	a) Development Management/ Enforcement Processes in the Council; and, b) Consultation with DEHLG.	a) Per granted permission/ enforcement action; compile at monitoring evaluation - see Section 9.4 b) Compile at monitoring evaluation - see Section 9.4
	CH2ii: Number of additions to the Record of Protected Structures and the number of additional ACAs	CH2ii: Make Additions to the Record of Protected Structures and make additional ACAs, where appropriate	Galway County Council	Compile at monitoring evaluation - see Section 9.4
Landscape	L1: Number of complaints received from statutory consultees regarding avoidable impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views - resulting from development which is granted permission under the Plan	L1: No developments permitted which result in avoidable impacts on the landscape - especially with regard to the County's landscapes which are most valuable and most sensitive to change and protected focal points and views - resulting from development which is granted permission under the Plan	a) Development Management Process in the Council; and, b) Consultation with DEHLG.	a) Per granted permission; compile at monitoring evaluation - see Section 9.4 b) Compile at monitoring evaluation - see Section 9.4