Investigating the long term planning framework for the Galway Bay community from climate change.

AUTHOR
Christina Kelly

A THESIS SUBMITTED FOR THE DEGREE OF MASTERS IN ENVIRONMENTAL SYSTEMS,
AT THE SCHOOL OF ENGINEERING,
GALWAY MAYO INSITUTE OF TECHNOLOGY, IRELAND

SUPERVISOR
Dr. Cilian Roden

DEPARTMENT OF BUILDING & CIVIL ENGINEERING
DEPARTMENT OF MECHANICAL & INDUSTRIAL ENGINEERING,
GALWAY MAYO INSITUTE OF TECHNOLOGY, IRELAND

SUBMITTED TO THE GALWAY-MAYO INSITUTE OF TECHNOLOGY,
SEPTEMBER 2010

GMIT
GALWAY-MAYO INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA NA GAILLIMHE-MAIGH EO

DECLARATION OF ORIGINALITY

SEPTEMBER, 2010

The substance of this thesis is the original work of the author and due reference and acknowledgement has been made, when necessary, to the work of others. No part of this thesis has been accepted for any degree and is not concurrently submitted for any other award. I declare that this thesis is my original work except where otherwise stated.

Name of Candidate (Christina Kelly)	Name of Supervisor (Dr. Cilian Roden)

Date: 17th September 2010

ACKNOWLEGEMENTS

The author would like to take this opportunity to express her gratitude to everyone who kindly agreed to take part in this research and were all so accommodating. This thesis is all the better for their contribution.

Many thanks also to the staff in the Department of Building & Civil Engineering and Department of Mechanical & Industrial Engineering at Galway Mayo Institute of Technology for all their help over the last twelve months. In particular, the author would like to thank Mark Deegan for his technical assistance and Niamh Ward for her time, patience and expertise with GIS. A special note of thanks to Dr Attracta Brennan for her considerate support over the summer months.

To Dr Cilian Roden, for all his advice, time and guidance over the past year; his knowledge and experience made this research possible and all the more inspiring. Thank you!

Lastly, the author would like to thank her parents and family for their support and encouragement; and Jimmy for his help, patience and belief in me, thank you!

ABSTRACT

This research looked at the scientific evidence available on climate change and in particular, projections on sea level rise which ranged from 0.5m to 2m by the end of the century. These projections were then considered in an Irish context. A review of current policy in Ireland revealed that there was no dedicated Government policy on climate change or coastal zone management. In terms of spatial planning policy, it became apparent that there was little or no guidance on climate change either at a national, regional or local level. Therefore, to determine the likely impacts of sea level rise in Ireland based on current spatial planning practice and policy, a scenario-building exercise was carried out for two case study areas in Galway Bay. The two case study areas were: Oranmore, a densely populated town located to the east of Inner Galway Bay; and Tawin Island, a rural dispersed community, located to the south east of Inner Galway Bay. A 'best' and 'worse' case scenario was envisaged for both areas in terms of sea level rise. In the absence of specific climate change policies it was projected that in the 'best' case scenario of 0.5m sea level rise, Tawin Island would suffer serious and adverse impacts while Oranmore was likely to experience slight to moderate impacts. However, in the 'worse' case scenario of a 2m sea level rise, it was likely that Tawin Island would be abandoned while many houses, businesses and infrastructure built within the floodplain of Oranmore Bay would be inundated and permanently flooded. In this regard, it was the author's opinion that a strategic and integrated climate change policy and adaptation plan is vital for the island of Ireland that recognises the importance of integrated land use and spatial planning in terms of mitigation and adaptation to climate change.

ACRONYMS

AR4	Fourth Assessment Report (IPCC)
C4I	Community Climate Change Consortium for Ireland
CFCs	Chlorofluorocarbons
CFRAMs	Catchment Flood Risk Assessment and Management Studies
CFRMP	Catchment Flood Risk Management Plan
CO_2	Carbon Dioxide
CSO	Central Statistics Office (Ireland)
ECCP	European Climate Change Programme
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EU	European Union
FAR	First Assessment Report (IPCC)
GCM	Global Climate Model
GHGs	Greenhouse Gases
GTPS	Galway Transportation and Planning Study
IAE	Irish Academy of Engineers
ICARUS	Irish Climate Analysis and Research Units
ICPSS	Irish Coastal Protection Strategy Study
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change
LAP	Local Area Plan
NAS	National Adaptation Strategies
NDP	National Development Plan
NGO	Non Governmental Organisation
NSS	National Spatial Strategy
NPWS	National Parks and Wildlife Service
NUIG	National University of Ireland, Galway
NUIM	National University of Ireland, Maynooth
OPW	Office of Public Works
PFRA	Preliminary flood risk assessment
PPM	Parts per million
RCM	Regional Climate Model
RIA	Royal Irish Academy
SEA	Strategic Environmental Assessment
SLR	Sea Level Rise
SRES	Special Report on Emissions Scenarios
TCD	Trinity College Dublin
UCD	University College Dublin
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization

Table of Contents

List of Tables

List of Figures

Appendices

1. Introduction

1.1 Background to Climate Change

Since the early stages of civilisation man has lived a simple and uncomplicated life located in small settlements close to water resources such as rivers and the sea (Delli Priscoli 2000). Travel was restricted to within the locality and the sea; agriculture was organically produced and dependent on basic farming and hunting techniques; industry was non-existent and health and well being were influenced by local environmental conditions.

In the latter centuries however, technology and industry have been influential in changing how humans live. Some will consider that this has resulted in a more developed, accessible and to some degree, a more progressive society. Nevertheless, with this progress came the transformation of the environment (Barca 2010).

Since the Industrial Revolution and over 200 years later, this progression is still spreading to China, India and other developing economies. This development to industrialisation has seen a move from the utilisation of human labour and natural materials to rapid industrialisation and the use of fossil fuels (Juniper 2007). The burning of fossil fuels leads to an increase in GHG emissions.

Some reflections on the Industrial Revolution have determined that the most visible manifestation of industrial change was the reworking of the earth's landscape whereby the foundations of a society based on agriculture were altered, placing it on the road to modern economic development; so much so that it was regarded that humankind's relationship with the natural world was profoundly affected (Barca 2010). As a consequence, new energy and technology resources were developed and different ways of farming and feeding the population emerged resulting in a major shift to the industrial mode of production.

During the intermittent period since the Industrial Revolution and our subsequent development in technologies, industries and manufacturing processes, the majority of which are dependent on the use of fossil fuels, there has been a resultant increase in the level of human induced greenhouse gases (GHGs) being emitted into the atmosphere (Huang and Lo). In fact, the atmospheric concentrations of carbon dioxide, methane and nitrous oxide remained roughly stable for almost 10,000 years before the abrupt and rapidly accelerating increases of the past 200 years (Collins 2007).

Simultaneously, the Earth's surface temperature has also been increasing (Collins 2007). It has been published that observational records indicate that 11 of the past 12 years are the warmest since reliable records began around 1850 (Pachauri 2007). This would suggest that there is a direct correlation between the increase in human induced GHGs and increased global warming. Therefore it is imperative to review the evidence that has become available in terms of global climate change projections and in particular, those for Ireland.

Nevertheless with all progress comes significant change – environmental, social and economic. As part of this thesis many aspects of environmental change have been reviewed generally however, given the extent of this research area, the main aspects of environmental change focused upon were climate change and carbon dependency.

There are a number of imminent environmental changes which are likely to have fundamental impacts on our surroundings; globally, nationally and locally. These environmental changes relate to *inter alia* fossil-fuel dependency, climate change, ocean acidification, biodiversity loss, nitrogen and phosphorus pollution, freshwater depletion and increase in population (Foley 2010).

Consequently the aim of this thesis was to focus in on Ireland's own situation and specifically, how the Irish Planning System was preparing for environmental change; in particular, climate change and more explicitly, a rise in sea levels and increased storm activity. Particularly, the emphasis was on how planning policy was evolving having regard to published scientific climate change projections and what means of mitigation and/ or adaptation where being explored in areas mostly vulnerable to change.

Ideally, all of the anticipated Irish climate change projections would have been analysed such as increased surface and ocean temperatures, extreme weather events, variations in sea chemistry etc. (Desmond 2009) however, given the time constraints and the scale of this subject area, it has not been possible. Notwithstanding, a concentrated study of the potential impacts from sea level rise and increased storm activity along the coast of eastern Galway Bay has been carried out, and has provided a valuable case study where land use and transportation policies have been tested in light of climate change projections for the area by the end of the century.

1.2 How bad is Climate Change?

Since the 1990s, scientists have become increasingly certain that climate change is a result of human induced activities. The evidence of change has mounted as climate records have grown longer. In 1988 the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) established the Intergovernmental Panel on Climate Change (IPCC). The role of the IPCC was to inform policy makers and the general public about what scientific researchers had learned in terms of climate change. The IPCC released its First Assessment Report in 1990 which confirmed the scientific basis for climate change (United Nations Environment Programme 1997).

This increased certainty of the relationship between climate change and human activity was reflected again in the most recent report (Pachauri 2007) where it was agreed across the scientific community that humans have interfered with our climate and that further human induced climate change is to follow in the future (Pachauri 2007). Therefore, the evidence confirms that climate change is real and will continue to have consequences.

1.2.1 Rio Declaration

In 1992, the first international Earth Summit was held in Rio de Janeiro, Brazil. More than 100 heads of state attended to address urgent problems of environmental protection and socio-economic development (United Nations Environment Programme 1997). At the gathering the leaders signed the Convention on Climate Change which aimed to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

1.2.2 Kyoto Protocol

In terms of European policy and environmental obligations, the Kyoto Protocol was adopted in Kyoto, Japan, on 11 December 1997 and entered into force on 16 February 2005 (Babiker et al. 2002). The Kyoto Protocol is an international agreement in response to the United Nations Framework Convention on Climate Change. The main aspect of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions. These targets amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. To date it is reported that a total of 184 Parties of the Convention have ratified its Protocol. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the '*Marrakesh Accords*'.

Under the Kyoto Protocol it is recognised that developed countries have been principally responsible for the current high levels of GHG emissions in the atmosphere as a consequence of over 150 years of industrial activity. In this regard, the Protocol has placed more pressure on the developed countries under the principle of '*common but differentiated responsibilities*'.

In this respect, developed countries have agreed to achieve an overall reduction of more than 5% in net emissions in the period 2008-2012, by comparison with 1990 levels. However, the overall European Union commitment is to achieve an 8% reduction below 1990 levels in annual GHG emissions. Furthermore, Ireland is obliged to limit the growth in its annual emissions to 13% above 1990 levels in the same period. For Ireland, this translates into an emissions target of approximately 63 million tonnes of CO_2 per annum (Department of Communications 2007b).

1.2.3 Is Ireland ready for Climate Change?

It is clear that the scientific evidence proves that climate change is happening and is a result of human induced emissions. Moreover, global and European policy is evolving to address this issue. In this regard, Ireland as a member state of the European Union, is legally obliged to reduce its emissions and therefore must look at alternative ways of producing energy that is not based on fossil fuels. This will have very real consequences in the way we shape our communities in terms of access to infrastructure and facilities which are not dependent on carbon based fuels. Therefore it is the opinion of the author that Government policy regarding energy usage and transportation which facilitates the mitigation of GHG emissions is obligatory.

With regards to existing communities more than 50% of the population on the island of Ireland live within 15 km of the coastline (Devoy 2008). Nevertheless, while the majority of these people live in a few major urban centres there are still people located within low-density areas. In this context, it is important to consider the potential implications which climate change impacts (such as sea level increase and increased storm activity) may have on these existing coastal communities. This is where land use planning policy must come into effect in ensuring either (a) the protection and conservation of vulnerable areas through mitigation and adaptation measures or (b) the natural erosion of both the natural and built environment as has occurred for millennia previously.

Nevertheless, at present, the impacts of human actions on the environment in terms of land use development has already resulted in serious pressure on natural resources (Foley 2010). The imminent environmental changes which are likely to have fundamental impacts on our surroundings (globally, nationally and locally) relate to *inter alia* fossil-fuel dependency, climate change, ocean acidification, biodiversity loss, nitrogen and phosphorus pollution, freshwater depletion and increase in population (Foley 2010). Therefore Ireland, along with the rest of the planet is having to face up to its own local environmental disasters and must address these issues before it is too late and there are no natural resources left for future generations.

1.3 Thesis Aim

Given the current economic climate in Ireland, the relaxed emphasis on the construction industry and reduced pressure on the natural environment, the author considered it a good time to take stock of where Ireland was at and where it was heading in terms of sustainable development, having cognisance to environmental change.

In addition to climate change implications, another environmental consideration deemed fundamental and inherently linked to climate change is Ireland's dependency on fossil fuels (Department of Communications 2007b). Consequently, land use planning and transportation has an integral part to play in shaping the environment in terms of where communities are located and how they are accessed. Bearing this in mind there is a real opportunity for the Irish Planning System to take on the challenges of future environmental change and oil dependency. It can lead the way in developing progressive and advanced land use planning and environmental policy which emphasises ecological and environmental planning in addition to supporting and promoting sustainable design and communities as well as the use of innovative and emerging green technologies and solutions.

Therefore, the aim of this thesis is to determine exactly how Ireland is preparing itself for environmental change. The author plans to do so by investigating the long term planning framework for the coastal environment of Galway Bay in terms of current planning policy.

1.4 Thesis Scope

Having due regard to the number of imminent environmental changes (Foley 2010) the aim of this thesis was to focus in on Ireland's own situation and specifically, how the Irish Planning System was preparing for environmental change; in particular, climate change and more explicitly, a rise in sea levels and increased storm activity. Particularly, the emphasis was on how planning policy was evolving having regard to published scientific climate change projections and what means of mitigation and/ or adaptation were being explored in areas mostly vulnerable to change.

A concentrated study of the potential impacts from sea level rise and increased storm activity along the coast of eastern Galway Bay has been carried out, and has provided a valuable case study where land use policies have been tested in light of climate change projections for the area by the end of the century.

1.5 Objective of the Research

Aside from Ireland's legal obligation as a member state of the EU to address environmental change, there is also an environmental, social and economic obligation to deal with the depletion of natural resources. The author believes that sustainable development is necessary to meet the needs of future generations and therefore must be enforced to protect this precious ecosystem.

While doing some background research into the present planning policy framework in Ireland, it became apparent to the author that there was a major lack of information with regards to adaptation to environmental change. Development Plans are seen as the blueprint for development in areas and are the strategic framework document for sustainable development. Therefore, the development plan must offer clear guidance on sustainable development policies and objectives, (both national and local), which address the various issues involved, such as climate change, waste management, transport, urban development, sustainable communities and use of natural resources etc. (Department of Environment 2007).

From the initial background research, it appeared that very few development plans were 'climate proofed' with regards to policy and objectives for adaptation. As a consequence, the importance of investigating the 'what ifs' in terms of current planning policy and

adapting a 'business as usual' approach became quite significant and so a case study of Galway Bay was considered to be a good way of identifying such implications in terms of future environmental changes. The outcome of the study could then determine if current policy was adequate as it was or if improvements would be considered necessary.

1.6 Methodology

The research methodology consisted of both qualitative and quantitative research.

1.6.1 Qualitative Research

The qualitative research comprised a comprehensive literature review of articles relating to environmental change and, in particular, climate change and carbon dependency. The articles were obtained from scientific journals, publications, newspaper articles and on-line resources. This set the current context of what is actually happening and what is likely to happen in our environment on a global, European and national scale; in other words, what the scientific evidence is implying in terms of climate change. Of utmost importance were the climatic and environmental projections associated with a continued 2 degree Celsius ($2^{o}C$) increase in global temperature and the development of peak oil and associated potential implications for our planet.

This thesis concentrated on the Irish context and in particular, the Irish Planning System and its ability to deal with any potential environmental changes. In this respect, a case study of Galway Bay was conducted having regard to the available scientific evidence and ongoing research being carried out nationally by the various institutions, academic centres and governmental organisations. The aim was to disseminate the potential impacts likely to affect the communities surrounding Galway Bay and to interpret how existing planning policy would allow the natural and built environment adapt to such changes.

In support of the literature review and qualitative research a number of focused interviews were conducted with key personnel including climate change experts, statutory and non-statutory environmental organisations, local authority (Galway County Council) professional staff and academic researchers. The aim of the interviews was to obtain information and a general understanding of the environmental issues pertinent to the study area and to determine how the planning system was adapting to change.

1.6.2 Quantitative Research

In terms of the quantitative research, the Galway Bay complex and surrounding communities proved to be too extensive an area to cover as part of one case study. Instead, one urban community, Oranmore, and one dispersed rural community, Tawin Island, were selected, and herein referred to as the subject areas. As part of the case study, a land use survey was carried out which reviewed the existing land uses currently located within the subject areas including key environmental designations and infrastructure. Following this exercise a review of Galway County Development Plan 2009-2015 and Oranmore Local Area Plan 2006-2012 was undertaken to determine the future and strategic plans for each of the subject areas having regard to future climate change projections and peak oil. This review was supplemented with site surveys estimating projected sea level increases and identification of vulnerable areas and infrastructure.

The case study proved very useful in terms of testing current policy. The knowledge gained from the literature and research review supported by the interviews provided an overview of where current planning policy was at and how it was evolving to mitigate against and adapt to environmental change.

Resulting from the qualitative and quantitative research, a 'best' and 'worst' case scenario was depicted for the communities of Oranmore and Tawin Island having regard to projected climate change impacts. Given the state of current planning policy it was concluded that if status quo remained the coastal communities of Oranmore and Tawin Island were in real jeopardy in terms of projected sea level rise unless some integrated climate change policy and action plan were implemented.

In terms of limitation, it is noted that the study of what is happening in Galway is not a reflection of what is happening in other areas within the country. Current PhD research being carried out by Jackie McGloughlin, NUIM, will provide a better overview of national progression towards climate change in terms of local authority capacity to adaptation. This research will be published towards the end of 2010.

Chapter 2 details the methodology used in this thesis research. The literature review comprising up- to-date scientific evidence and projections on climate change is included in Chapter 3. A review of European and Irish climate change policy is also included within this chapter. In Chapter 4 an overview of spatial planning and practice in Ireland is provided to set the context for the scenario-building exercise reported in Chapter 5. This

looks at the potential impacts of sea level rise on Galway Bay using 2 case study areas and 'best' and 'worst' case emissions scenarios. Finally, the conclusions on how the planning framework is adapting to climate change in Galway Bay are included in Chapter 6.

2. Research Methodology

2.1 Introduction

The methodology comprised both qualitative and quantitative research. Generally, in the case of writing up research there are three different types of approaches: theoretical, methodological and empirical (Silverman 2000). The approach taken by the author may be regarded as '*methodological*'. This approach is concerned with developing method or comparing and contrasting the use of several different methods (Silverman 2000).

For this particular research it was considered most appropriate by the author to combine both qualitative and quantitative methods to: 1) determine the likely impacts of environmental change on coastal communities having regard to scientific evidence published in peer reviewed articles; 2) investigate the current state of planning policy in Ireland by carrying out an appraisal of statutory and non-statutory policy; and 3) determine the likely implications of environmental change on a 'real life' coastal community based on a case study of Galway Bay.

Therefore it became apparent to the author that a literature review in addition to stakeholder interviews and a case study would be suitable methods to determine the implications of environmental change on coastal communities. Furthermore, as the overall effects of environmental and climate change may not become evident for some time, there is some degree of uncertainty with current climate change projections (Pachauri 2007). Bearing this in mind, the author deemed it important to carry out both qualitative and quantitative research to ensure as much up-to-date information as possible was collated as possible within the timeframe.

2.2 Qualitative Research

An overview of the literature review, conferences attended, interviews conducted and correspondence with key climate change personnel is outlined in the following sections.

2.2.1 Literature Review

As the research topic is very much under exploration at present, there is significant ongoing, published and unpublished research available (Lynas 2008). As a consequence, it was considered apt by the author to carry out a comprehensive literature review on climate

change projections and adaptation from both an international and local level perspective. This provided an overview of the global implications of climate change.

The information required to project future climate comprises the following actions: 1) determining how much fossil fuel will be burnt over the next few decades. This entails emissions scenario and concentration scenario; 2) estimating how the climate system will respond to increased GHG concentrations. This entails climate modelling; and 3) calculating how uncertainties in these aspects will be handled (Sweeney 2007).

Given that this author is not a climatologist or scientist; the literature review mainly comprised an analysis of peer-reviewed scientific journals. Furthermore, given that not all projections are based on complex computer models; some are based on palaeoclimate studies and investigations into past variations in temperature and their effects on the planet in prehistoric times (Lynas 2008). It was of paramount importance to cover as many aspects of climate change as was timely possible.

Of utmost importance was a review of the data and projections contained within the recent IPCC Fourth Assessment Report (AR4) (Pachauri 2007), as the most comprehensive and peer reviewed work of scientific evidence in the past decade. This IPCC work included a range of temperature projections for 2100: - a low emission scenario whereby GHG emissions would result in a warming of 1.1°C; and a high GHG emission scenario resulting in a warming of 6.4°C.

For the purpose of this thesis, a review of a global increase in temperature of 2°C has been carried out and a review of the subsequent downscaling of projections to an Irish context. This was the first step in identifying and quantifying the threats posed by climate change. The 2°C global temperature increase scenario was chosen in accordance with the projections of Professor John Sweeney, Irish Climate Analysis and Research Units (ICARUS), National University of Ireland, Maynooth (NUIM) (Sweeney 2010) and those discussed at a recent EPA conference (Environmental Protection Agency 2010). This rationale will be discussed in greater detail in Chapter 3.

In terms of identifying the particular environmental implications for Ireland - national, regional and local climate change projections were reviewed. This data was obtained from a range of sources including *inter alia*: Irish Climate Analysis and Research Units (ICARUS), National University of Ireland, Maynooth (NUIM); various research

departments in Trinity College Dublin (TCD), University College Dublin (UCD) and National University of Ireland, Galway (NUIG); Met Eireann; Office of Public Works (OPW); Irish Academy of Engineers (IAE); Royal Irish Academy (RIA); The Marine Institute; Environmental Protection Agency (EPA) etc. In addition, statistical information from the Central Statistics Office (CSO), the Economic and Social Research Institute (ESRI) and Sustainable Energy Authority of Ireland (SEAI) was analysed having regard to population demographics; energy policy and usage; environmental and resource economics etc.

The literature review enabled the author to effectively evaluate the information presented in terms of environmental change. Notwithstanding the array of publications available, there was a variance in the use of climatic models, resulting in some alternative evidence conclusions. In this regard the author's goal was to appreciate the information available and advance the material appropriate for the research required in this minor thesis (Silverman 2000) backed up by information gained through selective interviews.

Conversely, from an initial investigation by the author it appeared that there were some gaps in information with regards to the Irish context and environmental change, in particular: vulnerability; adaptation; Government policy on climate change; land use planning and transportation policy addressing environmental change; environmental assessment and coastal zone management. Nevertheless, the author considered it more tangible to focus on the planning policy context for Ireland and for Galway Bay. In this regard, a detailed review of Irish planning policy was conducted, having particular regard to sustainable development, climate change and a non-carbon dependent society. This provided an overview of the current state of planning policy in Ireland.

The main policy documents reviewed included *inter alia*: the National Climate Change Strategy 2007-2012, Irish White Paper for Energy Policy 2007-2020, Making Ireland's Development Sustainable 2002, National Spatial Strategy 2002-2020, National Development Plan 2007-2013, Draft Regional Planning Guidelines for the West Region 2010-2022 and Galway County Development Plan 2009-2015.

2.2.2 Lectures and Conferences

Notwithstanding the vast catalogue of published literature available, the author considered it informative to attend relevant conferences and presentations relating to the environment and climate change, where possible. These included a series of lectures on '*Reading and*

Understanding the Landscape'(Friends of Coole and Galway Rural Development 2010); a lecture on '*Climate Change and the Implications for the West of Ireland*' (Sweeney 2010); and the EPA '*Climate Change Conference*' (Environmental Protection Agency 2010). The motive for attendance at these events was to become versed in, and gain access to, the most up-to-date information available from the experts involved in this area of research. A number of experts from different specialist backgrounds presented papers on many aspects such as: geology, archaeology, climatology, geography, pedology[1], hydrology, phenology[2], economics and policy; providing a valuable overview of various integral factors impacting on the environment.

2.2.3 Research Interviews

Face-to-face interviews were considered appropriate and possible given that: a small number of people were involved; they were accessible; and many of the questions asked were 'open' and required an extended response. In addition, the majority of the stakeholders were considered to be 'key' in terms of gathering valuable insight and understanding in this research area (Gillham 2000b).

The author compiled a list of key stakeholders to be contacted. The stakeholders comprised representatives from: ICARUS[3], NUIG[4], EPA[5], Galway County Council and An Taisce. This was to obtain an all-encompassing view of current issues relating to environmental change within a national and local context. The main purpose of the interviews was as follows:

- Interview with Local Authority professional staff (Galway County Council)

  Objective: To ascertain the views of the local authority with regards to environmental change and evaluate the planned measures to be carried out to adapt to these changes, if any.

- Interview with Climate Change Expert/Academics from ICARUS (i.e. Professor John Sweeney) and NUIG (Dr David Burke)

---

[1] Pedology – study of soils
[2] Phenology - the study of periodic plant and animal life cycle events and how these are influenced by seasonal and interannual variations in climate
[3] ICARUS: Irish Climate Analysis and Research Units
[4] NUIG: National University of Ireland, Galway
[5] EPA: Environmental Protection Agency

Objective: To obtain a scientific view of current and projected implications for Ireland and Galway. To ascertain an objective opinion on how planning policy should adapt to these potential changes.

- Interview with the Environmental Protection Agency (EPA)

  Objective: To determine the most up-to-date and relevant information on Ireland's environment.

- Interview with Non-Governmental Organisation (NGO) (i.e. An Taisce)

  Objective: To gain knowledge of local environmental issues such as past climate-related incidences, ongoing environmental changes and concerns.

In addition to the five interviews carried out, one informal discussion was held with the Galway County Council Coastal Engineer; one questionnaire was completed by a Galway County Council Planning Officer; and two telephone discussions were held with: 1) Jackie McGloughlin, PhD student, ICARUS and 2) Jim Casey, Office of Public Works. Moreover, an invitation was issued to each of the four locally elected Galway County Councillors with responsibility for the Oranmore area to take part in this research. However, no response was received by the author. Nevertheless, the locally elected Councillors have a key role in decisions on planning matters such as the making of development plans which are:

> '*vested in the elected council as representatives of the local community acting in the interests of the common good and the proper planning and sustainable development of the area*'
>
> (Department of the Environment 2004).

In this context, it would have been very worthwhile to have discussed the implications of climate change with the local Councillors and how planning policy can adapt and mitigate against adverse impacts.

The stakeholders (whom the author approached for the interviews and discussions) were selected given their intrinsic involvement in the management of the environment. This exercise provided up-to-date information and a comprehensive understanding of the current issues with regards research, projections, policy development, future projects and

actions and potential areas of concern. Furthermore, during the interview, stakeholder personal views were obtained on current and potential types of adaptation strategies, current local authority initiatives relevant to environmental change and suggestions of possible implementation mechanisms.

2.3 Quantitative Research

In order to evaluate planning policy as it exists and how it would fair in terms of mitigation and adaptation to environmental change as projected, a case study was selected. The coastal community around Galway Bay was initially chosen as the case study. However, due to time constraints associated with this thesis, it was considered more expedient by the author to analyse the settlements of Oranmore and Tawin Island instead.

Oranmore represents an urban growth centre located on the inner east coast of Galway Bay; and Tawin Island represented a rural, dispersed community located along the southeast coast of Galway Bay. The planning policies appraised as part of the qualitative research were then applied to the case study/ subject areas and a quantitative review was carried out.

The quantitative review/ research entailed a land use survey of both subject areas. This comprised an analysis of the facilities, services, infrastructure and natural heritage sites currently extant within the area. Site visits were conducted on the following dates: 7th May 2010, 21st June 2021, 29th June 2010, 7th July 2010, 22nd July 20120, 14th August 2010 and 9th September 2010. A review of land use zoning was then carried out as stipulated in the relevant Development Plans: – Galway County Development Plan 2009-2015 being the planning policy blueprint for Tawin Island; and Oranmore Local Area Plan 2006, the strategic framework document for Oranmore Town. This provided an indication of how much and where, development might occur during the respective plan periods. After that, a review of significant planning applications for each of the subject areas provided evidence of how planning policy was being implemented and enforced.

Next, a review of the future regional climate change projections was considered, having particular regard to the character of the coastline, sea level increases, storm surges and increased storm activity. A hypothetical survey was then carried out using a metre staff indicating potential sea level increases along the coast. Subsequently, vulnerable areas

within these subject areas were highlighted and delineated on a map. This illustrated the areas most likely to be affected by increasing sea levels.

Following that, the case study areas were evaluated in light of current planning policy and how they would be protected in such a likely event, or not, if the case may be. In this context, a 'best' and 'worst' case scenario was depicted based on emissions targets and projected sea level rise. The likely outcomes were predicted for each of the subject areas in order to highlight the potential vulnerability of these coastal communities in situations where 'a business as usual' approach was taken by local authorities.

2.3.1 Mapping

It is noted that the vulnerability mapping was prepared using Mapinfo which is a GIS[6] programme. The data used comprised LIDAR survey material obtained from the Marine Institute. The data was made available in a compatible GIS format which enabled the author to extrapolate vertical contours. The research illustrated vulnerable areas to sea level rise, however it should be acknowledged that there is significant potential for using GIS to graphically display further climate change and land use information. Already, LIDAR is being used in the creation of 3D models of the urban landscape and vulnerable areas such as the modelling of sea level rise on Manhattan (freegeographytools.com 2010). Using GIS and Google Earth, it is possible to superimpose sea level rise data, instantly illustrating the vulnerable parts of the city in 3D/ real life format. It is highly recommended that this application be explored in the future by government departments in Ireland to cross communicate the various impacts of climate change i.e. planning authorities using the models to determine potential impacts from different types of development.

2.4 Research Outcomes

The qualitative and quantitative research methods enabled the author to determine the potential impacts for Ireland in terms of climate change. This helped to envisage and predict what may happen to the coastal communities of Oranmore and Tawin Island in the event of sea level increases resulting from climate change by the end of this century. As it transpired, there is little development in climate change policy and adaptation practices in

[6] GIS – Geographical Information System

Ireland. The final conclusions referred to these overall research findings and gave the view of the author in terms of future planning and adaptation to climate change impacts.

3. Literature Review of Global Climate Change

3.1 Introduction

'Man, however much he may like to pretend the contrary, is part of nature. Can he escape a pollution that is now so thoroughly distributed throughout our world?'(Carson 1962)

This question asked forty eight years ago is as relevant today as it was then. While Carson was examining the adverse impacts of applying human produced pesticides on the environment, it was also about the relationship of plants and animals to their environment. Her book was regarded as a controversial piece of research at the time, exposing how human interference with nature can have grave implications for ecology, human health, and economics. Her research has since been described as the most influential of the twentieth century, despite condemnation in the media and heavy-handed attempts by large (chemical) companies to ban her work. Nevertheless, Carson created public awareness of the environment which led to changes in the government policy and inspired the ecological movement (Carson 1962).

Today, there is much awareness of another significant environmental problem – climate change. Likewise, over 40 years later, this is a very controversial topic, widely debated in the media and on the internet. However, as scientific evidence grows and confirms that human induced GHG emissions are heating up the earth and resulting in climate change (Pachauri 2007), there are now some beginnings of change in government policy and to some degree, an inspired environmental movement, similar to the 1960s.

Since the recognition and acceptance of anthropogenic induced climate change in the 1980s, scientists from many disciplines have been carrying out extensive research and assessment of the likely impacts (Grothmann and Patt 2005). These include an increase in temperatures, sea level rise, extreme weather events etc.

Since the emergence of scientific evidence on the potential impacts, researchers and policy makers started looking into methods of mitigation i.e. examining how to limit global climate change and its economic impacts through the reduction of GHG emissions. Some contend that for the last two decades, European policy has focused exclusively on mitigation (Biesbroek et al. 2010). As a consequence, research in vulnerability and adaptation to climate change has been somewhat lagging behind. Indeed, it has only been

in the last few years, with impacts of climate change increasingly being observed, that adaptation was added to the policy agenda and EU Member States started developing National Adaptation Strategies (NASs) (Biesbroek et al. 2010).

3.2 Development of Climate Change

Climate change is happening now, and more change is certain (Karl 1999). Melting glaciers in the Alps, retreating snowfields in Patagonia, fatal heat waves in Europe (2007), hurricanes in the United States (2005), cyclones in Australia (2006) and flooding in Pakistan (2010) have all been indications of a changing climate (Marshall 2007, Lynas 2008, Gore 2006). Notwithstanding, it is acknowledged that there are alternative views to the reasons why this is happening which are not climate change-related but regarded more as the natural evolution of the earth (Lovelock 1988).

For years scientists have been studying the past to determine what the future holds. These studies mainly comprised geological surveys and paleoclimate studies which use records from ice sheets, tree rings, sediment, corals, shells and rocks to determine the past state of the climate system on Earth. In addition, archaeology, historical studies and climatology all provide chronological evidence of the past.

3.2.1 Historical Climate Change Evidence

One of the most accurate scientific methodologies of investigating past climate is looking at ice sheets in the Antarctic and Greenland. Here, a 400,000 year record of temperature and levels of atmospheric carbon dioxide (CO_2) and methane has been preserved (Hansen 2004). Scientists studied gases trapped in air bubbles in the ice. At a research station in Antarctica, a three-kilometre-long ice core retrieved from the ice sheets contained trapped bubbles of ancient air that revealed the composition of the atmosphere (and the gases) at the time the ice layers formed (Ruddiman 2005).

The ice sheets also gave an insight in ancient temperatures. The primary thermometer used to measure temperatures capitalised on the fact that water comes in 'light' and 'heavy' flavours or 'isotopes' (Alley 1998). These isotopes comprised hydrogen and oxygen allowing scientists to determine temperatures from their mass. Another natural thermometer is the actual current temperature of the ice sheet at the centre. At about a

mile down into the centre of the ice, it remains frozen even as its outside begins to warm up (Alley 1998).

In addition to the ice core drillings, elsewhere in the 1990s scientific teams were studying the effects of ocean currents, noting that present tepid, salty waters flow in the Gulf Stream from the equator toward the Arctic, where they release heat to the atmosphere, giving northern Europe its relatively equable climate (Alley 1998). After cooling, the salty waters become heavy and drop to the deep ocean, where they then flow southward as part of a great 'conveyor belt'(Alley 1998).

The application of environmental isotope techniques to modern physical oceanography was used to trace different water masses, establish their circulation patterns at depth, and investigate the mixing between the shallow and deep ocean. The assessment of modern ocean circulation is essential to understanding the effects of the ocean on the global climate and meteorology (Rozanski 1990)

Marine sediments are another important source of isotope data used in palaeoclimatology. The oxygen ratio of the carbonate shells of marine protozoans[7] called foraminifera, which are present in marine sediment cores, is a function of the oxygen ratio of sea water and of its temperature (Rozanski 1990). From studies of the ocean sediments it was possible to establish a detailed chronology and to evaluate ocean temperature variations during most of the present interglacial period, the Holocene and earlier in the Quarternary[8] (Rozanski 1990).

Therefore, the studies of the ice cores and ocean sediments showed that large, rapid changes in climate, typically lasting a few hundred to several thousand years, punctuated the longer cycles between glacial (cold) and interglacial (warm) periods (Alley 1998). Furthermore, the records from Antarctic Ice in 2006 showed that CO_2 levels varied from 180 parts per million (ppm) during the cold periods to 300 ppm during the warmest times (Marshall 2007).

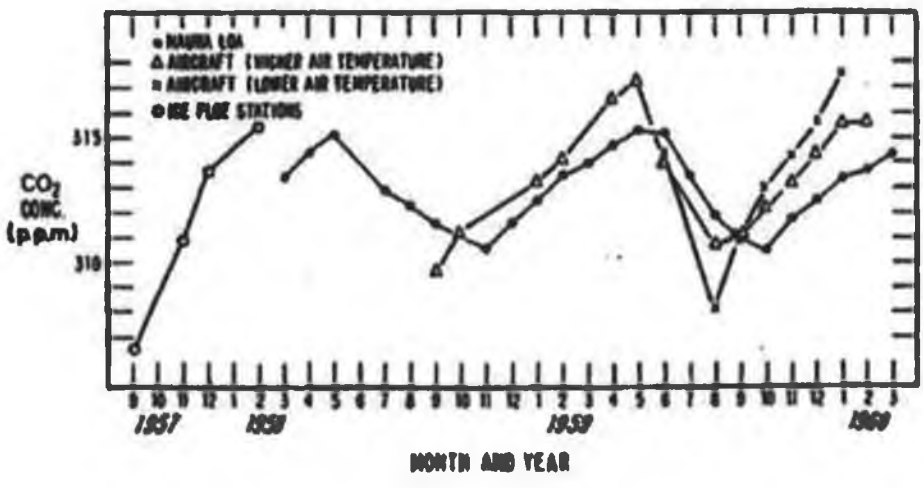
3.2.2 Present Day Climate

In 1957 Dave Keeling began taking daily measurements of atmospheric CO_2 at several remote locations around the world including the South Pole station and at Mauna Loa in

[7] Micro-organisms
[8] The Quaternary covers the time span of glaciations classified as the Pleistocene, and includes the present interglacial period, the Holocene.

Hawaii. At Mauna Loa in April 1958 the CO_2 concentration was 313 ppm, an increase of 1ppm to a maximum in May when it began to decline reaching a minimum in October. Subsequently, the concentration increased again and repeated the same seasonal pattern in 1959 (Scripps CO_2 Program 2010). For the first time, scientists were witnessing nature extracting CO_2 from the air for plant growth during summer and returning it each succeeding winter. However, in 1959 the average concentration had increased and increased still further in 1960. Therefore, not only had Keeling discovered the natural seasonal 'breathing' of the planet, but he had also discovered a rise in atmospheric CO_2.

Figure 1: Keeling Curve depicting CO_2 levels in the atmosphere

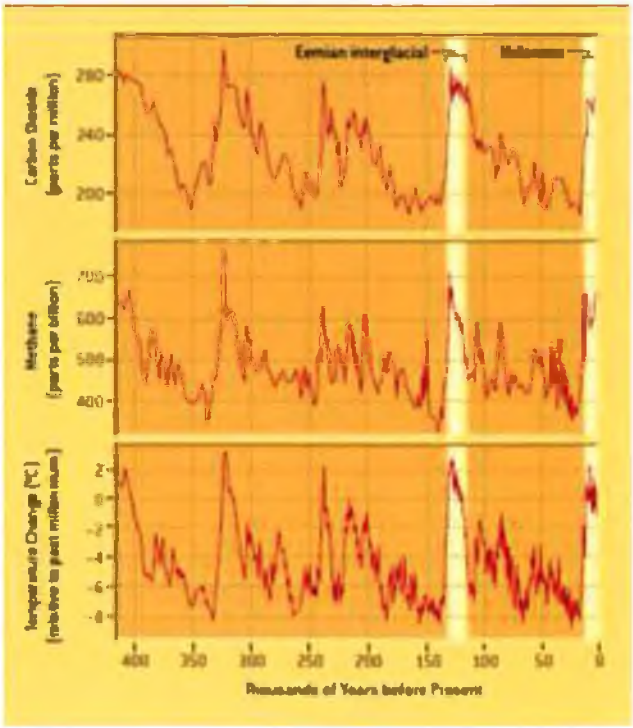


Source: Scripps Institution of Oceanography

The same pattern of steadily increasing concentrations of CO_2 that were witnessed in the 1960s has continued annually for almost a half century. Recent records of current levels of atmospheric CO_2 were reportedly 380 ppm (Marshall 2007) and even as high as about 392ppm (Gibbons 2009). As Gibbons reported, when other greenhouse gases such as methane and nitrous oxide are tallied, the real figure is about 460ppm. This pushes us over the 450ppm line that the IPCC warned we must stay below to avoid catastrophic climate impacts. Nevertheless, recent records indicated that we are now registering the highest levels of CO_2 in 400,000 years (Marshall 2007).

All of this scientific evidence demonstrated that as global temperatures increased and decreased, so did the levels of atmospheric CO_2. The two appeared to be inter-related. As illustrated in Figure 2, temperature change and levels of atmospheric methane and CO_2 for previous millennia indicate a correlating trend between both.

Figure 2: Records of global temperature, methane and CO_2



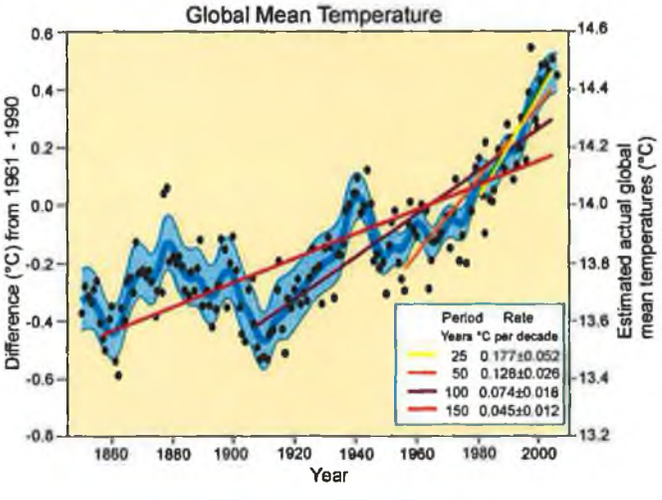
Source: (Hansen 2004)

The natural millennial climate swings illustrated in Figure 2, are associated with slow variations of the earth's orbit caused by the gravity of other planets (Hansen 2004). The energy that powers the world's climate systems comes directly from the sun. There are major variations between the heating of different parts of the world and these are dependent on the seasonal tilt of the earth; the latitude of a given area; and whether it is covered by land, sea or ice (Marshall 2007). The world's climate systems address these differences and redistribute that energy through air currents, cloud formations, rain, winds and ocean currents (Marshall 2007).

In this regard, it was contended by some that climate change is a result of natural evolution and that the earth is self regulating (Plimer 2009, Lovelock 1988 (First Ed.)). This was credible given that; sea level has always changed; ice sheets come and go; life always changes and extinctions of life happen naturally (Plimer 2009). Therefore, in the light of large rapid natural climate changes, it is questionable as to how much do humans really change climate?

While scientific research continues into specific details on climate change, scientists have become increasingly certain that human activities clearly affect the atmosphere in several troubling ways (Karl 1999). The concentration of atmospheric gases, primarily CO_2, methane, nitrous oxide and halocarbons[9] have all increased because of human induced activities (Collins 2007). These gases are referred to as 'greenhouse gases' (GHGs). As solar energy reaches the Earth's surface it is absorbed and then radiates heat back into the air. Some of this heat is trapped by the GHGs in the atmosphere. This process is called the 'Greenhouse Effect' and leads to global warming (Collins 2007). Records indicate that the atmospheric concentrations of CO_2, methane and nitrous oxide remained roughly stable for nearly 10,000 years, before the abrupt and rapidly accelerating increases of the past 200 years. It was calculated that the growth rates for concentrations of CO_2 have been faster in the past 10 years than over any 10-year period since atmospheric monitoring began in the late 1950s. In fact, measurements from the ice cores indicate that concentrations are now approximately 35 percent above preindustrial levels. Methane levels are reportedly around two and a half times preindustrial levels while nitrous oxide levels are around 20 percent higher (Collins 2007).

Figure 3: Variation of mean global air temperature for 150 years[10].



Source: (Kotlyakov 2010)

The significant increase in GHGs coincides with the emergence of the Industrial Revolution which experienced new patterns of investment and workforce and a mass

[9] Halocarbons: gases once used widely as refrigerants and spray propellants

[10] Dots are mean annual temperature for each year; the grey band shows deviations of the temperature values. Four straight lines means trends (and rates) of changes of the global temperature for 25, 50, 100, and 150 years.

movement of population from rural areas to new factories in the cities (Juniper 2007). This series of events first occurred in England, Europe and then in North America. Since then and over 200 years later, this progression is still spreading to China, India and other developing economies. This development to industrialisation has seen a move from the utilisation of human labour and natural materials to rapid industrialisation and the use of fossil fuels. The burning of fossil fuels leads to an increase in GHG emissions.

The reasons scientists are certain that these increases are attributable to human beings were based on two situations: 1) the geographic differences in concentrations reveal that sources occur predominantly over land in the more heavily populated Northern Hemisphere; and 2) analysis of isotopes, which can distinguish among sources of emissions, demonstrates that the majority of the increase in CO_2 comes from combustion of fossil fuels (coal, oil and natural gas). It is acknowledged that methane and nitrous oxide increases derive from agricultural practices and the burning of fossil fuels (Collins 2007).

The inevitable result of emitting large amounts of GHGs into the atmosphere is global warming. Over the past 150 years it was recorded that, despite fluctuations between decades, the Earth's global average surface temperature has increased about 0.8°C, much of it caused by the burning of fossil fuels (Hansen 2004). Furthermore, the temperature is expected to rise even faster as CO_2 levels continue to increase. This is due in part to fact that these future temperature rises will be a result of past emissions, and partly as they will reflect rapid anticipated increases in GHG emissions from human activity (Lynas 2008).

With regards to the future outlook from the implications of global warming, the following provides a brief summary of what to expect:

> *'The global warming that results from the greenhouse effect dries the planet by evaporating moisture from oceans, soils and plants. Additional moisture in the atmosphere provides a swollen reservoir of water that is tapped by all precipitating weather systems, be they tropical storms, thundershowers, snowstorms or frontal systems. This enhanced water cycle brings on more severe droughts in dry areas and leads to strikingly heavy rain or snowfall in wet regions, which heightens the risk of flooding. Such weather patterns have burdened many parts of the world in recent decades (Karl 1999)*

3.3 Global Climate Change Projections

The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide assessments of available scientific and technical information on Climate Change. Comprehensive assessments were carried out in 1990, 1995, 2001 and 2007.

The First Assessment Report (FAR) conducted by the IPCC was published in 1990. It was stated that several hundred working scientists from 25 countries participated in its preparation and review of the scientific data (Climate Change – The IPCC Scientific Assessment). It was acknowledged in FAR that this was the first most authoritative and strongly supported review on climate change that had been made by the international scientific community.

In 1990 the scientists confirmed in FAR that they were 'certain' that: - there was a natural greenhouse effect which already kept the Earth warmer than it would otherwise have been; and human induced emissions were substantially increasing the atmospheric concentrations of the GHGs - CO_2, methane, chlorofluorocarbons (CFCs) and nitrous oxide. They were certain that these increases will enhance the greenhouse effect, resulting in an additional warming of the Earth's surface.

To predict the potential impacts from global warming, the scientists used General Circulation Models (GCMs). These were three-dimensional mathematical models of the climate system (atmosphere-ocean-ice-land). These GCMs synthesised scientists' knowledge of the physical and dynamical processes in the overall system, allowing for the complex interactions between the various components. Nonetheless, the scientists qualified that '*in their current state of development, the descriptions of many of the processes involved are comparatively crude*' (Climate Change – The IPCC Scientific Assessment 1990.) As a consequence, it was admitted in FAR that there was 'considerable uncertainty' attached to their predictions of climate change.

At the time of FAR in 1990, the following predictions were noted based on current model results obtained at the time:

- *'under the IPCC Business-as-Usual (Scenario A) emissions of greenhouse gases, a rate of increase of global mean temperature during the next century of about 0.*

3°C per decade (with an uncertainty range of 0. 2°C to 0. 5°C per decade), this is greater than that seen over the past 10,000 years. This will result in a likely increase in global mean temperature of about 1°C above the present value by 2025 and VC before the end of the next century The rise will not be steady because of the influence of other factors

- *under the other IPCC emission scenarios which assume progressively increasing levels of controls rates of increase in global mean temperature of about 0. 2°C per decade (Scenario B), just above 0. 1°C per decade (Scenario C) and about 0. 1 °C per decade (Scenario D)'*

(Executive Summary, FAR, 1990)

From these predictions, it was also estimated at the time, that under the IPCC 'Business as Usual' emissions scenario, an average rate of global mean sea level rise of about 6cm per decade would occur over the next century (with an uncertainty range of 3 - 10cm per decade). This will be mainly due to thermal expansion of the oceans and the melting of some land ice. The predicted rise was about 20cm in global mean sea level by 2030 and 65cm by the end of the next century. Notwithstanding, there will be significant regional variations.

In terms of ecosystems, it was predicted in FAR that rapid changes in climate will alter the composition of ecosystems. Furthermore, while some species will benefit, others will be unable to migrate or adapt fast enough and may become extinct. In addition, increased levels of CO_2 may increase productivity and efficiency of water use of vegetation. The effect of warming on biological processes, although not fully comprehended, may increase the atmospheric concentrations of natural greenhouse gases (Climate Change – The IPCC Scientific Assessment 1990).

Since FAR was published in 1990 the IPCC have continued to collate and review more up-to-date and accurate scientific research, developed and improved global climate models and facilitated the greater exchange of data. As a result, predictions have become more precise. Subsequent reports were published in 1995, 1997, 2001 and 2007.

In 2007 the IPCC published their most recent findings in the Fourth Assessment Report (AR4). These findings concluded *inter alia* that eleven of the twelve years during the period 1995-2006 ranked among the twelve warmest years in the record of global surface

temperature since 1850 (Pachauri 2007). It should be noted that in a recent review of the IPCC AR4 a claim that the Himalayan glaciers would melt by 2035 was found to be incorrect (InterAcademy Council, 2010). Nonetheless, the InterAcademy Council who conducted the review, emphasised that the overwhelming body of evidence continued to point to the existence of climate change as a real and urgent danger.

In terms of the emissions scenarios and the temperature ranges, AR 4 broadened their range of temperature projections for 2100[11]. These have been based on the scenarios included in the IPCC Special Report on Emissions Scenarios (SRES) (Nakicenovic 2000). The lowest emission scenario could be as low as 1.1°C whereas for the highest emission scenario, global warming could reach 6.4°C. It is noted that in TAR, the global mean temperature range was 1°C for the lowest emission (business as usual) scenario to 3°C (with an uncertainty range of 2°C to 5°C per decade) for the highest emission scenario[12]. Therefore it was evident to the author that the potential risks from climate are growing with increasing scientific evidence.

In the most recent AR4 report, it was claimed that there was '*high agreement*' and '*much evidence*' that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades (Pachauri 2007). The projections anticipated an increase of global GHG emissions by 25 to 90% (CO_2-eq) between 2000 and 2030, with fossil fuels the most dominant in the global energy mix to 2030 and beyond.

---

[11] SRES refers to the scenarios described in the IPCC Special Report on Emissions Scenarios (SRES, 2000). The SRES scenarios are grouped into four scenario families (A1, A2, B1 and B2) that explore alternative development pathways, covering a wide range of demographic, economic and technological driving forces and resulting GHG emissions. The SRES scenarios do not include additional climate policies above current ones. The emissions projections are widely used in the assessments of future climate change, and their underlying assumptions with respect to socio-economic, demographic and technological change serve as inputs to many recent climate change vulnerability and impact assessments.

The A1 storyline assumes a world of very rapid economic growth, a global population that peaks in mid-century and rapid introduction of new and more efficient technologies. A1 is divided into three groups that describe alternative directions of technological change: fossil intensive (A1FI), non-fossil energy resources (A1T) and a balance across all sources (A1B). B1 describes a convergent world, with the same global population as A1, but with more rapid changes in economic structures toward a service and information economy. B2 describes a world with intermediate population and economic growth, emphasising local solutions to economic, social, and environmental sustainability. A2 describes a very heterogeneous world with high population growth, slow economic development and slow technological change. No likelihood has been attached to any of the SRES scenarios (Pachauri, R. K. a. R., A. (Eds.). 2007. IPCC Fourth Assessment Report: Climate Change 2007. Synthesis Report. Intergovernmental Panel on Climate Change.

[12] Under the IPCC Business-as-Usual (Scenario A) emissions of greenhouse gases, the rate of increase of global mean temperature during the next century of about 0. 3°C per decade (with an uncertainty range of 0. 2°C to 0. 5°C per decade)

As a consequence, it was accepted in AR4 that continued GHG emissions at or above current rates would cause further warming and would cause many changes in the global climate system during the 21st century that would *'very likely'* be larger than those observed during the 20th century (Pachauri 2007). The implications associated for increased temperatures and related sea level rise for each of SRES scenarios is included in Table 1.

Table 1: Projected global ave surface warming and sea level rise at the end of the 21st century

Case	Temperature change (°C at 2090-2099 relative to 1980-1999) [a, c]	(m at 2090-2099 relative to 1980-1999)	Sea level rise
	Best estimate	*Likely* range	Model-based range excluding future rapid dynamical changes in ice flow
Constant year 2000 concentrations[b]	0.6	0.3 – 0.9	Not available
B1 scenario	1.8	1.1 – 2.9	0.18 – 0.38
A1T scenario	2.4	1.4 – 3.8	0.20 – 0.45
B2 scenario	2.4	1.4 – 3.8	0.20 – 0.43
A1B scenario	2.8	1.7 – 4.4	0.21 – 0.48
A2 scenario	3.4	2.0 – 5.4	0.23 – 0.51
A1FI scenario	4.0	2.4 – 6.4	0.26 – 0.59

Source: Table 3.1, Section 3.2.1, Climate Change 2007: Synthesis Report (Pachauri 2007)

Since the publication of AR4 more recent observations reveal that CO_2 emissions from human activities grew faster over the past decade than the IPCC previously expected. Since 2000, the Pew Centre reported that the growth rate of actual CO_2 emissions has tracked the most pessimistic (i.e., the fastest growth rate for CO_2 emissions) of the IPCC scenarios (The Pew Centre 2009). Rather, climate models have now estimated that the fraction of CO_2 emitted by human activities that stays in the atmosphere (the airborne fraction) is growing over time. As a consequence, it was calculated that atmospheric CO_2 concentration increased at a rate of 2 ppm per year from 2000 to 2007, 33 percent faster than in the 1990s. The Pew Centre also referred to another recent study which showed twice as much global warming at the end of the current century than before the model was updated, 5.2 °C in the updated model run compared to 2.4 °C before the update (The Pew Centre 2009).

3.4.1 Climate Change Impacts for Europe

With regards to Europe, already wide-ranging impacts have been recorded such as: '*retreating glaciers, longer growing seasons, shift of species ranges, and health impacts due to a heatwave of unprecedented magnitude*'(Parry 2007). These observed changes are consistent with those projected for future climate change.

In general, it is expected that most of all European regions will be negatively affected by some future impacts of climate change, resulting in major economic challenges to many sectors (Parry 2007). There will be regional differences in Europe's natural resources and assets from the impacts of climate change. Adverse impacts will include increased risk of inland flash floods, and more frequent coastal flooding and increased erosion as a result of storminess and sea-level rise. Additionally, the great majority of organisms and ecosystems will have difficulty adapting to climate change. In mountainous areas there will be glacier retreat, reduced snow cover and winter tourism, and extensive species losses (in some areas up to 60% under high emission scenarios by 2080) (Parry 2007).

In terms of ecological loss this is expected to have an impact on everything from food, water and energy production, to life-saving drug sources, to cultural and aesthetic benefits (European Environment Agency 2010b).

In terms of the coast and sea level rise, the IPCC have projected that coastal areas will be exposed to increasing risks, including coastal erosion, due to climate change and sea-level rise. In AR4 scientists admitted that because understanding of some important effects driving sea level rise was too limited, AR4 did not assess the likelihood, nor provide a best estimate or an upper bound for sea level rise (Pachauri 2007). Nonetheless, Table 1 includes model-based projections of global average sea level rise for 2090-2099. Importantly to note, was that those projections did not include uncertainties in climate-carbon cycle feedbacks nor the full effects of changes in ice sheet flow. Consequently, the IPCC scientists warned that the upper values of the ranges were not to be considered upper bounds for sea level rise. Moreover, the projections (0.18-0.59m sea level rise by 2100) included a contribution from increased Greenland and Antarctic ice flow at the rates observed for 1993-2003, but this could increase or decrease in the future (Pachauri 2007).

In this regard, it is worth noting that the contraction of the Greenland ice sheet is projected to continue to contribute to sea level rise after 2100. The IPCC reported that current models at the time indicated '*virtually complete elimination of the Greenland ice sheet and*

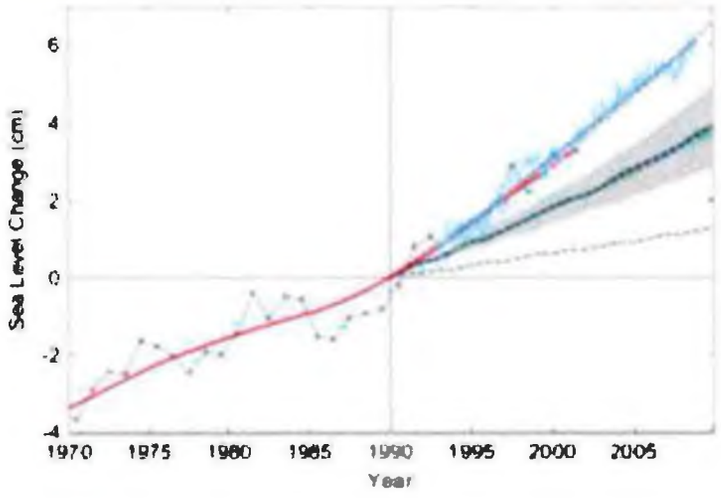
a resulting contribution to sea level rise of about 7m if global average warming were sustained for millennia in excess of 1.9 to 4.6°C relative to pre-industrial values' (Pachauri 2007).

Giving the seriousness of this implication, it has been suggested that some sort of a '*scientific reticence'* was inhibiting the communication of a threat of a potentially large sea level rise (Hansen 2007). Indeed it was Hansen's opinion that there was enough information now to make it a near certainty that IPCC 'business-as-usual' climate forcing scenarios would 'lead to a disastrous multi-meter sea level rise on the century timescale' (Hansen 2007).

At a recent conference it emerged that more up-to-date data and recent observations indicated that GHG emissions and many aspects of the climate were changing near the upper boundary of the IPCC range of projections (Richardson 2009). Consequently, it was reported that many key climate indicators were already moving beyond the patterns of natural variability within which society had developed. These indicators included: '*global mean surface temperature, sea level rise, global ocean temperature, Arctic sea ice extent, ocean acidification, and extreme climatic events'*. Bearing this in mind, scientists now believed that with unabated emissions, many trends in climate will likely accelerate, resulting in an increased risk of irreversible climatic shifts (Richardson 2009).

Since the last IPCC report AR4 in 2007, it was announced at the conference that updated trends in surface ocean temperature and heat content have been published. The revised estimates showed that the ocean has warmed significantly in recent years (Richardson 2009). In fact, it was reported at the conference that current estimates indicated that ocean warming was about 50% greater than had been previously reported by the IPCC in 2007. As a consequence, the new estimates were said to have helped to better explain the trend in sea level, as illustrated in Figure 5, that had been observed in recent decades as most of the sea level rise observed until recently had been the result of thermal expansion of seawater.

Figure 5: Change in sea level from 1970 to 2008, relative to the sea level at 1990[13].



Source: International Scientific Congress Climate Change: Global Risks, Challenges & Decisions - Synthesis Report, Page 8

At the conference it was shown that the rate of sea level rise had increased in the period from 1993 to the present as presented in Figure 5. This was largely attributed to the growing contribution of ice loss from Greenland and Antarctica. A model using base projections on the observed relationship between global average temperature rise and sea level rise over the past 120 years was used, having assumed that this observed relationship will continue into the future. The new estimates based on this approach suggested a sea level rise of around 1 metre or more by 2100 (Richardson 2009).

These projections of 1 metre by the end of the century have been supported elsewhere in scientific publications by The Pew Centre (The Pew Centre 2009). The Pew Centre also attributed their projections to 'a better understanding of the behaviour of large ice sheets combined with observations of rapid melting' which have raised projections of 21st-century global sea level rise. The Pew Centre referred to two recent studies of future sea level rise each using different methods. The projections in the two studies ranged from 0.5 to 2.0 meters for the end of the 21st century. Moreover, the Pew Centre reported that the chances of abrupt, large-scale sea level rise may be greater than previously understood and that the collapse of the West Antarctic Ice Sheet could cause global sea level to rise rapidly by more than 3 metres (The Pew Centre 2009).

[13] The solid lines are based on observations smoothed to remove the effects of interannual variability (light lines connect data points). Data in most recent years are obtained via satellite based sensors. The envelope of IPCC projections is shown for comparison; this includes the broken lines as individual projections and the shading as the uncertainty around the projections.

These projections have been mirrored elsewhere with estimates of 1.2m by 2100 (Uhel 2009) and between a minimum of 1m and maximum of 2m by 2100 (Vermeera 2009).

Therefore it would appear that global sea level rise is expected to be around 1- 1.5m by 2100. However, it is noted that if the levels of GHG emissions increase in accordance with the AR4 worst case scenario (A1F1) then this could result in a sea level rise of approximately 2m. It is also noted that these levels could be enhanced further with rapid melting of the ice sheets at the Antarctic and Greenland and as a result of increased storminess.

3.4.2 Sea level Rise related impacts

As a result, it was noted that coastal wetlands including salt marshes are projected to be negatively affected by sea-level rise especially where they are constrained on their landward side, or starved of sediment (Parry 2007).

In addition it is expected that many millions more people are projected to be flooded every year due to sea-level rise by the 2080s (Parry 2007). In fact, it is estimated that one third of the EU population live within 50km of the coast and some 140,000 km² of land is currently within 1m of sea level (Uhel 2009). People living in densely-populated and low-lying areas where adaptive capacity is relatively low, and which already face other challenges such as local coastal subsidence, have been identified as being especially at risk. Infrastructure and buildings will be affected by intense precipitation events, increased flood risk, and sea level rise with the greatest impact on transportation systems by flooding of roads, railways and transit systems. Critical coastal infrastructure including sea ports will be exposed to coastal flooding, and storms may provoke impacts on maritime transport and related infrastructure (Commission of European Communities 2009a).

With regards to tourism, it was reported that problems of water supply are already becoming increasingly common in Europe's tourist areas. Moreover, it was anticipated that coastal tourism will also be affected as a result of faster coastal erosion and changes in the marine environment and marine water quality, with less fish and more frequent jelly fish and algae blooms (Commission of European Communities 2009a).

In terms of European coastal ecosystems, projections include the following:

- *'Half of Europe's coastal wetlands are expected to disappear (approximately 4500 km2) as a result of sea level rise linked to climate change. About 10 % of Europe's coastline is already protected by sea defences.*
- *Climate change is also expected to affect river flows and species in coastal wetlands and estuaries. Higher water temperatures might also shift the balance in favour of invasive alien species.*(European Environment Agency 2010a)

In terms of economics, it was estimated that climate change impacts on European coastal areas may amount to 12-18 billion Euro/year for economic damages by 2080 (based on the high emission scenario). However, it was also qualified that adaptation measures could significantly reduce the risk to around EUR 1 billion (Uhel 2009). Elsewhere it was anticipated that the annual adaptation cost to protect Europe's coastal zones against sea level rise could cost € 5.4 billion (per year). Again it has been emphasised that benefits of early adaptation are clear (Fernandez Diez-Picazo 2009).

3.5 Climate Change Mitigation

After many years of investigating climate change impacts, the social scientists were also investigating methods of mitigation: '*how best and at what cost to limit global climate change through reducing the emissions of GHGs'* (Grothmann and Patt 2005). Since the late 1980s, the European Union (EU) has been instrumental on an international scale with regards to reducing GHG emissions, particularly through the research and ambitious policy emission reduction targets of several leading EU countries (Biesbroek et al. 2010).

Initially, the EU was a principal player in the development of the two United Nations (UN) climate treaties - the 1992 UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, agreed in 1997.

Since then the EU has been endorsing a range of measures to limit its GHG emissions. In 2000 the European Commission launched the European Climate Change Programme (ECCP) which has led to the adoption of a wide range of new policies and measures, including the innovative EU Emissions Trading System (ETS) (European Commission 2010a)

Under the Kyoto Protocol (1997) the 15 EU members at the time, were obliged to reduce their collective emissions during the period 2008-2012 to 8% below 1990 levels. So far,

monitoring and projections indicated that the 15 countries are on track to meet this target (European Commission 2010a).

In 2007 EU leaders approved an integrated approach to climate and energy policy. The objective was to transform Europe into a '*highly energy-efficient, low carbon economy*' (European Commission 2010a). A unilateral commitment was given that Europe would cut its emissions by at least 20% of 1990 levels by 2020. This commitment is being implemented through a package of binding legislation.

Furthermore, the EU has also offered to increase its emissions reduction to 30% by 2020. This was dependent on other major emitting countries in the developed and developing worlds signing up to do their fair share under a future global climate agreement. It is anticipated that this agreement will take effect at the start of 2013 when the Kyoto Protocol's first commitment period will have expired (European Commission 2010a).

Notwithstanding, it is noted that at the most recent United Nations Climate Change Conference held in December 2009, also comprising the 15th Conference of the Parties (COP 15) to the UNFCCC, there was a disappointing outcome in terms of reaching legally binding commitments in the reduction of GHG emissions. Indeed it was reported that what the world really needed was a climate treaty from the Copenhagen summit and '*all it got was an accord*'(Guardian 2009).

At the conference there was a real chance for international counties to commit to a legally binding treaty on GHG emissions however, this not happen. Instead, the Copenhagen Accord was reached. This document recognised that climate change was one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2°C. Nevertheless, the document was not legally binding and did not contain any legally binding commitments for reducing CO_2 emissions.

Consequently, it was reported that the EU became a target of blame for the summit's *'lacklustre finale'* (Guardian 2009). The charge was that the '*EU leads the rich world in terms of commitment to cut emissions and to make a financial contribution to help others and yet it failed to use that moral authority to up the ante in negotiations'*. In this respect, it was considered that as the most effective multilateral body that was in existence for dealing with climate issues, the EU should have been more forthright in making its mark on the final accord. (Guardian 2009)

Regardless, the Copenhagen Accord reached in December 2009 represented a step towards reaching an agreement. In accordance with the European Commission, it is stated that the EU will be pressing for a global deal that is '*ambitious, comprehensive and legally binding*' (European Commission 2010a).

3.6 Climate Change Adaptation

In terms of adaptation, it has been widely acknowledged that only since increasing evidence of climate impacts (e.g. with Arctic sea ice and mountain glaciers melting, floods, storm damage) has adaptation climbed the political agenda (Biesbroek et al. 2010). In this regard, adaptation was now seen as an explicit policy response to manage the unavoidable impacts. Up until recently, it was the primary focus of the EU to deliver the Kyoto targets, whilst mechanisms played a rather limited role in adaptation (Grothmann and Patt 2005).

Nonetheless, since the publication of the European Commission's White Paper in April 2009 (Commission of European Communities 2009b), the European Commission recognised the need for comprehensive adaptation strategies in Member States. In addition, the Commission stressed the importance of an integrated impacts assessment and comprehensive adaptation strategy at the EU level by 2013 (Biesbroek et al. 2010)

Adaptation to climate change was referred to as '*the adjustments by the affected human and natural systems to moderate potential changes or to benefit from opportunities associated with climate change*'(Grothmann and Patt 2005). Furthermore, it was acknowledged that adaptation to climate change is likely to benefit from experience gained in reaction to extreme climate events, specifically by implementing proactive climate change risk management adaptation plans (Parry 2007). Notwithstanding, it was noted by the IPCC that whilst adaptation to climate change has already taken place, this was on a limited basis (Parry 2007). In early 2009 it was reported that nine EU Member States had developed a National Adaptation Strategy, whilst several others were in the process of developing one (Biesbroek et al. 2010).

Notwithstanding, the IPCC were aware that adaptation measures were seldom undertaken in response to climate change alone (very high confidence) (Parry 2007).

Bearing this is mind, it has been acknowledged by the European Commission that adapting to the challenges created or aggravated by climate change at coastal regions will require an integrated approach to both water management and to the management of marine and coastal zones, including measures to mainstream adaptation into sectoral policies (Commission of European Communities 2009a)

In this regard, a number of existing EU polices are considered to be well capable of facilitating adaptation efforts and optimum use should be made of this legislation. Existing legislation referred to include: EU Water Framework Directive; EU Integrated Maritime Policy and its environmental pillar: the Marine Strategy Framework Directive; Integrated Coastal Zone Management; and Common Fisheries Policy.

Nevertheless, policy makers considered that the uncertain nature of the impact of climate change on water required a comprehensive and continuing consideration of adaptation options including both demand and supply-side measures as well as man-made (or engineered) solutions, behavioural changes and solutions provided by the natural environment (Commission of European Communities 2009a).

In terms of coastal towns and cities, the European Environment Agency (EEA) has been doing some research on the impacts of climate change on these settlements and their vulnerability. In terms of adaptation, they see it as a time for rethinking urban design and management however, few have taken concrete action yet (European Environment Agency 2009).

With a changing climate, extreme weather events are predicted to occur more frequently. The EEA recommended two lines of action as follows: 1) cutting GHG emissions to stabilise temperature rise at below 2 °C above pre-industrial levels; and 2) putting in place adaptive measures (European Environment Agency 2009).

Cities and towns are recognised as being very vulnerable to the impacts of climate change with their high population density and physical structure. The threats vary across Europe but include projections of a rise in sea level of 1–1.5 m by 2100 (Richardson 2009).

The EEA highlighted that location is not the only factor to consider. The physical make-up and design of a city or town can also lessen or worsen the impact. An example of the 'urban heat island' effect was given by the EEA, which is caused by differences in urban density and vegetation cover. Another example highlighted was the degree of soil sealing,

which determines the potential for water infiltration after heavy rainfall (European Environment Agency 2009).

Therefore, giving the graveness of the potential outcome, the EEA warned that unless action is taken now, some cities will suffer considerably, both in terms of population and environment, with significant economic implications. Consequently, the EEA accept that investing now in mitigation and adaptation will help to avoid huge costs later. Indeed, they remarked that some cities have already seen this as a wider opportunity for creating a better future. Of particular emphasis, was that better urban planning will improve quality of life for all and create new employment opportunities by enhancing the market for new technologies and green architecture.

Therefore, it was identified that cities will have to find innovative solutions to cope with the impacts of climate change. In this context, engineering approaches such as flood barriers were regarded as part of the solution. Adaptation, however, also required fundamental change in urban design and management. The EEA recommended that it should be 'mainstreamed' in all related policies, including land use, housing, water management, transport, energy, social equity and health (European Environment Agency 2009). Recommendations from the EEA include:

- Planning new urban developments outside coastal and river flood plains. If this is not possible, use adaptive designs such as floating houses.
- Using energy efficient design in building construction and design.
- Implementing water management schemes to keep water use within sustainable limits.
- Greening cities with parks, green walls and roofs — designed to provide cooling and ventilation as well as water storage and infiltration.
- Linking in with action at the regional, national and European level. For instance, cities vulnerable to excessive rainfall need to act in tandem with their surrounding regions to increase water storage capacity.

Other recommendations included highlighting the role of green infrastructure. It is noted that healthy ecosystems preserve biodiversity and provide many valuable services such as the storage of water. Therefore the benefits of providing green infrastructure should also be explored in contributing to adaptation such as: protecting watersheds which will decrease the need for man-made water treatment facilities; and protecting waterways to

prevent soil erosion, improve water quality, and provide wildlife habitat corridors (Commission of European Communities 2009a).

In light of the above mentioned adaptation measures, it was noted that the economic implications of adapting to climate change will be quite significant. In the UK it was calculated that the cost of flooding is currently around 2 billion pounds per year. If the emissions stabilise, it was estimated that the costs of flooding my only increase to about 3 billion pounds a year. However, if emissions continue to soar and the British Government take a 'business as usual' approach, it was estimated that flooding could increase tenfold to 27 billion pounds a year by 2080 (Marshall 2007). In this respect it was well regarded that the benefits of strong, early action considerably outweigh the costs. Further evidence suggested that tackling climate change is the pro-growth strategy for the longer term, and can be done in a way that does not cap the aspirations for growth of rich or poor countries. Indeed, the earlier effective action is taken, the less costly it will be (Stern 2006).

3.7 The Irish Context

The aim essentially of this thesis research is to establish what the implications are for Ireland from climate change. A literature review of available publications, attendance at conferences and information meetings was carried out, as well as conducting interviews with professionals working within the realm of climate change research to determine the most up-to-date information.

3.7.1 Climate Change Impacts for Ireland

Ireland, like many of the European countries has been extensively involved in the research of climate change impacts over the past decade. In interview with Dr Margaret Desmond, EPA, Dr Desmond highlighted that over the years, the focus was to collate all of the scientific evidence and determine the impacts of climate change for Ireland. This was the main priority. Now the priority is shifting towards assessing vulnerability and adaptation to climate change. Full details of the interview with Dr Desmond are included in Appendix 1. As a result there is a good degree of information available in relation to climate change impacts for Ireland.

For instance, Irish scientists have developed a substantial national climate modelling capability with a comprehensive data-base of results on the future climate of Ireland

(Dunne 2008). Researchers from the C4I Project (Community Climate Change Consortium for Ireland) worked on a regional climate model (RCM) and a range of climate simulations for the twenty-first century were carried out. A summary of the outcomes and predicted climate change impacts from the C4I developed RCM are outlined in Table 2.

At the same time, Professor John Sweeney was involved in a STRIVE[14] project (Sweeney and Charlton 2008) which used a mixture of three Global Climate Models (GCMs). Professor Sweeney, in interview, confirmed that the best results were compiled and downscaled for Ireland. Detail of the interview with Professor Sweeney is included in Appendix 1. Under this STRIVE project Professor Sweeney advised that they came up with was a series of temperature increases ranging from 1.5 to 2.0°C degrees by 2050, as opposed to the 1961-90 levels and changes in rainfall, which confirmed earlier work that winters are likely to get significantly wetter and summers are likely to get significantly drier, especially in the east and south. These temperature increases were confirmed by the work produced by C4I which projected temperature increases of 3-4°C by 2100. Nevertheless, Professor Sweeney emphasised that some climate change projections have a degree of uncertainty associated with them because researchers still do not know what the driving forces, in terms of emissions, will be globally (Appendix 1).

Table 2: Summary of Climate Change Impacts as reported by C4I

Type of Impact	**Description of Impact**
Temperature Increase	The climate will continue to warm, particularly in the summer and autumn seasons: possible increases of 3 to 4°C towards the end of the century. The greatest warming will occur in the south and east of the country.
Warmer, drier summer Wetter autumn, winter	Autumn and winter seasons will become wetter: increases in the range 15-25% towards the end of the century. Summers will become drier: 10-18% decrease towards the end of the century. Regional details remain elusive, due to the large uncertainty in local projections.
Decrease in wind strength	Mean windspeeds are not expected to change significantly over the coming decades, but there is likely to be an overall reduction in strengths towards the end of the century, particularly in summer (4-5%).

[14] Science, Technology, Research and Innovation for the Environment (STRIVE) research programme for the period 2007-2013 administered by the EPA

Increase in cyclones	The frequency of very intense cyclones affecting Ireland is likely to increase.
Increase in Ocean Warming	The seas around Ireland have been warming at the rate of 0.3-0.4°C per decade since the 1980s; over the Irish Sea a greater warming has been observed (0.6-0.7°C per decade). The trends are consistent with what has been observed globally and are predicted to continue over the coming decades.
Sea level increases	Sea levels are rising on average about 3.5 cm per decade around Ireland.
Increase in storm surge Increase in extreme wave heights	Ocean modelling results indicate an increase in the frequency of storm surge events around Irish coastal areas; in the northwest the increase in surge heights between 50 and 100 cm is around 30% by mid century. Extreme wave heights are also likely to increase in most regions.
Increase in winter stream flows and decrease in summer flows	Changes in precipitation and temperature are likely to lead to a rise in winter stream flows (increasing the risk of flooding), and a reduction in summer flows.
Increase exposure to UV radiation	Changes in the climate may impede the recovery of the ozone layer; together with a warmer climate, there may be negative health consequences due to a greater exposure to UV radiation.
Increase in demand for heating energy	Demand for heating energy is likely to reduce significantly as the climate warms.

Source: Based on the summary of key findings, page 5 (Dunne 2008)

3.7.2 Impacts on Coastal Communities

For years researchers have been concerned with the increase in development along the Irish coast. In Ireland it was recognised that the majority of the Atlantic seaboard, including Connemara, was distinctly coastal, while the interior was somewhat desolate (Aalen, Whelan and Stout 1997). In fact, more than 50% of Ireland's population live within 15km of the coastline (Devoy 2008). Notwithstanding, it was recognised that the majority of people are concentrated in a few major urban centres (Devoy 2008).

For years, development effects on vegetation, drainage and soils has been intense and landscapes widely regarded as 'natural' are the actual effect of earlier land use (Aalen et al. 1997). In terms of coastal areas, it was reported that whilst population in Ireland has declined in the 20th century in comparison to the previous centuries, coastal systems are still responding to the earlier human impacts of the 18th and 19th centuries (Devoy 2008).

3.7.3 Sea Level Rise Projections

In 1992 the Irish Government was fully aware that much of the Irish coast will be affected by sea-level rise and, in particular, the intensely developed areas which will be most seriously at risk. Indeed, the Government highlighted that low-lying areas around the main cities of Dublin, Cork and Galway had already experienced increases in population density since 1971; with the majority of it attributed to housing estates along the shoreline, making these areas most vulnerable. Furthermore, it was noted that key industries and infrastructure located in predominantly low-lying coastal locations would be endangered by increased erosion or flooding (Spatial Planning Unit 1991). Despite these earlier predictions, the Irish Government has been seen to adopt 'a reduced adaptive capacity' in addressing coastal change issues and the impacts of sea level increases (Devoy 2008).

3.7.4 Alternative sea level rise projections

In terms of sea level measurements, it was recently reported that there was no available historic sea level measurements on the geographic or time series scales required to accurately assess changes around Ireland's coast. Consequently, heavy reliance was placed on computer models to predict future trends (Marine Institute 2009)

Elsewhere, it was noted that measurements of sea level rise in Ireland have been based on the analysis of sea gauges (Desmond 2009). However, it was reported that isostatic uplift (geological rebound following deglaciation after the last ice age) distorted the signal, but had been accounted for in the analysis of sea level rise around Ireland (Desmond 2009). Bearing this in mind, it was observed that during the satellite era, global sea level rise of 3.5cm per decade was occurring (Desmond 2009).

With regards future sea level rise, there are varying professional opinions and assumptions on the resultant projected increases for Ireland by 2100: an increase in sea level of 40cm (Farrell 2009), 50cm (Irish Committee on Climate Change 2010) or 60cm (Desmond 2009). Notwithstanding these projections, a significantly higher forecast of 1m sea level rise by 2100 has been predicted by others (Sweeney 2010) and (Devoy 2008).

At the recent EPA conference (Environmental Protection Agency 2010) the question of an increase in sea level was raised by one of the delegates. Professor Ray Bates, Meteorology and Climate Centre, UCD, stated that to date, sea level was rising by 3.2mm/ yr and as a consequence, future sea level rise would be around 50cm by 2100. When asked if it was more likely to rise to 1m by 2100 Mr Bates stated that he did not think it would and re-

iterated that they were projections and not predictions. In interview with Dr Margaret Desmond (Appendix 1), Dr Desmond also stated that the query of sea level rise had come up before at other conferences and accepted that it can be difficult to calculate but these were the figures (50-60cm) that the EPA worked with (Desmond 2009).

In interview with Professor John Sweeney (Appendix 1), it was Professor Sweeney's opinion that the projection of approximately 50cm by 2100 was a conservative opinion. The scientists in ICARUS expect sea level to rise between 0.5 and 1m. Indeed, Professor Sweeney commented that the estimates that were published in the IPCC AR4 were in the 0.5m range; and whilst the estimates have been falling for the past few years they have now began to stabilise and more recent suggestions are that they may result in a 1m rise. Professor Sweeney, in his opinion, believed that the IPCC sea level rise estimates were rather conservative as they excluded ice melts in Greenland and Antarctica. Nevertheless, the expectation is that it may result in anything up to 1m.

Therefore while there are some conflicting opinions, a difference of 50cm could be quite significant in terms of coastal inundation. Furthermore, it is acknowledged that these projections do not include further potential increases from extreme weather events or storm and wave surges etc which are also anticipated, as set out in Table 2.

Dynamic weather aspects (storm surges, waves, tides etc) have different effects on coastal environments around Ireland. For example, the West coast of Ireland is well exposed to the full effects of eastwards-moving cyclones and swell wave energy from the North Atlantic (Devoy 2008). As a consequence, it is estimated that predicted changes in the North Atlantic storminess arising from climate change are expected to cause Ireland's coastal wetlands and other soft sediment systems to be among the first in Europe to respond to storm-led sea level rise. In this regard, it is recognised that already, the rate of coastal erosion on soft coasts is approximately 0.2-0.5m/yr, rising to 1-2m/y on southern and eastern coasts (Devoy 2008). Coastal retreat along the Atlantic coast is currently at a rate of 0.5-1.0m/y in areas affected by storms and will increase in the future as sea level rises (Marine Institute 2009). Additionally, it is estimated that about 130-160 hectares of coastal land are lost each year from about 300 localities around Ireland, mostly from the east coast (Nairn 2005). With regards to areas of soft coastline, Professor Sweeney, in interview, highlighted that the potential energy of wave attack will be increased (Appendix 1). For Galway Bay, characterised by a softer coastline, as in the interior of the Bay, it

may suffer regression as a result, similar to Clew Bay further north, for example, where the drumlins in Clew Bay may be more aggressively eroded on the seaward side as sea level increases. Moreover, Professor Sweeney explained that Galway Bay, because of its configuration concentrates wave attack in the interior of the Bay just like a funnel so if increased storm surges were experienced it would enhance that erosive capability.

Therefore, as a result of sea level rise there will be an increase in coastal erosion, estuarine infilling, coastal flooding, changes in dune beach systems and saltwater intrusion of coastal aquifers. With regards to coastal flooding, this already occurs occasionally when high spring tide coincides with onshore winds and high rainfall (Nairn 2005).

In terms of surges, this is when the difference between a higher than expected sea level and the predicted astronomic tide level occurs. This normally happens when high onshore winds pile the water up on the coast or when an area of low barometric pressure causes the water level to rise (Farrell 2009).

The maximum tidal range around the Irish coast is approximately 2-4 metres however; this increases to 4-5 metres in restricted waters such as the Shannon Estuary (Nairn 2005). Tidal magnitude can reach extremes during periods of low atmospheric pressure and under strong onshore winds.

In terms of waves, on the continental shelf south and west of Ireland wave heights range from 3 to 5 metres in January and 2 to 4 metres in June. Storm conditions may drive the waves onto the coast with a tremendous energy release, changing the shape of sandy beaches and dunes in a few hours and sculpting the cliffs and islands of the more prominent parts of the coast (Nairn 2005). In terms of the height of the wave in the Northeast Atlantic, these are significantly correlated with the North Atlantic Oscillation. It has been published that '*increases in significant wave height (i.e. the mean height of the highest one third of all waves) have been demonstrated in the North Atlantic between 1988 to 2002*'(Marine Institute 2009). It has been reported that increases of up to 0.6m in the monthly significant wave height were monitored in the Northeast Atlantic between 1988 and 2002. These increases have been linked to changes in the North Atlantic Oscillation. Moreover, in the southwest of Ireland, it was recorded that significant wave heights have increased by 0.8m per decade (Marine Institute 2009).

In combination, tides and surges on their own generate high still water levels and flood low lying areas by simply flowing onto them (Farrell 2009). Conversely, waves when driven by storms, can pound coastal defences, erode beaches and dunes, run up sea walls and embankments and flood hinterland areas by overtopping (Farrell 2009). The effect of these storms is greatly exaggerated when they correspond with high spring tides and surges.

Furthermore, a study carried out by the coastal engineer in Department of Communications, Marine and Natural Resources (Farrell 2009) concluded that the effect of the IPCC climate change forecast scenarios stipulating that storms will increase in frequency and intensity will in fact, increase the probability of occurrence of extreme events and accordingly, reducing return periods even further. The study revealed that 1) areas that are currently not flooded by an event of a particular occurrence probability will be flooded; 2) areas that are flooded to a particular depth will suffer deeper flooding for the same occurrence probability; and 3) the frequency of flooding at a particular depth will increase dramatically. The report deduced that the increase in rates of coastal erosion and the increase in probability of coastal flooding, in particular, point towards extremely serious economic implications for Ireland.

3.7.5 Implications of Sea Level Rise for Natural Heritage

In general, coastal ecosystems around Ireland will be vulnerable to extreme weather events and sea level rise (Desmond 2009). This may result in damage to and/ or loss of coastal habitats. Coastal flood plains will also be at risk where high tides and storm surge coincide with intense rainfall and result in flooding, coastal erosion and damage to exposed fisheries and aquaculture. In addition, coastal wetlands and estuaries will be vulnerable to saltwater intrusion, resulting from sea level increases. This will have grave implications for County Galway as the second largest county in Ireland with an area of 6,148 square kilometres and a coastline of 689 kilometres and many off shore islands (Galway County Council 2004).

With regards to Galway Bay, it is noted that the effects of sea level rise, coastal flooding and coastal erosion will be influenced by its exposure, geology, geometric profile and sediment grading (Farrell 2009). In this regard, it is noted that there are numerous shallow and intertidal inlets on the eastern side of Galway Bay. A number of small islands composed of glacial deposits are located along the eastern side including Tawin Island. A

diverse range of marine, coastal and terrestrial habitats, including several listed on Annex I of the EU Habitats Directive, occur within the site, making the area of high scientific importance. These landscape features contribute to this areas vulnerability.

Inner eastern Galway Bay is characterised by salt marsh systems. It is acknowledged that coastal marshes in Ireland are often organic dominated with distinctive low, across marsh height ranges (Devoy 2008). It is considered that mild climate and high annual rainfall over western coasts are important factors in conditioning these marsh characteristics, resulting in increases in plant productivity and competitiveness in marshes of freshwater and euryhaline[15] species (Devoy 2008). During the mid-Holocene era, the rapid growth rates of many western coastal wetlands, as linked to reed swamps and freshwater bogs, surpassed sea level rise and limited coastal inundation and onshore movement of sedimentary rocks (Devoy 2008). Therefore, the expeditious increase in sea level rise, combined with recent human pressures on coastal land use, may reduce this former natural resilience or resistance of marshes to inundation, with these environments becoming increasingly more sensitive to biogeophysical changes (Devoy 2008).

In addition coastal lagoons that have a specific salinity regime maintained by a coastal barrier may be particularly vulnerable to sea-level rises. In the event that the coastal barrier is breached, allowing salt water infiltration, then significant changes in habitat and consequently species composition may occur (Sweeney 2003). In this regard, changes in sea level rise are, likely to be long term, and adaptation to new conditions will be made.

A scenario likely to occur as a consequence of greater rates of erosion, coastal flooding and rigid physical coastal protection works is referred to as 'coastal squeeze'. This is where the area between the low and high water mark is reduced to the minimum possible (Nairn 2005). This will result in a loss of valuable coastal ecological wetlands (Sweeney 2010).

In this zone coastal species such as the cockle will be reduced due to sea level rise. Furthermore, other possible side effects may include increased predation[16] and changes in competition for food between shellfish however, it is acknowledged that these changes are more difficult to predict (Nairn 2005).

---

[15] Euryhaline species: organisms able to adapt to a wide range of saline waters.

[16] Predation: In ecology, predation describes a biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked).

In terms of fauna, changes in the intertidal habitat and in the invertebrate populations will, most probably, have an adverse impact on overwintering bird habitats and bird populations, especially some of the waders, which do not use inland habitats (Nairn 2005).

With regards to an increase in the occurrence of storm events, it is recognised that in general, '*it is not the maximum wave action that is experienced but the average wave exposure that is the determining factor in species distribution'* (Sweeney 2003). It is common for storm events to occur on all coasts and these usually have short-term impacts on the species and communities occurring there. However, these events are usually short lived and, when prevailing conditions return, species re-colonise the habitats. Conversely, if storm events occur for longer periods and the average wave exposure at a site is significantly increased, then species may not be able to re-colonise themselves and the community species composition shifts (Sweeney 2003).

Scientific research has identified a number of common sub-tidal and inter-tidal species which are of conservation interest around Ireland and are sensitive to wave exposure. These include *inter alia*: sea grasses *(Zostera spp.)*; Kelps *Laminaria hyperborea* and *Laminaria saccharina;* and the brown algae *Fucus serratus. (Sweeney 2003).*

With regards to marine birds it is recognised that shore and 'low' island nesting species are vulnerable to rising sea levels and storm surges. In Inner Galway Bay these include the sandwich tern and cormorant. Inner Galway Bay is also recognised for its important wintering waterfowl sites, which are low lying and vulnerable to sea level change and storm surges. These areas accommodate brent goose, bar-tailed godwit and black-throated diver, which are all vulnerable to coastal climate change impacts.

In conversation with Dr. David Bourke, NUIG, it was Dr Burke's opinion that there had been limited research conducted in terms of the impacts of climate change on biodiversity specifically in Ireland to date. Dr Bourke was working on the EPA funded project COCO-ADAPT which involved the assessment of the potential impacts of climate change on threatened species and habitats in Ireland. Notwithstanding, Dr Bourke confirmed that due to time constraints and resources, there had been no comprehensive baseline data or database of biodiversity in Ireland to make historical comparisons. As a consequence, they were using models to predict changes based on different scenarios of temperature increases, sea level increases, rainfall data etc. Nevertheless, Dr Bourke believed that there is potential for loss of many habitat species in Ireland as plants and animals will not

be able to adapt to changing temperatures, sea level increases and increased exposure to storm activity. Detail of interview with Dr Bourke is included in Appendix 1.

3.7.6 Implications of Sea level Rise on existing communities

In general, the impacts arising from sea level rise comprise loss of land as a result of inundation and increased erosion; and increased risk of flooding both at the coast and inland along major river networks during major storm surge events (Desmond 2009). An increase in extreme weather events may also result in human injury and loss of life.

There will be some positive impacts for the tourism industry and economic sector however, these may be shortlived. As a result of increased population this will place additional pressure on Ireland's environment, thus resulting in the detriment of the very attraction they seek to visit and enjoy. It is anticipated that tourists are better able to adapt to changing climate conditions than the tourism industry and will soon switch their choice of destination when the results of climate change begin to impact on the enjoyment of their holiday destination (Fealy 2009). Therefore, warmer ocean temperatures and warmer, drier summers may attract more tourists to Ireland's coast. Warmer temperatures may bring with it higher numbers of dolphins and whales off the coasts increasing tourism opportunities for mammal watching. Notwithstanding, there will be adverse impacts associated with increasing land and ocean temperatures and it will be necessary to prepare for these. Negative tourism impacts include:

- *Water-based activities on the coast and inland waterways such as cruising, angling, bird and whale watching will be affected by more unpredictable stormy weather*
- *Ireland's links courses, coastal paths and beaches will suffer from increased coastal erosion*
- *Ireland's coastal landscape, and its cultural heritage features such as castles, historic houses and promontory forts, along with our coastline will be affected by increased coastal erosion, more frequent storms and rising sea levels*
- *Higher water temperatures, combined with pollution and a potential increase in invasive species of plants and fish will affect inland waterways by making them less attractive for angling and other water-based activities*
- *Bird watching may suffer due to a decline in their food sources'* (Fealy et al 2009 5-7)

Increased storm events, on the other hand, increases the potential for extreme water sports such as surfing, wind surfing and kite surfing.

3.7.7 Implications of sea level rise on infrastructure

With respect to infrastructure provision within coastal areas, sea level rise and increased storm activity may cause damage to roads, bridges, telecommunications etc. Some industries may also be affected such as shipping, fisheries and aquaculture. Therefore these impacts point towards serious social and economic implications for Ireland. At the EPA conference it was noted by the author that was some frustration among engineers in terms of mitigation against coastal impacts such as inundation. A representative from the Engineers Institute stated that they had prepared mitigation recommendations in light of the climate change projections however; they did this themselves without any guidance from Government. In their most recent report '*Protection of Critical Infrastructure*' it was accepted that a rise in sea level in the range 0.5-1m was predicted by the end of the century (Irish Academy of Engineers and Engineers Ireland 2010). In this regard, it was acknowledged that protection will be required in the form of '*enhancement of existing coastal defences*', with substantial works required in Dublin, Belfast and Cork. It was also predicted that river stream flow will increase by approximately 20% by mid century. Moreover it is anticipated that flood events are likely to become more frequent with the current 50 year event likely to be associated with a circa 10-year return period (Irish Academy of Engineers and Engineers Ireland 2010). Therefore both engineering organisations recommend the following actions:

- Flood defences should be designed into all new infrastructure areas, avoiding flood plains. A robust and acceptable methodology should be developed on which to base the delineation of flood plains.
- Cuttings and embankments will require alterations and improvements to cope with increased flooding, as will water infrastructure dependent on electricity for pumping.
- All owners of energy infrastructure should carry out a preliminary climate change risk assessment and prepare a climate change asset risk register.
- A register of critical infrastructure vulnerable to climate change should be established with a formal flood risk assessment carried out for each critical infrastructure asset.

- Design Standards: The engineering profession and climate change researchers should co-operate in identifying which climate change parameters are critical to infrastructure design and what further climate change research is required to enable the engineering profession to amend current design standards. In the interim, it would be prudent that new construction should allow for a sea level rise of **at least 0.5m.**

(Irish Academy of Engineers and Engineers Ireland 2010)

3.8 Ireland's Policy Response to Climate Change

A review of Irish legislation on climate change was embarked upon to determine what mitigation and adaptation measures the Irish Government was pursuing and will pursue to reduce the potential adverse impacts from climate change.

3.8.1 National Climate Change Strategy 2007-2012

Under the Kyoto Protocol Ireland agreed to a target of limiting GHG emissions to 13% above 1990 levels by the first commitment period 2008-2012, as part of its contribution to the overall EU target. In response to Ireland's commitment to the Kyoto Protocol the Irish Government published the National Climate Change Strategy in 2000 which provided a framework for achieving GHG emission reductions 'in *the most efficient and equitable manner while continuing to support economic growth and to prepare Ireland for the more ambitious commitments that will be required after 2012' (Department of the Environment 2007).* This Strategy was superseded in 2007 by the National Climate Change Strategy 2007-2012 which built on the measures included in the first strategy in 2000. The 2007-2012 Strategy sets out the mitigation channels by which Ireland will meet its Kyoto 2008 - 2012 commitment and continue to in the post 2012 period. These channels essentially focus on energy supply, transport, residential design and build, industry, commercial and services, agriculture, land-use and forestry and waste.

To date the Government has published the 'Irish White Paper Delivering a Sustainable Energy Future for Ireland 2007-2020' (Department of Communications 2007a). The main objectives set out in the White Paper were to ensure security of energy supply; promote the sustainability of energy supply and use; enhance the competitiveness of energy supply; and include an integrated approach to delivery.

More recently, the Government published 'Maximising Ireland's Energy Efficiency - The National Energy Efficiency Action Plan 2009 – 2020'(Department of Communications 2010). The purpose of The National Energy Efficiency Action Plan 2009 – 2020 (NEEAP) is to identify policies and measures that have the potential to contribute towards Ireland's national 20% target. In 2007, the EU agreed new climate and energy targets- 20-20-20 by 2020 – 20% reduction in GHG emissions by 2020; 20% energy efficiency by 2020 and 20% of the EU's energy consumption to be from renewable sources by 2020 (Department of Communications 2010).

It was acknowledged that fossil fuels accounted for 96% of all energy use in Ireland in 2007. Furthermore it was highlighted that Ireland's demand for energy had grown by 84% over the period 1990 – 2007, with usage increasing in every sector of the economy (Department of Communications 2010).

Under the National Climate Change Strategy 2007-2012, it was an objective to develop a national adaptation strategy to climate change over the next two years i.e. in 2009. This strategy was to provide a framework for the integration of adaptation issues into decision-making at national and local level (Department of Environment 2007b).

To date, no national adaptation plan or framework has been published.

3.8.2 Climate Change Bill 2010

As of yet, no Climate Change Bill has been published for Ireland. At the recent EPA conference (Environmental Protection Agency 2010b) Minister of State, Ciaran Cuffe, with special responsibility for Sustainable Transport, Horticulture, Planning and Heritage gave a presentation. In his presentation the Minister announced that Ireland was planning to reduce its GHG emissions by 30% by 2020. The Minister also claimed that the Heads of Bill, prior to the Climate Change Bill would be published in the summer of 2010. There has been no announcement on the Climate Change Bill to date.

Following the Minister's presentation, Mr Owen Ryan, Climate Change Policy, Department of Environment, Heritage and Local Government, gave a presentation which discussed Ireland's GHG emissions of 20% by 2020 and not 30%, as earlier presented by the Minister, Ciaran Cuffe. Mr Ryan stated that there would be an opportunity for stakeholder consultation when the Heads of Bill for Climate Change is published and that a National Adaptation Framework would be announced along with the Heads of Bill.

It is noted that at the EPA Conference (Environmental Protection Agency 2010), the anomaly over the GHG emissions target of 20% or 30% (erroneously stated by the Minister) caused some confusion among the delegates. Furthermore, some delegates vented their frustration at the continuing absence of a national climate change plan or policy and adaptation plan from the Government.

3.8.3 Ireland's progress to date

A review of current available statistics was conducted to determine exactly where Ireland was at in terms of reaching its mitigation and adaptation goals.

The main developments to date in Ireland with regards energy consumption are highlighted in the next paragraph. These developments include the most up to date statistics published by Sustainable Energy Authority of Ireland (SEAI) in 2009 (Howley 2009) and are indicative as to how Ireland is progressing in terms of the different sectors and energy users nationally.

The year 2008

- Ireland's economy contracted by 3% in 2008. Energy demand grew by 1.5% and energy-related CO_2 emissions increased by 1.3%.
- Energy-related CO_2 emissions fell by 4.6% in industry and transport recorded a 1.9% reduction in emissions in 2008 compared with 2007.
- Energy-related CO_2 emissions increased by 9.7% in the services sector and 8.8% in the residential sector. It is noted that one significant factor highlighted was the reduction in external temperatures during 2008, i.e. a return to normal weather in 2008 after a mild year in 2007.
- Imported oil and gas accounted for 81% of energy supply and Ireland's overall import dependency was 89% in 2008.

The period 2005 – 2008

- Since 2005, energy-related CO_2 emissions have increased by 0.2% per annum (excluding international aviation), while the economy has grown by 2.8% per annum. In contrast, over the period since 1990, energy-related CO_2 emissions grew by 2.2% per annum, while the economy grew by 5.9% per annum.

- The average annual growth in 2005 – 2008 was 8.9% for natural gas and 16% for renewable energy, while oil has reduced by 0.6% per annum and coal by 7.8% per annum.
- Transport, residential and services sectors' energy demand grew in the period 2005 – 2008 by 3.6%, 1.7% and 1.2% per annum respectively, while demand in industry fell by 2.1% per annum (Howley 2009).

Furthermore, it was acknowledged that fossil fuels accounted for 96% of all energy use in Ireland in 2007. It was highlighted that Ireland's demand for energy has grown by 84% over the period 1990 – 2007, with usage increasing in every sector of the economy (Department of Communications 2010). Therefore it is fundamental that Ireland reconsiders it position in terms of energy usage and resources.

3.9 Current and Future Climate Change Research Projects in Ireland

To determine the current state of research and development in Ireland a number of interviews and correspondence was carried out with key personnel involved in academia and Government organisations.

3.9.1 Vulnerability Assessment

Dr Margaret Desmond, EPA in interview, stated that whilst the research into climate change impacts would continue, the emphasis was now beginning to focus on vulnerability and adaptation to climate change. Dr Desmond felt that before they could tackle vulnerability and adaptation, a baseline of scientific evidence on likely impacts was required first and foremost. The next stage was to conduct an impact assessment of the current state of the environment and prepare baseline data. From a climate perspective, they need to determine what is vulnerable and at risk. In Ireland, Dr Desmond qualified that there was no national vulnerability assessment but was aware that this was a knowledge gap. In this regard, the EPA recently had a research call out and this will be a first attempt at establishing Ireland's national vulnerabilities. The project is expected to comprise a desktop review of all the literature, hold a stakeholder consultation on what the key areas of vulnerability are and to focus on the short term impacts. Dr Desmond's feeling was, without pre-empting the study, that the main vulnerability will be water; and in terms of areas, it will be geographic/ coastal areas. Dr Desmond confirmed that the project will not commence until September 2010 but would hope to have results within a

year. Dr Desmond believed that this will provide support for building of policy. The next stage, in Dr Desmond's opinion, was to look at the key vulnerabilities and put a cost on them. Then they would look at the other list of vulnerable areas/ sectors afterwards.

It is noted that Dr Desmond felt that the costing of adaptation options was something that the Irish Government needed to think about but had not been developed yet. Dr Desmond also acknowledged that Ireland does not have an adaptation plan to climate change but insinuated that a framework would be coming through in a few months.

Dr Desmond confirmed that there was no dedicated climate change unit for Ireland at present. Dr Desmond also confirmed that she was the only person in climate change research employed full time by the EPA. Dr Desmond has been in this position over a year and a half. Please refer to Appendix 1 for more details on the interview.

3.9.2 COCOADAPT Project

COCOADAPT (Co-ordination, communication and Adaptation for Climate Change) is an EPA managed project in Ireland. COCOADAPT is a multidisciplinary integrated assessment of the drivers and impacts of climate change on a variety of sectors in Ireland, towards the development of adaptations strategies at local, regional, national level. In conversation with Dr Dave Bourke, NUIG, Dr Bourke explained that he was involved in examining the impact of climate change on protected species and habitats in Ireland. The project involved a multi-model approach to project future species/habitats distribution changes under a variety of climate change scenarios. Dr Bourke described that the biodiversity project he was involved in was made up of 2 postdoctoral researchers and they were working on biodiversity. In addition, there were 5 PhD students working on other sectors – construction, biodiversity, water resources, tourism and planning. The aim of the project is to take all that they have learned from all the separate components and implement a case study, likely to be in County Mayo and try and identify specifically the impacts that will be in that area. They will identify general kinds of impacts there and then make adaptation or mitigation recommendations in terms of how they would adapt or mitigate against climate change in their area. Dr Bourke felt that this will hopefully happen over the next 6 months. The report is meant to be delivered by the end of the 2010 or the following year.

In terms of the planning aspect of the COCOADAPT project, Jackie McGloughlin, ICARUS, NUIM is a PhD student researching 'Planning for Climate Change: Enhancing

adaptive capacity in Ireland's local authorities'. In conversation with Jackie, it is estimated that this project will be finalised at the end of 2010. Details of both conversations with Dr Bourke and Jackie McGloughlin are included in Appendix 1.

3.9.3 Flooding and Coastal Studies

In terms of coastal flooding, Mr Jim Casey, Coastal Engineer with the OPW confirmed by email that some flood studies had been conducted in the East and South of Ireland. Under national flood policy it was a requirement that flood risk be managed in a catchment-based manner through a framework of Catchment Flood Risk Management Plans (CFRMPs) (OPW). In response to the new policy, it is reported that the OPW developed, and is currently pilot testing, a method to meet the flood policy requirements through Catchment Flood Risk Assessment and Management (CFRAM) studies. The three pilot studies are: 1) The Lee CFRAM Study; 2) The Dodder CFRAM Study; and 3) The Suir CFRAM Study.

In relation to the Galway Bay area, Mr Casey stated that the OPW was working on preliminary flood risk assessment (PFRA) mapping for the whole of Ireland in accordance with the EU Floods Directive[17] and SI 122[18]. However, Mr Casey highlighted that this was currently focussed on consideration of existing risk and not future climate change. Mr Casey, nonetheless, noted that future scenario PFRA maps to take account of climate change were being considered and, if proceeded with, were unlikely to be available until the latter part of 2011.

In relation to plans for a CFRAM covering the Corrib and Galway Bay area, Mr Casey confirmed that this was not likely to commence until early 2011. Moreover, the only other study the OPW was working on of relevance was the Irish Coastal Protection Strategy Study (ICPSS) which is producing strategic coastal flood hazard and potential risk mapping for coastal areas. Notwithstanding, Mr Casey admitted that whilst much of this information had been produced in draft for the east and south coast and was underway for the west coast, it did not yet incorporate the future or climate change scenario. This latter work commenced on the east and south coast and was likely to be available by end of this

[17] Directive 2007/60/EC on the assessment and management of flood risks entered into force on 26 November 2007. This Directive now requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. With this Directive also reinforces the rights of the public to access this information and to have a say in the planning process (Commission, E. 2010a. A New EU Floods Directive.)

[18] Statutory Instrument No. 122 of 2010. European Communities (Assessment and Management of Flood Risks) regulations 2010.

year. However, Mr Casey confirmed via email correspondence (Appendix 1) that it will be 2011 before the same information is available for the west coast.

3.9.4 Smart Bay, Galway

SmartBay Galway is a national research infrastructure project being managed by the Marine Institute, Galway. It comprises a network of buoys, seafloor cables and other infrastructure, supporting a range of sensors, information systems, telemetry and other communication technologies (Marine Institute 2009). This combination provides the basis for in-situ, real time oceanographic monitoring. In conversation with Mr Paul Geoghan, SmartBay Operations Manager, Marine Institute, Mr Geoghan explained that SmartBay was a pilot study which received a PRTLI Award[19] which was for certain work programmes at GMIT and NUIG. In terms of climate change, Mr Geoghan gave details on the various research projects ongoing in Galway Bay. In Carna there is a buoy at sea monitoring levels of CO_2 in the ocean. There is also storm surge data being collated on a regular basis in terms of heights etc. In addition, tidal gauges are used and datasets are available for the last 2 years providing information on wave heights, salinity etc. However, Mr Geoghan noted there were some technical difficulties with the data. Mr Geoghan also mentioned that NUIG are using a high resolution model of Galway Bay comprising radar and not just point locations. This project involves erecting a station monitor at Mutton Island and Spiddal, which will monitor wave heights over a large area. At present they are not developing sea level projections. Notwithstanding, Professor Sweeney noted that Galway Bay is currently one of the most intensely monitored bays in the world now with SmartBay and other monitoring streams in the Bay. It was assumed that any abrupt changes in frequency will be detected fairly quickly as a result of these projects. Details of conversation with Mr Paul Geoghan are included in Appendix 1.

3.10 Current and Future Climate Change Research Projects in Galway

As part of the overall climate change research, meetings and correspondence with the professional staff of Galway County Council was carried out to determine the current state of knowledge and research being conducted in County Galway in terms of mitigation and adaptation.

[19] Programme for Research in Third Level Institutions (PRTLI) Award

3.10.1 Heritage

An interview was carried out with Ms Marie Mannion, Heritage Officer, Galway County Council on the 2nd July, 2010 at the Council Offices. Details of the interview are included in Appendix 1. The main project Marie discussed was the undertaking of a coastal audit of the whole county which will have regard to climate change issues. The aim of this auditing exercise is to create a one-stop shop of all Galway County Council's (the Council) information and data sets.

From a heritage perspective, Marie envisaged that the one-stop shop will be where all the information is collated initially, enabling the Council to see where the gaps exist. The Council commissioned a GIS consultancy, Compass Systems, to work with them and five other local authorities, compiling data sets and identifying what was available. In order to deal with climate change, Marie saw this as a 5-10 year project.

Marie noted that in terms of heritage, 95% of archaeological and built heritage along the Galway coast is unknown. The initial step for the Council; Marie felt, was the collation of data and determining what they have. Marie felt that in order to prepare yourself for climate change, you need to know what you have, before you know how to deal with it. The issues of climate change will be factored into this process also, but at the moment, from a built heritage and archaeological perspective, Marie confirmed that the information is incomplete.

From a natural heritage perspective, the whole geomorphology of the area was something Marie thought they needed to get as much information on as possible; whether in terms of climate change or any developmental pressures, the Council will then be in a better position once they have the information.

When Marie was questioned on whether Galway County Council had carried out any studies themselves on climate change impacts, Marie suggested it would be something they would do down the line. From a natural heritage perspective, Marie confirmed that there was a huge gap in knowledge.

Marie also explained that the Council was involved in providing biodiversity training for staff over the previous months and during September 2010 they will commence a certificate programme in Biodiversity Awareness which they have developed with NUIG. This training will help staff to be more aware of biodiversity. The course includes

classroom learning, field trips and application to projects. This will inform the staff of the potential impacts on biodiversity from development.

3.10.2 Coastal Engineering Works

In conversation with Kevin Finn, Coastal Engineer, at the Galway County Council offices on 22nd July 2010, the projected impacts of climate change and, in particular, a potential sea level rise of up to 1m by 2100 was discussed. Kevin confirmed that he was not aware of any climate change studies or research being carried out within the Council in terms of the coast or sea level rise. Indeed, Kevin was surprised that a 1m rise was the actual projection and was quite concerned at the potential impact this would have on the coast.

Kevin explained that at the moment, local authorities do not have much money or funding and act more like facilitators; in that they facilitate projects. For example, they facilitated the Department of Community, Equality and Gaeltacht Affairs on the Aran Islands and Inisboffin Island harbour works. For the Inis Mor harbour development, this was a capital project using computational and physical modelling. The project is currently being carried out by specialist consultants. The criteria for the project included designing for 50 years; therefore it was Kevin's belief that some predictions in terms of sea level increases must have been included in addition to 1 in 20 year storms. The consultants (HR Wallingford) working on the project have the expertise in research and predictions. Nonetheless, Kevin confirmed that apart from coastal remedial works, there has been no specific research or projects done to date on the coast in terms of climate change for the next 50-100 years.

Kevin confirmed that there was a marine department within the Council but there was only one engineer working there at the moment. Previously, there used to be up to 3 persons working in the department but given the Council's economic budget at the moment, climate change and coastal works have not been the priority.

3.10.3 Forward Planning

Mr Anton Martens, Forward Planner, Galway County Council was not available for an interview however; he did complete a questionnaire that was sent to him. In terms of planning studies being carried out on projected local impacts for Galway Bay resulting from climate change, Mr Marten stated that he was not aware of any studies for Galway Bay by Galway County Council, although he did suggest that Galway City Council may have undertaken research for coastal protection works.

In terms of a Coastal Zone Management (CZM) plan for the county, Mr Martens referred to the County Plan which included broad policies in relation to CZM in the county. These policies and objectives included the preparation of coastal zone management studies for the coast and islands and standards in relation to coastal management and protection. Mr Martens believed that these studies would improve the information base, guidance and effectiveness of coastal protection and management. Mr Martens highlighted that existing CZM policies for Galway Bay were fragmented between different local authorities and other agencies. He also felt that there would be greater effectiveness through a joint CZM study and strategy for Galway Bay dealing with the varied and complex issues around climate change, coastal flooding, coastal development setbacks, integration of social, economic and environmental issues, etc.

To date, there have been no CZM Plans or any CZM studies prepared for Galway Bay or county.

In terms of planning policy and renewable energy projects located within Galway Bay, Mr Martens confirmed that the Council are currently in the process of drafting a Wind Energy Strategy for County Galway, which will provide additional guidance on appropriate locations and assessment criteria for wind farms in the County. Mr Martens emphasised that the functional area of the County Council only extends to the foreshore/high water mark.

4. Spatial Planning, Practice and Policy in Ireland

4.1 Introduction

This chapter provides an overview of current planning policy in Ireland at national level with the National Spatial Strategy; regional level with the Regional Planning Guidelines; and at local level with the County Plan and Local Area Plans. The strategic planning policy was reviewed having regard for climate change impacts.

4.2 National Planning Policy

4.2.1 National Spatial Strategy 2002-2010

The National Spatial Strategy (NSS) was published in November 2002 and sets out Government policy with regard to achieving balanced regional development in the period up to 2020. It has a focus on people, on places and on building communities. The strategy looks at how different parts of the country will in the future be able to sustain:

- A better quality of life for people
- A strong, competitive position
- An environment of the highest quality.

The NSS promotes a better balance of social, economic and population growth between regions through:

- The enhanced development of existing cities and larger towns to act as 'gateways' and 'hubs' for their wider regions;
- Developing a critical mass by integrating the location of large pools of labour and skills with high quality infrastructure; and
- Utilising the critical mass of the gateways, hubs and other towns together with effective transport and communication linkages to ensure that non-urban areas achieve higher levels of regional competitiveness.

Galway was designated a 'Gateway' within the settlement hierarchy of the NSS. The underlying message for 'Gateways' within the NSS is the importance of gaining the critical mass of population, employment and infrastructure to support the proper and orderly spatial growth of the Country (Department of Environment 2002).

In terms of climate change, it is stated that the aim of the NSS was not to replace or re-state environmental policies generally. However, it is emphasised that development

arising from the NSS will be implemented within the framework of strong and ambitious policies for the protection of the environment and policies to integrate environmental considerations into sectoral policies. In this regard, it is stated in the NSS that policy and action will focus on limitations on GHG emissions in the context of the earlier National Climate Change Strategy (2000), with measures to support sustainable agriculture, and initiatives to address the impact of transport on the environment.

Notwithstanding, there were no specific policies within the NSS in relation to climate change impacts, mitigation or adaptation.

4.2.2 National Development Plan 2007 - 2013

The National Development Plan 2007-2013 (NDP) is the fiscal framework used to implement the NSS objectives and prioritise capital investment to deliver more balanced social, economic and physical development between the regions. It is acknowledged that the NDP focuses on Gateways and Hubs to achieve economic growth and provides for major investment in the rural economy.

4.3 Regional Planning Policy

4.3.1 Draft Regional Planning Guidelines for the West Region 2010 – 2022

The Draft Regional Planning Guidelines (DRPGs) have been prepared to implement the NSS adopted by Government in 2002. They set out a regional framework to achieve balanced regional development and are aimed at a better distribution of employment opportunities across the country and delivering a better quality of life as a result (West Regional Authority 2010). The DRPGs were on public display for consultation from 22nd January 2010 to 9th April 2010 when submissions and observations on the DRPGs were invited. The DRPGs were accompanied by a Draft SEA Environmental Report; Draft Habitats Directive Assessment Screening; and Draft Regional Flood Risk. The public consultation period will inform the final RPGs before implementation in accordance with Part II, Section 24 of Planning and Development (Amendment) Act, 2010 (2010) .

It is stated in the DRPGs that they were prepared in accordance with, and were consistent with The Planning System & Flood Risk Management - Guidelines for Planning Authorities 2009 (Department of Environment 2009b).

In general, the DRPGs provide a comprehensive framework to guide local authorities in the preparation of development plans and the assessment of applications for planning permission. In this respect, the Draft RPGs have been reviewed as they set out the future policies likely to be implemented within the region, as opposed to the 2004-2016 RPGs which will be superseded by the new RPGs in 2010.

Climate Change

The DRPGs recognise that climate change will impact on the landscape of the West Region through: rising sea levels; coastal erosion; increased rainfall and flooding. The following climate change policies are included in the DRPGs as follows:

Climate Change Policies

It is outlined that a common approach to landscape management should be adopted throughout the region. This approach should:

- *'Ensure that the quality and character of landscape areas are identified;*
- *Ensure a common designation and description for areas that require protection; and*
- *Ensure that common policies are applied to areas that require protection.*'

(Section 6.1, Draft RPGs for the West Region 2010-2022)

Moreover, the DRPGs specify that this approach should also identify the nature and scale of development that would be permitted within areas of different designations. In addition, it is prescribed in the DRPGs that landscape protection policies should also take account of: the need to manage the provision of forestry and renewable energy development; and of the particular vulnerability of certain features such as bogs and mires, designated sites and important archaeological landscapes.

Natural Heritage & Ecological Integrity

It is accepted in the DRPGs that people are dependent on the natural environment to provide the citizens of the West Region with a high quality of life however; it is a resource which must be maintained for future generations through sustainable development. Regardless, it is noted in the DRPGs that the habitats of the West Region have been altered by human beings over time.

The following policies included in the DRPGs set out the framework for the protection and conservation of natural heritage and ecological sites.

Natural Heritage & Ecological Integrity Policies

- *'To implement the EU Directives with regard to the protection and enhancement of the natural environment.*
- *To support the protection of Nature Heritage Areas, Special Protection Areas, Special Areas of Conservation, Nature Reserves, Ramsar Sites (Wetlands), Wildfowl Sanctuaries, National Parks, Nature Reserves and the biodiversity designated under the Habitats Directive, Birds Directive, Wildlife Act, Flora Protection Order and other designated or future designated sites'.*

(Section 6.3, Draft RPGs for the West Region 2010-2022)

Marine Spatial Planning

The value of coastal areas are recognised in the DRPGs as being highly productive ecosystems, '*supporting rich biological diversity and fish resources'*(West Region Authority 2010). However, it is also accepted in the DRPGs that there are pressures on this finite resource including: over-fishing; pollution from land-based activities and hard structural development along the coastline including growing urban areas and tourism.

Coastal erosion is also anticipated in the DRPGs and is expected to become more severe due to: changes in weather patterns; increased precipitation and storm occurrence; and sea level rises resulting in coastal flooding and erosion problems in vulnerable coastline areas.

It is included in the DRPGs that new proposals on Marine Spatial Planning will be forthcoming in the years ahead. Furthermore it is speculated that a proposed EU Marine Strategy Directive will require an ecosystem based approach to ensure the sustainable management of the marine environment. In addition, a co-ordinated approach to marine spatial planning and the River Basin Management Plans for the Western and Shannon River Basin Districts was promoted in the DRPGs. The River Basin Management Plans are a requirement under the EU Water Framework Directive, 2000. The purpose of the WFD is to establish an original, integrated approach to the protection, improvement and sustainable use of rivers, lakes, estuaries, coastal waters and groundwater within Europe. As highlighted, the primary focus of the Directive is to achieve 'good' ecological status for all waters by 2015 (Moss 2008).

Marine Spatial Planning Policies

The following policies have been included in the DRPGs for marine spatial planning:

- *'Support the sustainable use of coastal resources.*
- *Promote and support a dynamic and sustainable coastal economy'.*

(Section 6.6, Draft RPGs for the West Region 2010-2022)

4.4 Local Planning Policy

In accordance with Part II, Section 10 of the Planning and Development Act (Amendment) 2010 (Act) (2010) a development plan shall set out an overall strategy for the 'proper planning and sustainable development of the area of the development plan'. Furthermore it is specified in the Act that the development plan should include objectives for *'the conservation and protection of the environment including, in particular, the archaeological and natural heritage and the conservation and protection of European sites and any other sites which may be prescribed for the purposes of this paragraph'*(Part II, Section 10 (2)(c))

Development plans are seen as a statutory framework within which sustainable development can be achieved. In this regard the development plan must be transparent and offer clear guidance on sustainable development policies and objectives, both national and local, which address the various issues involved, such as climate change, sustainable communities and use of natural resources etc (Department of Environment 2007a). Additionally, development plans should be consistent with the objectives of *The National Climate Change Strategy 2007-2012.*

4.4.1 Galway County Development Plan 2009-2015

The Galway County Development Plan 2009-2015 (County Plan) was prepared in accordance with the Planning and Development Acts, 2000-2006. The County Plan sets out an overall strategy for the proper planning and sustainable development of the administrative area of Galway County Council (Galway County Council 2009). It is noted that the current County Plan was prepared having cognisance for the previous Development Plan for the County of Galway 2003-2009, taking into consideration recent key development trends and national, regional and local policy developments (Galway County Council 2009). In addition, it is stated in the County Plan that the EU requirement

to include the application of Strategic Environmental Assessment to certain plans and programmes was also taken into account during its preparatory stages (Galway County Council 2009).

Spatial Planning Strategy

The County Plan includes a settlement strategy based on a well-developed urban structure supporting diverse rural areas. It is stated within the County Plan that the strategy follows '*a strong yet flexible approach to development*', with particular emphasis on building critical mass in the Hub Town (Tuam) and at key towns and villages along the strategic development corridors emerging along the new transportation infrastructure (road and rail). The rationale for this settlement strategy was founded on existing and proposed service infrastructure whilst providing a focus for the continued support of the rural areas. It is envisaged in the County Plan that rural populations will continue to be supported through the settlement centres and through a sustainable, flexible approach to maintaining rural economy and population, 'balanced against responsible environmental protection'(Galway County Council 2009).

Figure 6: Illustration of Settlement Strategy for County Galway

Source: Galway County Development Plan 2009-2015 (Section 2,2)

In terms of growth within the County, it was acknowledged in the County Plan that the population of Galway County recorded in the 2006 Census was 159,256 persons from a recorded figure of 131,613 in 1996. This represents a 21% increase in a 10 year period compared to the national figure for the same period of 16.7%.

Settlement Hierarchy

A settlement hierarchy has been set out in the County Plan which distinguishes the type, role and function of each urban and rural settlement. The hierarchy is as follows:

Table 3: Settlement Hierarchy for County Galway

Type of Settlement	*Description*
Galway Metropolitan Gateway Area	Galway City is a vital economic driver for the entire West region. The types of services provided by the city reach beyond the county boundary. Significant employers include large public service and industrial organisations that draw employees from the network of satellite towns surrounding the city, including **Oranmore**, Bearna, Baile Chláir, Maigh Cuilinn, Briarhill and An Carn Mór
Hub Town	Tuam is the only major hub town identified in the NSS. It is envisaged Tuam will develop as a strong hub town catering for a large catchment within the Region and County.
Service Hubs	They provide an extensive range of services including health, community, financial employment and retail. These towns have a strong historical identity as market towns and in most cases have relatively well-developed infrastructure. Sustained growth in these settlements is required to achieve their potential as self-sustaining towns in their own right. These service hubs have, or will have Local Area Plans prepared and implemented to guide development.
Local Service Centres	These settlements provide a more limited range of services to smaller hinterlands than service hubs. Service provision often includes a range of retail and educational services but limited financial, health and community services.
Small Settlements	These smaller settlements provide only basic services to their community, such as convenience goods and petrol. Education services normally extend to primary education only. Despite the small number of services, these settlement are distinguished from mere house clusters by the presence of such services which serve an important community purpose and provide the basis for further future development.

Source: Galway County Development Plan (Section 3.3.11)

From the settlement description outlined in Table 3 it is apparent that Oranmore will continue to grow as a commuter town, accommodating persons who travel and work in Galway City. The housing allocation planned for Oranmore over the plan period 2009-2015 is for an additional 900 houses. Given that the average number of persons per household in County Galway was 2.92 in 2006 Census (Central Statistics Office Ireland) this would equate to an additional population equivalent of 2,628.

Economic Development and Tourism

Some of the key issues identified in the County Plan for economic development include the following:

- *'The need to encourage and foster alternative economic activity in the rural areas in the face of continuing decline in employment in agriculture is another challenge to be addressed.*
- *The active promotion of balanced economic development and opportunities throughout the county to balance the huge economic draw that is Galway City area is another issue that requires active policies to shape and direct economic development.*'

(Section 4.1, Galway County Development Plan 2009-2015)

As part of the overall economic development of County Galway, tourism-related industries are seen as a major contributor to the county's economy. It is noted in the County Plan that the county possesses extensive areas of scenic beauty which '*when added to its distinctive heritage, culture and leisure facilities are a major indigenous resource'*.

Some relevant tourism policies included in the County Plan are as follows:

- ***Policy ED20**: Positively support and promote sustainable Tourism Infrastructure development related to the enhancement of the County's tourism profile, with facilities such as those related to sailing, boating, angling, walking and pony trekking routes, pier or marina development, golf courses, adventure centres, theme parks, interpretative centres and Gaelic Games and other sporting facilities; and ensure that all such developments are built to a high environmental standard to protect the County's most significant tourism asset – its natural environment and landscape.*
- ***Policy ED23**: Key rural assets must be protected and the local potential of rural areas developed. This will be achieved through identifying, conserving and developing on a sustainable basis the various types and combinations of economic strengths of rural areas, with the support of appropriate levels of infrastructure provision. The potential for economic activity in rural areas such as natural resource, local enterprise and tourism related development, and the qualities that*

underpin such activity such as a clean and attractive environment, will be central to this process.

- ***Policy ED27**: Maintain and preserve the rural character, visual amenity and scenic views of the open countryside.*
- ***Policy ED28**: Protect and maintain water quality, both coastal and inland, in order to maintain and enhance the development of special interest tourism activities.*

(Section 4.7.1, Galway County Development Plan 2009-2015)

Rural and Urban Housing

With regards to rural housing, i.e. housing outside of towns and villages, this is fully endorsed within the County Plan. It is stated that as a general principle, subject to good planning practice in matters of location, siting, design and '*the protection of environmentally sensitive areas of high landscape value'*, rural generated housing needs should be accommodated in areas where they arise. The only stipulation prescribed in the County Plan is that measures should be adopted to ensure that the provision of new housing in rural areas subject is to be occupied by established members of the rural community. Notwithstanding, there is provision under Policy HP23for '*Bone fide applicants'* who are not considered to be established members of the rural community to qualify to build a permanent home in the rural areas, subject to being able to satisfy the planning authority of their commitment to operate a full-time business from their proposed home in a rural area, to discourage commuting to towns or cities.

In terms of urban housing, the County Plan has incorporated the Galway Settlement Strategy which:

'recognises and supports the key role of urban areas, towns and villages in providing attractive living environments with convenient access to a higher level of services, facilities and amenities, in building critical mass to support the efficient provision of services, facilities and employment opportunities and in supporting and providing services for the surrounding rural areas'.

(Section 5.4, Galway County Development Plan 2009-2015)

In relation to town centres and urban areas, the following policy is of particular relevance:

*'**Policy HP30**: Support the development of infill sites in towns and villages and encourage the use of upper floors of retail premises as residential accommodation as a means of providing additional housing and revitalising settlements'*

(Section 5.4.1, Galway County Development Plan 2009-2015)

Transportation

In terms of transportation and movement within Galway County, the following policy outlines Galway County Council's strategic goal for the county:

*'**Policy RT1**: Seek to promote the development of a sustainable transport system that provides a range of transport options for the County, including a safe road network, a range of bus services and rail services, adequate facilities for walking and cycling and opportunities for air and water-based travel. The Council will seek to ensure that improvements in transportation infrastructure and services support the strategic development and settlement strategy for the County and provide an appropriate level of accessibility to urban and rural facilities, services and opportunities. The Planning Authority shall have regard to any new guidance on the integration of roads planning, development planning and development management practices that may issue from the DOEHLG and/or Dept of Transport during the lifetime of this Plan'.*

(Section 6.1.1, Galway County Development Plan 2009-2015)

Energy

It is recognised in the County Plan that the impacts and predicted future impacts of over-reliance on non-renewable energy sources are unreliable and expensive. The effects of climate change are also acknowledged in the County Plan as a threatening global environmental problem. In this context it is specified in the County Plan that Galway County Council realise that it can make an important and positive contribution towards initiating climate change action in '*land use planning, transport, services planning, housing provision, energy planning and awareness raising*'.

In terms of development and subsequent pressures on the environment, the following policy is particularly relevant:

*'**Policy IS43**: Ensure that new developments consider the implications of climatic and sea level changes for natural systems, human settlements and infrastructural elements'.*

(Section 7.6.1, Galway County Development Plan 2009-2015)

Heritage, Landscape and Environmental Management

The County Plan recognises the important contribution the natural and built heritage and landscape makes to the county and western region. It is acknowledged in the County Plan that county Galway was undergoing rapid change and this had major effects on the natural and built heritage. Moreover, it is accepted in the County Plan that people must take responsibility for their actions and fully understand the implications for the social heritage. In this regard, it is encouraged in the County Plan that all stakeholders have a shared responsibility for the heritage of the county. Furthermore, it is expressed in the County Plan that people must ensure that future generations will be proud of the natural, urban and rural heritage, which is left as a legacy.

The following are some of the general heritage policies included in the County Plan:

***Policy HL1**: Conserve, protect and enhance the special character of the County as defined by its natural heritage and biodiversity, its built environment, landscape and cultural, social and sporting heritage.*

***Policy HL2**: Ensure that heritage protection is an integral part of coherent policies of economic and social development and of urban and rural planning.*

(Section 9.1.1, Galway County Development Plan 2009-2015)

In terms of 'Designated Sites, Habitats and Species Policies' there are a number of general policies included in the County Plan which seek the conservation and protection of designated heritage sites. Of particular relevance is the following policy:

*'**Policy HL31**: It is the policy of the Council to implement Article 6(3) of the EU Habitats Directive, and to subject any plan (including County Development Plan, Local Area Plans) or projects likely to impact Natura 2000 or European Sites (SACs, SPAs), whether directly (in situ), indirectly (exsitu) or in combination with other plans or projects, to an Appropriate Assessment in order to inform decision making. A plan or project may only be authorised after the competent authority has*

made certain, based on scientific knowledge, that it will not adversely affect the integrity of the site; in the case of derogations, authorisation must be pursued under Article 6(4)[20]'

(Section 9.3.1.1, Galway County Development Plan 2009-2015)

With regards to natural heritage and biodiversity, the County Plan recognises the role that various habitats play throughout the county in forming part of an "ecological network" that facilitates the movement of species between areas. This results in the '*effective functioning and survival of the diverse range of habitats and species in the County*' (Galway County Council 2009). A copy of the County Plan 'Map HL5Econets' is included in Appendix 4. Ecological networks are described in the County Plan as providing:

'a spatial, network-based approach to the conservation of biodiversity, which differs from the site-based approach of environmental designations, by using 'corridors' or 'stepping stones' that support species migration, dispersal and daily movements between the 'core areas' and thereby contribute to a more integrated and functional ecological system'.

(Section 9.3.2, Galway County Development Plan 2009-2015)

In support of the ecological networks the following policy is included in the County Plan:

*'**Policy HL37**: Facilitate the identification and protection of the main elements of the ecological network in the County and provide for its appropriate and sustainable use.'*

In discussion with Dr David Bourke, NUIG, (Appendix 1 for interview details) Dr Bourke emphasised the importance of providing 'ecological' or 'green' networks to allow for the migration of species. As part of the COCO-ADAPT project he was working on, the facilitation of species movement through nature corridors would be fundamental in biodiversity adaptation to climate change. For example, as temperatures increase some

[20] Article 6(4) Commission Opinions: '*The second subparagraph of Article 6(4) provides for a special treatment whenever the plan or project concerns a site hosting priority habitats and/or species. The realisation of plans or projects likely to adversely affect these sites can be justified only if the evoked imperative reasons of overriding public interest concern human health and public safety or overriding beneficial consequences for the environment, or if, before granting approval to the plan or project, the Commission expresses an opinion on the initiative envisaged.*' Environment, E. C. 2008. Management of Natura 2000 sites: Guidance. Article 6 - Managing and protecting Natura 2000 sites.

species will try to move to higher elevations or cooler regions and consequently will need to move from one habitat to another.

The Coastal Zone

With regards to the coastal zone it is acknowledged in the County Plan that much of the coastline of Galway County is home to a variety of natural habitats and several important/rare/interesting species of flora and fauna. With this recognition, the County Plan specifies that Integrated Coastal Zone Management (ICZM) is about the planning and management of coastal resources and coastal space. However, it is understood that this will be an ongoing process, which will evolve over time. Therefore the County Plan places the onus on ICZM to address pertinent issues such as tourism-related development; the fishing industry; coastal settlement patterns; transport; coastal erosion; habitat destruction; protection of coastal zone cSACs and SPA's and prevention of pollution. Furthermore, it is accepted in the County Plan that the coastal zone assets are 'under constant threat and therefore in need of protection'(Galway County Council 2009).

Some of the relevant policies included in the County Plan are as follows:

> ***'Policy HL51:*** *Seek to have protected and preserve in so far as is practicable the quality of the coastline, while balancing against the economic and social needs of coastal communities.'*
>
> ***'Policy HL52:*** *Seek to have protected in so far as is practicable, the flora and fauna and natural habitats along the coastline.'* (Emphasis by author)
>
> (Section 9.3.4.1, Galway County Development Plan 2009-2015)

However, it is noted that, as of yet, there is no actual ICZM Plan for the County Galway coastline. One of the objectives included in the County Plan goes so far as:

> ***'Objective HL33:*** *Consider the preparation of integrated coastal zone management plans for specific areas of the county's coastline and off-shore islands as the need arises, based on identified zones of vulnerability such as shellfish farming areas or expanding harbours.'* [emphasis by author]
>
> (Section 9.3.4.2, Galway County Development Plan 2009-2015)

Flood Management

It is outlined in the County Plan that the Council shall adopt a comprehensive risk-based planning approach to flood management to prevent or minimise future flood events. Furthermore, it is stated in the County Plan that development will be considered in accordance with the Ministerial Guidelines on the Planning System and Flood Risk Management, where the avoidance of development in areas where flood risk has been identified shall be the primary response. It is also outlined in the County Plan that the Council will prepare flood zone maps for all zoned lands within the county and that all future Local Area Plans shall prepare Flood Risk Zone Areas. Notwithstanding, a map of historical flood areas prepared by the Council is included in Appendix 4.

The following relevant policies on flooding are included in the County Plan:

> *'**Policy HL66**: It is the policy of the Council to restrict inappropriate development in areas at risk of flooding (whether inland or coastal), erosion and other natural hazards (Refer to Development Management Standard DM 23)'.*
>
> *'**Policy HL68**: It is the policy of the Council to seek to prevent inappropriate risks of flooding. Development will not normally be permitted in flood risk areas unless appropriate flood protection and mitigation measures can be put in place to ensure that the site can be safely developed and occupied and flood risk as a result of the development is not increased elsewhere'.*
>
> (Section 9.3.5.1, Galway County Development Plan 2009-2015)

Climate Change

There are no **specific** policies in the County Plan for climate change action. The only direct mention of climate change was under Section 7.6 – Energy, where less reliance on non renewable resources was highlighted. In this section the one relevant policy was as follows:

> ***Policy IS39**: Support the National Climate Change Strategy by facilitating measures to reduce emissions of greenhouse gases over the committed timeframe 2007-2012.*
>
> (Section 7.6.1, Galway County Development Plan 2009-2015)

Development Management Standards and Controls

Development management and development controls are planning tools used to regulate development in accordance with established planning principles and best practice guidelines in the interests of the common good (Galway County Council 2009).

While many of the development standards are quite general such as layout and design guidance, the following standards are quite relevant to Galway Bay.

DM Standard 37: Sites with Nature Conservation Designations

The following measures shall be applied in respect of designated environmental sites:

1. Appropriate Assessment:

Screening for appropriate assessment and / or appropriate assessment will be required with all applications where it is considered that the proposed development may impact (directly or indirectly), or in combination with other projects, on a Natura 2000 designated site i.e. a Special Area of Conservation (SAC) or a Special Protection Area (SPA), to inform decision making. The need for an appropriate assessment should be discussed with the Planning Section prior to the submission of an application. The appropriate assessment shall be carried out in accordance with Article 6 of the Habitats Directive and Section 18 of the European Communities (Natural Habitats) Regulations 1997 and shall identify and evaluate the direct and indirect effects, which the development would be likely to have upon the designated site.

2. Ecological Assessment:

Ecological assessment will be required with all significant planning applications, where it is considered that the proposed development may impact (directly or indirectly), or in conjunction with other projects, on a National designated site or a proposed National designated site i.e. Natural Heritage Area (NHA) or a proposed Natural Heritage Area (pNHA), to inform decision making.

The need for an ecological assessment should be discussed with the Planning Section prior to the submission of an application. The assessment should include consideration of impacts in relation to biodiversity, ecological linkages, water

quality and drainage. GCC will generally require ecological assessments for developments proposed within a notional zone between the boundary of a national designated site to the next field boundary or to a distance of 50 metres, whichever is greater.

DM Standard 39: Coastal Management and Protection

The following requirements shall be considered and applied where appropriate with respect to coastal management and protection:

1. Natural Processes

Where possible, developments shall ensure that the landward migration of coastal features, such as dunes and marshes, shall be facilitated as these features form an integral part of the coastal system – both physically and ecologically – and provide protection against wave energy through dissipation.

2. Sea Level Change and Flooding

New developments shall generally comply with the following approach to coastal management for sea level change:

1. No new building or new development within 100m of 'soft' shoreline.

2. No further reclamation of estuary land.

3. No removal of sand dunes, beach sand or gravel.

4. All coastal defence measures to be assessed for environmental impact.

3. Coastal Edge

In addition to the above, a general minimum horizontal setback of 30m from the foreshore field boundary line, for new development, or along the 3m natural contour line, whichever is the greatest, is to be created. Any planning applications within this setback must demonstrate that any development would not be subject to potential rising sea levels as a result of global warming, and must address any issues with regard to rising sea levels, with regard to the siting of any development. New developments should not restrict opportunities for providing public access to the foreshore.

The coastal edge and coastal habitats shall be protected from destruction and degradation to ensure that their roles as ecological corridors, coastal flooding and storm surge buffers are retained and enhanced, and developers proposing developments in the vicinity of this area will be requested to carry out an ecological survey and submit an ecological plan that incorporates the natural vegetation and topography of the area. (emphasis by author)

Strategic Environmental Assessment

As part of the County Plan preparatory process, Galway County Council was obliged to carry out a Strategic Environmental Assessment (SEA) under the EU Directive 2001/42/EC. Under this legislation a local authority must carry out a SEA on all plans and programmes likely to have significant effects on the environment, including those which set the framework for future development consent for Environmental Impact Assessment (EIA)-type projects (Department of Environment 2007a). In this respect, all county development plans and local area plans (LAPs) for towns of 10,000 or more come within the scope of the EU Directive.

CAAS consultants who prepared the SEA (CAAS 2009) as an accompaniment to the County Plan, specify that a range of potential alternative scenarios for the types of planning strategies for the County Plan were identified at an early stage in the process and evaluated for their likely significant environmental effects. The scenarios identified were as follows:

- *'Alternative Scenario 1: Dispersed Development Strategy (Rural Dispersal with Limited Urban Growth) follows a laissez-faire approach to development.*
- *Alternative Scenario 2: Structured Development Strategy (Well Developed Urban Structure supporting Diverse Rural Areas) follows a strong yet flexible approach to development, placing emphasis on building critical mass in the Hub town (Tuam) and at key towns and villages along the strategic development corridors emerging along the new transportation infrastructure (road and rail).*
- *Alternative Scenario 3: Centred Development Strategy (Strong Urban Centres and Rural Protection) focuses 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.' (CAAS 2009)

(Chapter 4, SEA Statement for Galway County Development Plan 2009-2015)

After an evaluation process '*Alternative Scenario 2: Structure Development Strategy'* was considered to be the most appropriate settlement pattern for the county. The consultants stated that this option represented '*a pragmatic recognition and continuation of established patterns and trends of development in County Galway'*. (CAAS 2009)

4.4.2 Oranmore Local Area Plan 2006-2012

The Oranmore Local Area Plan (Oranmore LAP) covers the period from 2006-2012 (Council 2006). A LAP should address relevant issues in greater detail than in the development plan (i.e. Galway County Development Plan) however; these must be consistent with the approach of the County Plan. Therefore the County Plan is regarded as the 'parent' document, which sets out the strategic framework within which the zoning and other objectives of the LAP must be formulated (Department of Environment 2007a).

As specified in the Oranmore LAP, the strategic aim of the Plan is to set out a clear framework for the sustainable development of Oranmore. As a consequence, sufficient lands were identified for:

'future housing, industry, commerce, open space uses and community facilities while protecting and preserving the town's intrinsic character, heritage and amenity and making a positive contribution to an improvement in quality of life'.

(Section 1.1, Oranmore LAP, 2006-2012)

Settlement Strategy

It is noted that the Oranmore LAP was prepared in accordance with the previous Galway County Development Plan 2003-2009. In this context 500 residential units were allocated to Oranmore for development during 2003 and 2009. From the review of the current County Plan 2009-2015, it is acknowledged that the allocation now for Oranmore is 900 dwellings as part of its designation within the Galway Metropolitan Gateway Area.

In the Oranmore LAP it was stated that there were approximately 266 hectares zoned for residential development in the LAP, including 42 hectares 'Inner Residential'. Moreover, out of the total Residential zonings it was noted that 138 hectares remain undeveloped.

Given that Oranmore is a designated growth area under the County Plan, residential densities of between 30 and 40 dwellings per hectare could be accommodated (Department of Environment 2009a). This could potentially equate to an additional 4,140 to 5,520 new dwellings. Besides, given that the average number of persons per household in County Galway recorded in the 2006 Census was 2.92[21], this could equate to an increase in population of 12,000 persons.

In terms of lands zoned for residential development, these are delineated on *'Map 1: Land Use Zoning Objectives'* (Appendix 5).

Natural Heritage

It is regarded in the Oranmore LAP that Oranmore's natural heritage is a unique and special resource. Furthermore, it is clearly stated in the LAP that it is the aim of the council to facilitate the maintenance and preservation of the natural heritage.

A set of general policies are included in the Oranmore LAP which specify the protection and conservation of natural heritage sites etc. In terms of specifics, the following policies are highlighted as follows:

It is the policy of the Council to:

3.1.2 Recognise that nature conservation is not just confined to designated sites and acknowledge the need to protect non-designated habitats and landscapes and to conserve the biological diversity of the town. The natural heritage of the area includes a variety of diverse habitats including lakes, rivers, streams, natural springs, wetland, woodland, trees / groups of trees, stone walls, fens, salt marshes, hedgerows and associated wildlife.

3.1.4 Protect and conserve ecological networks and prevent loss and fragment of ecological corridors where possible.

3.1.5 Protect rivers and streams by reserving land along their banks for ecological corridors, where appropriate, and discourage culverting or realignment.

[21] Census of Population 2006. Volume 3, Table 19
<http://beyond2020.cso.ie/Census/TableViewer/tableView.aspx?ReportId=76422>

Town Centre

As stated in the Oranmore LAP, it was the aim of Galway County Council to enhance the town centre through the promotion of appropriate infill development and expansion of the centre having regard to the town vernacular, location and heritage. One of the policies included in the LAP was as follows:

> *'Enhance the town centre through the promotion of appropriate infill development and increased densities subject to high standard of layout, design and finish and having regard to the town vernacular, location and heritage*. (emphasis by author)
>
> (Section 3.10, Oranmore LAP 2006-2012)

Climate Change

There is no specific reference to climate change in the Oranmore LAP.

Strategic Environmental Assessment (SEA)

It is stated in the Oranmore LAP that the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (S.I 436 of 2004) came into effect after 21st July 2004. It was these Planning and Development Regulations 2004 (Regulations) which transposed the requirements of Directive 2001/42/EC, otherwise known as the SEA (Strategic Environmental Assessment) Directive. However, as explained in the Oranmore LAP, the consultation process for the Oranmore LAP began in December 2003 and as a consequence; the requirement to screen for SEA under the Regulations did not apply.

Nevertheless, it was a requirement at the time of the preparation of the Oranmore LAP, under Section 19 of the Planning and Development Act, 2000 (since amended) to include '*information on the likely significant effects on the environment of implementing the Plan*'. It was stated in the Oranmore LAP that to fulfil this requirement, an Environmental Assessment was carried out under the following headings:

- Oranmore Local Area Plan
- Environmental Factors likely to be Affected
- Assessment
- Alternative

A brief summary of the potential general impacts on human beings, natural, built and cultural heritage, water, sustainable transportation and waste management and energy was carried out as part of the Environmental Assessment. In terms of the alternative the following was concluded in the Oranmore LAP:

> *'The implication of continuing as before has been examined. Decisions made without a Local Area Plan being in place would lead to individual applications being assessed on their own merits. A 'plan led' approach is recognised as the best option for a co-ordinated approach and the proper planning and sustainable development of the Oranmore area.'*
>
> *(Appendix 1, Oranmore LAP 2006-2012)*

4.5 Implementation of Planning Policy

To determine how well the policies in the Galway County Plan and Oranmore LAP were being implemented, a review of significant planning applications was carried out for each of the Case Study areas: Oranmore and Tawin Island.

Oranmore

4.5.1 Population and demographics for Oranmore

Oranmore is a town located approximately 9km from Galway City. During the last census in 2006, the population of Oranmore town was recorded at 3,513 persons (Central Statistics Office Ireland). Moreover the number of private households in Oranmore at the time of the 2006 Census was recorded at 1,385. A brief overview of the demographics according to the Census of Population for 2002 and 2006 are outlined in Table 4.

Notwithstanding the CSO statistics, the population statistics within the Oranmore Local Area Plan 2006 (LAP) are much larger. In the LAP it was noted that survey work carried out in October 2005 indicated that there were actually 1,785 households located within the LAP boundary area. Furthermore, Galway County Council (the Council) calculated that given the average number of persons per household in Galway at the time was 3.06 persons, it was therefore estimated that the 2005 population within the LAP boundary area for Oranmore was approximately 5,462 persons (Galway County Council 2006). Therefore some anomalies exist in terms of the ED boundary and LAP boundary.

Nonetheless, it was qualified in the LAP that the Census 2002 figure did not take into account the total number of households within the LAP boundary, implying that the latter was larger than the former (Galway County Council 2006) It was acknowledged that the next Census of Population will be held on April 10th 2011 and this will provide a more up-to-date profile of population and demographics for Ireland.

Table 4: Population statistics for Oranmore Electoral Division, 1996, 2002, 2006

Electoral Division	*Census 1996*	*Census 2002*	*Census 2006*
	Total no. of persons	Total no. of persons	Total no. of persons
Oranmore*	1,410	1,692	3,513
	Total no. of private households	*Total no. Of private households*	*Total no. Of private households*
Oranmore	**	520	1,064

Source: Central Statistics Office (CSO) Census 2002: Volume 1 - Population Classified by Area; Volume 3 - Household Composition and Family Units and Census 2006: Volume 1 - Population Classified by Area, Volume 3 - Household Composition, Family Units and Fertility
Note *: - Oranmore, Clarinbridge, Baile an Teampaill = part of Electoral Division (ED)
** ED statistics for 19996 not available online at www.cso.ie

4.5.2 Development Context for Oranmore

In addition to the growth in population and households, road infrastructure has been significantly developed, as well as commercial premises. In particular, there has been significant growth in the retail sector with the development of Orantown Centre located at Carrowmoneash to the north of the town; and the new mixed-use development, currently under construction, at Innplot to the immediate west of Main Street, Oranmore.

The Orantown Centre (Planning Ref: 97/1952 and ABP Ref: 07.106095) was granted planning permission by An Bord Pleanála on 21st October 1998 and comprised a mixed-use development including retail units, a supermarket, apartments and associated car parking. This development is fully constructed and in operation. Details of this planning application are included in Appendix 2.

Figure 7: Orantown Centre to the north of Oranmore, located on Station Road (Application Ref: 97/1952 and ABP Ref: 07.106095)

The other more recent mixed-use development, currently under construction, to the west of Main Street, Oranmore, was originally granted planning permission (Planning Ref: 03/5413 and ABP Ref: 07.209434) by An Bord Pleanála on 19th April 2005 and was subject to over 25 conditions. The development comprised a series of blocks, which enclose urban spaces. The proposed uses comprised shopping centre retail (5,122m²), Supermarket (4,503m²), offices (3,403.9m²), 18 bedroom hotel, medical centre (624m²), crèche (344m²), bar and restaurant (1147.6m²), and 197 residential units (Kennelly 2010). This development also comprised the construction of a coastal walkway over the Millplot River, which runs adjacent to the north of the site. The Millplot River and an inter-tidal area of Galway/Oranmore Bay bound this site which accommodates a variety of habitats including a salt marsh area along the western and northern perimeter of the site adjacent to the shoreline and river (Caprani 2005). The development site also overlapped with the cSAC and SPA as per application drawings included in Appendix 2. Furthermore, it was also illustrated on the original OS map submitted with the original application that the Innplot site was subject to previous flooding events. Mapping and drawings associated with Planning Application (Ref:03/5413 and 07.106095) are included in Appendix 2.

From a review of the National Flood Hazard Mapping on the OPW website[22], this area known as 'Innplot' has been subject to flooding in the past. A Galway County Council Meeting Minute report, dated 27th May 2005, was included on the OPW website with the flood mapping. This report, included in Appendix 6, clearly notes the following *'O12.*

[22] http://www.floodmaps.ie/View/Default.aspx

Innplot, Oranmore– Flooding occurs due to a combination of high tides and high flows in the river. Flood Id = 1885' (Oranmore Area Engineers Meeting Minutes 27/May/ 2005)

Notwithstanding, from a review of the An Bord Pleanála Inspector's report (Ref: 03/5413 and ABP Ref: 07209434) it was stated that the Environmental Impact Statement (EIS), accompanying the subject planning application, made reference to the site elevations as follows: *'Areas of the site below 3 metres O.D. Malin will regularly flood as a result of high astronomical tides.'* (Caprani 2005, 8)

It is acknowledged that mitigation measures have been proposed as part of the development such as: increased infilling of the Bay; provision of culverts; finished floor levels of 4.5m OD; and the provision of a 5m sea wall and rock armour.

Furthermore, it is noted that the buildings were designed having regard to flooding events in 1995 and 1997, which gave rise to flood levels of 3.49 m O.D. and 3.48m O.D. respectively. It was stated in the EIS that it was from these figures that a 200 year return period flood level of 3.98m O.D. was estimated. Consequently, the lowest proposed finished floor level was 4.5m O.D.; that is 0.5 metres above the 200 year high tide levels.

Since the original parent application (Planning Ref: 03/5413 and ABP Ref: 07.209434) was granted permission, there have been a number of subsequent applications for amendments as part of the same development. Notwithstanding, the most recent planning application (Planning Ref: 09/1936 and ABP Ref: 07.235842) granted permission by An Bord Pleanála was for a foodstore (Aldi), crèche, ESB substation, revised road layouts and surface carparking at Innplot, Oranmore (Kennelly 2010).

As part of the building design for this discount store, finished floor levels have increased to 6.6m OD. Nevertheless, the development still incorporated basement car parking.

In terms of building design for flood relief and coastal barriers the following caveat is set out in the Planning and Flood Risk Management Guidelines (Department of Environment 2009b, Section 2.25)

> *'The provision of flood protection measures in appropriate locations, such as in or adjacent to town centres, can significantly reduce flood risk. However, the presence of flood protection structures should be ignored in determining flood zones. This is because areas protected by flood defences still carry a residual risk*

of flooding from overtopping or breach of defences and the fact that there may be no guarantee that the defences will be maintained in perpetuity. The likelihood and extent of this residual risk needs to be considered, together with the potential impact on proposed uses, at both development plan and development management stages, as well as in emergency planning. In particular, the finished floor levels within protected zones will need to take account of both urban design considerations and the residual risk remaining.'

Figure 8: Mixed Use Development currently under construction to the west of Main Street, Oranmore (Application Ref: 03/5413 and ABP Ref: 07.209434)

It is also noted that a site to the north of Oranmore town, on lands at St Mary's Quay are also zoned for 'Town Centre'[23] use. Last year, an application (08/3779) was submitted to Galway County Council in December 2008 for development comprising: 59 no. mixed size apartments and shop/retail spaces in three four-storey buildings, basement and all ancillary site facilities and works and the demolition of existing out-buildings. Approximately 10 objections were made in relation to the application, including one from An Taisce and one submission from the Department of Environment, Heritage and Local Government requesting screening under Article 6(3) of the EU Habitats Directive and an ecological impact assessment as part of a Further Information Request. Consequently, the application was withdrawn by the applicant in July 2009.

In terms of other town centre and residential zoning, lands are delineated on *'Map 1: Land Use Zoning Objectives'* which is included in Appendix 5. From a review of this map, it is noted that lands adjacent to the east of the Millplot River Bridge, immediately south of the river, are zoned for '*Town centre'* and '*Residential Development*'. From a review of the

[23] **'Town Centre' zoning – commercial and residential development is accepted as 'permitted in principle'.** Appendix 3, Oranmomre LAP 2006-2012

National Flood Hazard Mapping on the OPW website[24], this area known as 'Millplot' has been subject to flooding in the past. The Galway County Council Meeting Minute report, dated 27th May 2005, included on the OPW website with the flood mapping clearly notes the following: *'O11. Millplot, Oranmore– River overflows its banks every year after heavy rain. Flood Id = 1884'*(emphasis by author) (Oranmore Area Engineers Meeting Minutes 27/May/ 2005)

Please refer to Appendix 6 for details of the Engineers Report.

Tawin Island

4.5.3 Demographics and Population

Despite a review of Volume 1 and Table 11*: 'Population of inhabited islands off the coast, 2002 and 2006'* from the Census of Population 2006, there were no records available for Tawin Island. Nevertheless, from a site visit to the Island the author identified that there were approximately 20 dwellings on the Island. Given that the average number of persons per household in Galway County at the time of the Census of Population 2006 was approximately 2.99[25], it was estimated that the population of Tawin Island in 2006 was approximately 60 persons. In 1994 it was reported that there were approximately 10 families on the Island resulting in a population of approximately 50 people (Dáil Éireann 1994).

4.5.4 Development Context for Tawin Island

Tawin Island is a rural setting with limited development. Apart from a small number of residential developments, the remainder of the island is used for farming and fishing. The majority of planning applications granted planning permission on the Island within the last 5 years has been for extensions and refurbishments. Since 2005 there was only one planning application granted permission for the construction of a new dwelling on Tawin Island (Ref:072456).

[24] http://www.floodmaps.ie/View/Default.aspx
[25] 2006 Census Reports - Volume 3, Table19 Available at : http://beyond2020.cso.ie/Census/TableViewer/tableView.aspx?ReportId=76422

Figure 9: Illustration of planning applications submitted for development on Tawin Island since 1995

Source: Screenshot of digital planning application database, Planning Enquiry System, Galway County Council

It is noted that Tawin Island in the past has been subject to flooding. In a parliamentary debate recorded on 3rd February 1994 (Dáil Éireann 1994), Deputy McCormack raised the problem of serious coastal erosion on Tawin Island, Maree, Oranmore, County Galway. Mr McCormack highlighted that as a result of coastal erosion the island may be washed away. He also acknowledged that the problem of coastal erosion and flooding had become acute in recent years, probably due to the change in the prevailing winds from south, south west to north, north west which was exposing that side of the island to the Atlantic Ocean.

Mr McCormack informed the Dáil that in previous years the local residents made 'valiant efforts' to stop the erosion by mounting stone and gravel banks in places where the Atlantic was breaching the coastline but because of the change in the prevailing winds, there was now approximately a 200 yard stretch of very vulnerable coastline. The tide was reportedly coming in and flooding vast acres of farmland. Moreover, due to the extreme flooding and retention of sea water above what used to be the high water mark, the level of the water at the changing of the tide was on two different levels each side of the bridge resulting in extreme pressure being put on the bridge and the causeway with the water seeping through. Mr McCormack emphasised the fact that at various times during high tides, which could occur every two weeks at that time of the year, the island was completely cut off with two to three feet of water on the roadway. Of most concern, Mr

McCormack highlighted was that once, this impact used to be for a couple of hours but more recently, it was repeated two to three days in succession, depending on wind conditions.

It is also noted that in conversation with Dr Bourke, NUIG, Dr Bourke felt that climate change was not the priority in the NPWS[26] at the moment. It was his understanding that the NPWS was under resourced and had higher priorities such as European court cases. It was noted that from a review of the NPWS website, a number of draft conservation plans have been prepared for a number of designated conservation areas however; there was no plan available for Galway Bay (National Parks and Wildlife Service).

4.6 Qualitative Reviews of current Planning Policy in Galway

As part of the research interviews, opinions on the effectiveness of current policy within County Galway were sought. It is noted that while some of these opinions are subjective such as Galway County Council staff, it has helped to determine the current state of planning policy in Galway and highlight areas for improvements as well as good aspects of policy. It is noted that details of all research interviews and correspondence are included in Appendix 1.

A number of questions were issued to Mr Anton Martens (Appendix 1), Forward Planning, Galway County Council reflecting on the current state of planning policy and climate change in County Galway. Regardless of there being no actual specific climate change policy contained within either the County Plan or Oranmore LAP, Mr Martens stated that there were a number of policies, objectives and standards in the County Plan to deal with climate change across a range of sectors including; planning; transport; infrastructure; energy; heritage; coastal development, etc. Mr Martens also made reference to various LAPs for towns and villages in County Galway which provided '*additional guidance in relation to flooding and climate change, including buffers along rivers and streams, hydrological assessment where appropriate*', etc. On a couple of occasions, Mr Martens referred to the Bearna LAP which included provisions for a coastal development setback to deal with, inter alia, issues of coastal flooding and climate change impacts.

[26] NPWS: National Parks and Wildlife Service – is responsible for the designation of heritage sites and oversee the implementation of EU Habitats Directives and Wildlife Acts

Mr Martens also cited DM Standard 39 in the County Plan as appropriate for dealing with coastal management, flooding and climate change issues. In terms of the Oranmore LAP Mr Martens highlighted that the LAP included coastal buffers, highlighted areas of potential flooding and provided guidance as to appropriate locations for new development.

With regards to the evaluation of development plan objectives and policies, Mr Martens noted that a Strategic Environmental Assessment (SEA) was undertaken as part of the preparation of the County Plan, which included considerations in relation to climate change, flooding, energy, emissions, etc. The SEA recommended a number of mitigation measures, which Mr Marten confirmed had been included in the County Plan where appropriate.

With respect to Ireland's emission targets and land use planning and transportation policy, Mr Martens referred to the County Plan policies and objectives that promote more sustainable settlement patterns, land use configurations and transport systems. Mr Martens also alluded to the County Plan controlling urban-generated rural housing in the Galway Transportation and Planning Study (GTPS), an area around Galway City within commuting distance of the city.

In terms of Integrated Coastal Zone Management (ICZM), it was the opinion of Marie Mannion (Appendix 1), Heritage Officer, Galway County Council, that CZM was a very difficult concept for some people to understand. As a consequence, the Council was trying to break it down into '*bite size*' bits, by trying to achieve a coastal zone management system '*a few steps below that and build on it*'. The process at the moment involved working in partnership with other local authorities. Moreover, the Council realised that climate change issues do not just stop at county boundaries and, according to Marie that was why the Council was taking a more strategic, holistic approach.

Mr Martens, also felt that there was a need for improvement in terms of CZM. In his opinion, CZM studies/ plan would improve the information base, guidance and effectiveness of coastal protection and management in the county. In conversation with Mr Derek Hambleton, Chairperson of An Taisce, it was his opinion that whilst reference was made in the County Plan to climate change and CZM, in terms of activity there had been little done in terms of reducing the negative terms of climate change.

One major problem that was re-iterated in the Council was a lack of funding, resources and expertise to implement policies. Marie Mannion felt that habitat mapping was costly and the Council did not have the resources. Only one habitat project had been undertaken in Kinvara, despite the fact that Galway is the largest designated county in Ireland with 40% of land mass comprising designated sites. Nevertheless, Marie believed that the Council had very good policies in the County Plan and LAPs already for the protection of natural heritage sites.

Mr Martens also felt that there were significant challenges in implementing Flood Risk Management Plans due to the lack of or incomplete data; shortage of staff resources or expertise; and lack of training concerning practical mitigation and adaptation measures at local level, etc. It is noted that at a recent EPA conference on climate change there was only one planner in attendance[27].

In terms of coastal management and maintenance, Kevin Finn, Engineer, Galway County Council, also emphasised that, at present, local authorities do not have much money or funding. As a result, Kevin confirmed that climate change or sea level rise were not considered a priority in the Council and there were no future plans, money or staff set aside for coastal mitigation or adaptation work.

In conversation with Jackie McGloughlin, (Appendix 1) ICARUS, NUIM, these issues raised by Galway County Council professional seemed familiar to her research. Jackie is a PhD student working on the COCOADAPT project. Her research is '*Planning for Climate Change: Enhancing adaptive capacity in Ireland's local authorities*'. In terms of climate change and Galway County Council's situation i.e. lack of specific climate change policy or objectives in their County Plan and LAPs, Jackie felt that Galway County Council was '*a little bit worse*' than other local authorities in terms of dealing with climate change.

Jackie also talked about her research findings to date which noted that the majority of development plans in general, were not being monitored in implementation. Jackie also felt that it was important to stress the importance of a development plan as a strategic document; and local authorities needed to demonstrate synergies with sea level increases, critical infrastructure etc. A key driver, Jackie considered to be important in climate proofing plans was the SEA process.

[27] Review of the list of delegates in attendance.

Jackie also pointed out that in some local authorities, not all locally elected representatives '*subscribed to climate change theories*'.

It is noted that four of the local councillors for the Oranmore electoral area were invited to partake in this research; however no responses were received from any of the four politicians. This would considered important to the author as the elected councillors are regarded as 'the policy-making arm of the local authority', who act by what are termed 'reserved functions'[28], which include making important decisions on planning applications and adopting development plans (Department of Environment 2004).

[28] Reserved functions: are defined by law and specified across a whole range of enactments. These comprise mainly decisions on important matters of policy and finance (e.g. adoption of annual budget, development plan, bye-laws).

5. Scenario-building of Climate Change Impacts in Galway Bay

5.1 Introduction

Within the case study of Galway Bay, data collated by different methods but bearing on the same issue have resulted in a *'multi-method'* approach (Gillham 2000a). This method involved an accumulation of the earlier qualitative research methods applied including: the literature review, lecture and conference outcomes, stakeholder interviews, review of the climate change projections for Ireland and the Irish context and, planning policy appraisal and statistical analysis.

Based on the current state of knowledge it was possible to build climate change scenarios for Galway Bay in terms of projected impacts.

5.2. Assumptions

The qualitative research enabled the author to document historical climate change-related events; current climatic changes; and the anticipated impacts likely to occur by the end of this century if there is a continued increase in global GHG emissions.

From this piece of research, it became apparent to the author that there have been no specific studies undertaken of climate change impacts on Galway Bay to date. As a consequence, the general projections and implications for Ireland and in particular, the West Coast, outlined in Section 2.6 were used as a basis for Galway Bay.

From the most recent climate change evidence reviewed in Chapter 2, it is assumed that at best, the globe will increase by 2°C towards the end of this century. This assumption has been based on the most recent reports published since AR4 (The Pew Centre 2009, Richardson 2009, Sweeney and Charlton 2008, Sweeney 2010)

In terms of sea level rise, it is assumed that global sea level rise will be approximately 1m by the end of the century. This has been based on the more recent estimates indicating that ocean warming was about 50% greater than had been previously reported by the IPCC in 2007(Richardson 2009). The assumed 1m rise by 2100 has been purported in more recent times by many scientists, including Professor John Sweeney (Uhel 2009, The Pew Centre 2009, Vermeera 2009). Nonetheless, given that there have been some significant variations of projected sea level rise between 0.5m (Envionmental Protection Agency 2010, Desmond 2009) and 2.0m (Uhel 2009) it was considered a more measured approach

by the author to look at the 'worst' and 'best' case scenarios to give a more informed and 'real life' situation.

In terms of vulnerable areas, it was estimated that land within +5m of sea level (Malin Head O.D.) is most likely to be affected by flooding and inundation. This has been based on a global temperature increase of 2°C and a sea level rise of 1m by the end of the century contributing to an increase in extreme weather events, increased precipitation, storm surges, wave heights and coastal erosion (Dunne 2008, Devoy 2008, Sweeney and Charlton 2008, Marine Institute 2009).

5.3 Scenario-building Methodology

The author decided to focus in on two coastal communities as part of the scenario building exercise: 1) Oranmore, an urban growth settlement located to the south of Galway city and to the immediate east of inner Galway Bay; and 2) Tawin Island, a rural, dispersed settlement located on a low lying peninsula in inner southeast Galway Bay.

As part of the quantitative research, a land use survey was conducted of both subject areas. This gave an overview of what existed within each subject area in terms of uses and infrastructure. Light Detection and Ranging (LIDAR) data was obtained, from the Marine Institute. This is a remote sensing system used to collect topographic data. It uses laser scanning to collect height or elevation data. The author extrapolated the contours above sea level (Malin Head OD) to determine existing elevations along the coast of Galway Bay.

Thus, having regard to climate change projections: in particular, sea level rise, at best, of 0.5m and at worst, 2m by 2100; storm surges of 0.5m to 1m (Dunne 2008); increase in wave heights[29] (Marine Institute 2009); coastal retreat of 0.2-0.5m/yr (Devoy 2008); and increased precipitation, a hypothetical survey of both subject areas was carried out using a metre staff [30] indicating potential sea level increases along the coast. This enabled the author to map vulnerable areas around the coast (deemed to be those areas within the +5m contour as inferred from the literature review). Subsequently, the envisaged vulnerable

[29] Increases in significant wave height (the mean height of the highest 1/3 of waves) of 0.8 m per decade.
[30] A 5 Metre Telescopic Staff was used. This surveying instrument is dimensioned in 1m intervals (printed black and red on white), has 'E' reading cm graduations and mm graduations on the rear for height measuring.

areas within these subject areas were highlighted and delineated on maps. This illustrated the area most likely to be affected by increasing sea levels. The vulnerable areas are mapped on Drawings No. 1, 2 and 3 and are included in Appendix 2.

Following that, a 'risk assessment' was carried out for each of the case study areas which determined their vulnerability under 'best' and 'worst' case scenarios in terms of sea level rise. The areas were then evaluated in light of current planning policy and how they would be protected in such a likely event, or not, if the case may be based on current planning policy. The scenario building exercise was to highlight the potential vulnerability of these coastal communities in situations where '*a business as usual*' approach to current planning policy was to remain.

5.4 Flood Risk Assessment

To determine how vulnerable the case study areas were to the impacts of sea level rise it was important to consider the following:

- Projected sea level rise;
- Additional climate change impacts such as coastal erosion, storm surge, wave height and increased precipitation;
- Climate Change indicators; and
- Vulnerability of land uses within the coastal zone.

In terms of assessing the climate change impacts, the author determined that the effects on human beings, the environment and the economy would be suitable indicators for the purpose of this research. The impact assessment developed by the author is included in Table 5. A slight impact is a temporary impact causing a minor inconvenience. A moderate impact is one which lasts for a long period of time, causing disruption to

Table 5: Flood risk impact assessment

Rating	Indicators	Impacts
Extreme	Human Beings	Accessibility, property, health
Moderate	Environment	Soil, water quality, habitats
Slight	Economy	Infrastructure, property, human

To determine the vulnerability of land uses, the author consulted the Planning and Flood Risk Management Guidelines (Department of Environment 2009b) as set out in Table 6.

Table 6: Land Use Vulnerability Classification

Type of Land use	Vulnerability Rating
Emergency Services Emergency Access Residential Schools Health centres Primary Roads Water treatment/ pumping Stations	Extremely Vulnerable
Retail Leisure Commercial Industry Agricultural/ forestry land Local transport routes	Very Vulnerable
Flood control infrastructure Docks, marinas Water-based recreation and tourism (excluding sleeping accommodation) Lifeguard and coastguard stations Amenity open space, outdoor sports and recreation and essential facilities	Vulnerable

5.5 Qualitative Assessment

A brief overview and characterisation of the case study areas: - Oranmore and Tawin Island, was compiled to set the current context. A review of significant infrastructure and developments within close proximity to the coastal area was undertaken for both subject areas to identify what may be at risk from potential climate change impacts. This exercise was conducted having regard to the climate change projections, in particular, sea level rise, for Galway Bay.

5.5.1 Description of Oranmore

Oranmore is situated to the east of inner Galway Bay. Traditionally the town comprised a main street, linear in structure, whereby three roads radiated: the Station Road (N64 road to Claregalway); the Old Dublin Road (the junction in the centre of the town) and the Rinnville-Maree Road (a y-junction at the end of the town)(Galway County Council 2006).

Today however, there have been many changes to this original layout. The town is now located at the junction of two National Primary Routes, the N6 and the N18, which serve the north, east and south of the country. Therefore, there is a lot of traffic passing through and adjacent to the town, as witnessed by the author on several site visits.

Figure 10: Location of Oranmore

Source: Ordnance Survey of Ireland

Figure 11: View of traffic driving through Oranmore Town Centre

5.5.2 Development Context

As discussed in Section 4.5.2 Oranmore has experienced significant development in recent years. An increase in the population of 108%, as well as an increase in private households of 105% during the inter-census period 2002-2006 is testimony to this.

In addition to new housing there has been a number of large mixed use developments granted planning permission in Oranmore in recent years namely; Orantown Shopping Centre to the north of the town centre and the new missed use development to west of Main Street, comprising a Tescos, Aldi, approximately 200 apartments as well as office space and community facilities. In addition, a coastal walk is to be provided along the west and north of Oranmore Bay as part of the overall development in addition to a coastal wall. More details of recent developments are included in Section 4.5.2 and Appendix 2.

5.5.3 Natural Setting

Oranmore is located along the shorefront of Galway Bay. This natural amenity forms part of the larger Galway Bay complex which is a designated natural heritage site. In this context Galway Bay was nominated a candidate Special Area of Conservation (cSAC), a proposed Natural Heritage Area (pNHA) and Special Protection Area (SPA) under National and EU legislation. NHAs are heritage sites that are afforded protection for flora, fauna, habitats and geological sites of national importance. SACs are '*prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level*' (National Parks and Wildlife Service). SACs are selected and designated in accordance with the EU Habitats Directive which was transposed into Irish law in the European Union (Natural Habitats) Regulations,1997 as amended in 1998 and 2005). A brief description of the Galway Bay Complex (Site Code: 000268) is as follows:

> *'Situated on the west coast of Ireland, this site comprises the inner, shallow part of a large bay which is partially sheltered by the Aran Islands. The Burren karstic limestone fringes the southern sides and extends into the sublittoral. West of Galway city the bedrock geology is granite. There are numerous shallow and intertidal inlets on the eastern and southern sides, notably Muckinish, Aughinish and Kinvarra Bays. A number of small islands composed of glacial deposits are located along the eastern side. These include Eddy Island, Deer Island and Tawin Island. A diverse range of marine, coastal and terrestrial habitats, including*

several listed on Annex I of the EU Habitats Directive, occur within the site, making the area of high scientific importance'.

(Site Synopsis. Galway Bay Complex. Site Code: 000268, 2001)

SPAs are designated under the EU Birds Directive and ensure the protection of birds at their breeding, feeding, roosting and wintering areas. Species are identified which are rare, in danger of extinction or vulnerable to changes in habitat and which need protection (National Parks and Wildlife Service). Inner Galway Bay is a SPA and the following important characteristics are highlighted:

'Galway Bay is one of the most important ornithological sites in the western region. It supports an excellent diversity of wintering wetland birds, with divers, grebes, cormorants, dabbling duck, sea duck and waders all well represented. There are internationally important wintering populations of Great Northern Diver (83) and Brent Goose (676), and nationally important populations of an additional sixteen species...

Inner Galway Bay provides good quality habitat for Common Seal, a species that is listed on Annex II of the E.U. Habitats Directive. In 1984, this seal colony was one of the top three sites in the country, with over 140 animals recorded. The seals use a range of haul-out sites distributed through the bay. The site provides optimum habitat for Otter'.(Site Synopsis. Inner Galway Bay SPA. Site Code: 004031)

Figure 12: View of Galway Bay from Oranmore Castle

Galway Bay is therefore an important natural habitat, rich in biodiversity and a valuable asset to Oranmore. This has been duly recognised in the LAP which acknowledges that the Bay and its environs are an integral part of Oranmore's natural heritage. Furthermore, it is highlighted in the LAP that the shore area which extends southwards from Oranmore is rich in oyster beds that are the foundation of the Clarinbridge and Galway Oyster Festivals held each year.

The surrounding rural landscape mainly comprises agricultural development within low lying grazing areas. Many of these areas are characterised by stone walls, hedgerows and an open field system.

In terms of geology and hydrogeology, the Galway Bay region comprises bedrock consisting of a range of igneous, sedimentary and metamorphic rocks. In particular, the area includes the Carboniferous limestone upland of the Burren and the large, composite Galway granite batholiths. In addition, it is said that the peripheral and smaller occurrences of 'equally interesting rocks' presents Galway Bay with a long and complex geological history (Pracht 2004).

With regards to Oranmore, the area is classified as a 'regionally important aquifer', karstified (conduit) (Geological Survey of Ireland). The area is largely recognised as being of 'high vulnerability[31]', with some areas to the north of the Millplot River characterised as being of 'extreme vulnerability. A number of boreholes have also been identified throughout the area. This suggests that the area is very susceptible to groundwater contamination. Notwithstanding, it is noted that vulnerability of groundwater is dependent on (i) time of travel of infiltrating water; (ii) the relative quantity of contaminants that can reach the groundwater; and (iii) the contaminant attenuation capacity of the geological materials through which the water and contaminants infiltrate (Department of Environment 1999).

5.5.4 Description of Tawin Island

Tawin Island is located approximately 20km from Galway City, and within the middle of eastern Galway Bay. Tawin is joined to the mainland in Maree by a bridge. The Island is accessible from the south of Oranmore, via the Rinnville-Maree Road (a y-junction at the end of the town).

[31] Vulnerability: A term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities.

Figure 13: Location of Tawin Island, to the east of Inner Galway Bay

Source: Ordnance Survey of Ireland[32]

5.5.5 Development Context

A site visit to Tawin Island enabled the author to identify approximately 20 dwellings on the Island. It was estimated in Section 4.5.4 that there are approximately 60 persons living on the Island. Development has been limited on the island with one new dwelling granted planning permission in 2007.

There is one access road onto the Island which is very low lying and borders along the sea.

5.5.6 Natural Setting

Tawin Island forms part of a low lying peninsula which divides inner Galway Bay into sub-bays of similar extent, creating a barricade between the '*developing hinterland to the north and the more rural, though changing landscape to the south'* (Whilde 1986). It has been referred to as one of the few locations in Ireland where the central plain infringes the west coast and the limestone surface descends gently under the sea (Whilde 1986).

Characteristic of Tawin Island are the salt marshes. These are part of the inter tidal area, occurring between neap tides and spring high water marks (Nairn 2005). Salt marshes formed on peat substrates are quite common along the west coast of Ireland, with many

[32] http://maps.osi.ie/publicviewer/#V1,532716,719458,4

grazed mainly by cattle (Nairn 2005). Along the west coast of Ireland it is acknowledged that salt marshes may have been formed due to marine flooding of glacial deposits as opposed to the vegetative colonisation of mudflats (Nairn 2005).

Tawin Island is also quite renowned for its common seals which normally are observed along the exposed beaches to the south of the Island. It was recorded that up to 100 and more have been witnessed on occasion, however pods of 20-30 are more common (Whilde 1986).

As discussed previously within this section, the Galway Bay complex is a designated SAC and SPA, as well as a NHA. Therefore, it is no surprise that Tawin Island is a prime destination for a rich diversity of visiting species. These include brent geese, sandwich terns, Arctic Sterna paradisaea, common S. Hirundo, little S. Albifrons and on occasion, the rare roseate tern s. Dougalli journeying westwards to a nestling island off the Connemara coast (Whilde 1986).

Figure 14: View of Galway Bay taken from the bridge onto Tawin Island

5.6 Scenario-building for 2100 in Galway Bay

The contextual overview of Oranmore and Tawin Island indicated that both of these coastal settlements are rich in natural and built heritage and likely to be sensitive to any adverse impacts resulting from climate change, given their location within close proximity to Galway Bay.

5.6.1 Implications of Sea Level Rise for Oranmore

Best Case Scenario – 0.5m sea level rise by 2100

A 0.5m rise in sea level may not seem too significant; however there are a number of considerations which must be factored in. The topography around Oranmore is naturally low lying and comprises a very soft coastline. As a result, the area adjacent Oranmore Bay floods at high tides already. This is illustrated in Figures 15-19. Therefore an increase in sea level rise of 0.5m coinciding with a spring high tide has the potential to be disruptive. Taking into account the possibility of a storm event and storm surge of 0.5m then there is the potential for significant disruption in Oranmore.

In terms of the Flood risk impact assessment the following is considered in light of a sea level rise of 0.5m and a potential storm surge of 0.5m.

Human Beings: An increase of sea level rise to 1m at Oranmore would result in a slight to moderate impact due to temporary road closures (Coastal Road and main R338), inaccessibility to properties at St Mary's Quay, Innplot and the Millplot and potential health risk to groundwater contamination from the flooding of septic tanks in the locality. Some vulnerable people such as the elderly or disabled may also be at risk if unable to leave their property.

Environment: It is anticipated that there is a slight to moderate risk of soil erosion, bank erosion and damage to vegetation as well as the temporary impacts on water quality, habitats and flora and fauna caused by bacteria and other pollutants carried by flood water. However, it is noted that flooding can play a beneficial role in natural habitats. Many wetland habitats are dependent on annual flooding for their sustainability.

Economy: It is envisaged that there is a slight risk to the economy in terms of temporary infrastructure disruption such as road closures and access to properties.

In terms of vulnerability, the areas within the 1-5m vulnerability range are included in Figure 20. In the 'best' case scenario where sea level rise is 0.5m coinciding with a 0.5m storm surge the types of land use and vulnerability rating are included in Table 7.

Table 7: Vulnerability Assessment for Oranmore at 0.5m sea level rise

Type of Land use	Vulnerability Rating
Access to Garda Station Emergency access at Innplot Access to apartments and parking at Innplot Access to properties at St Mary's Quay, Millplot Access to pumping station Primary road access- R338	Extremely Vulnerable
Land used for grazing/ agricultural use Access to Aldi and Tesco Store and surface/ car parking Access to Oranmore Castle and quay	Very Vulnerable
SAC amenity New coastal/ boardwalk proposed around Oranmore Bay	Vulnerable

Worst Case Scenario – 2m sea level rise by 2100

A 2m rise in sea level is significant, exacerbated by coinciding with a spring high tide and increased storm activity including a storm surge of 0.5m. As discussed, the area adjacent Oranmore Bay already floods at spring high tide, as illustrated in Figures 15-19. Therefore an increase in sea level rise of 2m coinciding with a high tide has the potential to be extremely disruptive.

In terms of the Flood risk impact assessment the following is considered in light of a sea level rise of 2m and a potential storm surge of 0.5m.

Human Beings: An increase of sea level rise to 2.5m at Oranmore would result in a moderate to extreme impact due to long term road closures (Coastal Road and main R338), permanent flooding and damage to properties at St Mary's Quay and the Millplot. There is also a moderate to extreme impact to properties along Main Street towards the Millplot River. There is a moderate to extreme health risk in terms of groundwater contamination from the flooding of septic tanks in the locality. Some persons may also suffer injuries or stress caused by weather damage. Vulnerable people such as the elderly or disabled will

also be at moderate to severe risk if housebound or unable to leave their property, within close proximity to Oranmore Bay.

Environment: It is anticipated that there is a moderate to severe risk of soil erosion, bank erosion and damage to vegetation as well as the long term impacts on water quality, habitats and flora and fauna caused by bacteria and other pollutants carried by flood water.

Economy: It is envisaged that there is a moderate risk to the economy in terms of long term infrastructure disruption such as road closures and access to properties. There is also a moderate to extreme risk in terms of access to the permitted Tescos and Aldi stores located at Innplot, Oranmore.

In terms of vulnerability, the areas within the 1-5m vulnerability range are included in Figure 20. In the 'worst' case scenario where sea level rise is 2m coinciding with a 0.5m storm surge the types of land use and vulnerability rating are included in Table 8.

Table 8: Vulnerability Assessment for Oranmore at 2.5m sea level rise

Type of Land use	Vulnerability Rating
Garda Station Emergency access at Innplot Access to apartments and parking at Innplot Properties at St Mary's Quay, Millplot, Main Street, Oranmore Pumping station Primary road access- R338	Extremely Vulnerable
Land used for grazing/ agricultural use Access to Aldi and Tesco Store and surface/ car parking Access to Oranmore Castle and quay	Very Vulnerable
SAC amenity New coastal/ boardwalk proposed around Oranmore Bay New Coastal wall proposed may be breached	Vulnerable

5.6.1 Implications of Sea Level Rise for Tawin Island

Best Case Scenario – 0.5m sea level rise by 2100

A 0.5m rise in sea level may not seem too significant but in case of Tawin Island this can have significant implications given its low lying topography, exposure, geology, geometric

profile and sediment grading (Farrell 2009) as illustrated in Figures 21-23. Furthermore, Tawin Island composed of glacial deposits and located along the eastern side of Galway Bay is another contributing factor in its vulnerability. Bearing in mind also that the Island was reportedly already susceptible to flooding on an annual basis (Dáil Éireann 1994) 16 years ago.

Therefore an increase in sea level rise of 0.5m coinciding with a spring high tide has the potential to be most disruptive. Taking into account the possibility of a storm event and storm surge of 0.5m then there is the potential for significant disruption on Tawin Island.

In terms of the flood risk impact assessment the following is considered in light of a sea level rise of 0.5m and a potential storm surge of 0.5m.

Human Beings: An increase of sea level rise to 1m at Tawin Island would result in moderate to severe impact due to permanent road cut off of the main Maree-Tawin access road resulting in no access to properties, agriculture or aquaculture on the Island. There is a moderate health due to groundwater contamination from the flooding of septic tanks in the locality. In addition there is the potential for saltwater intrusion into the groundwater. Some vulnerable people such as the elderly or disabled are at moderate to severe risk if their property is inaccessible to emergency services. Additional health problems such as stress and injuries are may also be problematic.

Environment: It is anticipated that there is a severe risk of soil erosion, bank erosion and damage to vegetation including the protected salt marsh system. It was the opinion of Dr David Bourke, NUIG, that the salt marsh system characteristic to Tawin Island would be lost to the sea with a 1m sea level rise. Dr Bourke felt that these salt marshes would not have time to move to higher elevations and recreate themselves. There is a moderate to severe risk of temporary impacts on water quality, habitats and flora and fauna caused by bacteria and other pollutants carried by flood water.

Economy: It is envisaged that there is a moderate risk to the economy in terms of permanent infrastructure disruption. This will impact on the livelihoods of residents involved in agricultural or aquaculture practices.

In terms of vulnerability, the areas within the 1-5m vulnerability range are included in Figure 24. In the 'best' case scenario where sea level rise is 0.5m coinciding with a 0.5m storm surge the types of land use and vulnerability rating are included in Table 7.

Table 9: Vulnerability Assessment for Tawin Island at 0.5m sea level rise

Type of Land use	Vulnerability Rating
Primary Road access (Maree-Tawin road) Emergency access to residents Access to all houses on the Island	Extremely Vulnerable
Land used for grazing/ agricultural use Telecommunications and utilities	Very Vulnerable
SAC amenity	Vulnerable

Worst Case Scenario – 2m sea level rise by 2100

A 2m rise in sea level is extremely significant, exacerbated by coinciding with a spring high tide and increased storm activity including a storm surge of 0.5m. As discussed, the Island already floods at spring high tide. Therefore an increase in sea level rise of 2m coinciding with a high tide has the potential to be extremely disruptive.

In terms of the Flood risk impact assessment the following is considered in light of a sea level rise of 2m and a potential storm surge of 0.5m.

Human Beings: An increase of sea level rise to 2.5m at Tawin Island would result in severe impact due to permanent road cut off of the main Maree-Tawin access road resulting in no access to properties, agriculture or aquaculture on the Island. There is a severe health due to groundwater contamination from the flooding of septic tanks in the locality and saltwater intrusion into the groundwater. A number of properties will suffer from flooding and damage resulting in moderate and severe impact on the local communities. Additional health problems such as stress and injuries associated with the flooding and property damage may also be problematic.

Environment: It is anticipated that the majority of the SAC salt marsh system will be inundated from sea level rise at 2.5m. This will result in permanent loss of habitat and certain biodiversity within the area.

Economy: It is envisaged that there is a severe risk to the local economy in terms of permanent infrastructure and housing damage. This will impact on the livelihoods of residents living and working on the Island.

In the 'worst' case scenario where sea level rise is 2m coinciding with a 0.5m storm surge the types of land use and vulnerability rating are included in Table 10.

Table 10: Vulnerability Assessment for Tawin Island at 2.5m sea level rise

Type of Land use	Vulnerability Rating
Primary Road access (Maree-Tawin road) Emergency access to residents Houses on the Island	Extremely Vulnerable
Land used for grazing/ agricultural use Telecommunications and utilities	Very Vulnerable
SAC amenity	Vulnerable

5.7 Critique of Scenario-building Exercise

The scenario-building exercise was carried out to envisage which elements of Oranmore and Tawin Island would be affected by sea level rise. This exercise was largely based on projections discussed in Chapter 3. However as qualified in Chapter 3, these projections are based on recent observations and trends and global climate modelling of future scenarios as speculated by the IPCC in AR4. Regardless of how accurate these measurements and models become, it will never be possible to determine exactly what will happen in 90 years time from now. This is due to external influences beyond our control. Nevertheless, there are 4 key influences which could sway the outcome of climate change. The key influences are as follows: time scale, future policy, the economy and climate science.

Timescale

In the best case scenario, the timescale for the projected sea level rise of 0.5m is the end of this century however, this is uncertain. The sea level rise of 0.5m may actually materialize much sooner, in which case, the areas within +1m of sea level (Malin Head O.D) in Oranmore and Tawin Island would be very vulnerable as there are no coastal mitigation measures in place. Conversely, the projected time scale for a 0.5m sea level rise may not actually transpire for centuries. In this respect, the urgency is not so immediate.

In the worst case scenario, the potential for a 2m rise in sea level will only diminish if the timescale is longer than expected. If, on the other hand, the timescale for this increase is much sooner than 90 years, there will be a severe impact on the local communities of

Oranmore and Tawin in the absence of any mitigation measures. This will result in the permanent damage and loss of homes and properties, roads, key infrastructure such as the Garda station and pumping station and many businesses along Main Street.

Future Policy

As discussed in Chapter 3, the Kyoto Protocol is the only legally binding framework for industrialized countries and the European community in terms of GHG emissions. However, this treaty expires in 2012 and while negotiations are underway for the next treaty, there has been no formal commitment on GHG emissions from the larger industrialised countries such as China, India or America. As a result, it is difficult to determine how future policy will progress.

In the best case scenario, the level of sea rise may be maintained at 0.5m by the end of the century if a mandatory reduction was agreed on global GHG emissions to within a temperature increase of 2°C. On the other hand, if a global commitment to a reduction in GHG emissions fail, and GHG emissions continue to rise, then global warming will be exacerbated resulting in a sea level rise much greater than 0.5m by the end of the century.

In the worst case scenario, an agreed GHG emissions target would help to maintain a sea level rise of no greater than 2m by the end of the century. Conversely, in the absence of any global agreement to curb GHG emissions, global warming would continue to rise at a worrying rate as it currently is. This could potentially result in the flooding and abandonment of Oranmore and Tawin in the absence of coastal mitigation works.

The Economy

Over the past decade there has been an international financial crisis. As a result, fiscal investment has been directed towards stabilizing and improving the economy first and foremost. As a result, investment in climate change has not been a priority at national or local scale. This was emphasized on a number of occasions in correspondence with personnel in Galway County Council. In the event the national economy improves in Ireland and more investment is provided into climate change projects such as research, education and training, mitigation and adaptation, then the risks from sea level rise will be diminished. Alternatively, if the Irish economy deteriorates further it is inevitable that investment in climate change will suffer.

In the best case scenario, improved investment in climate change will result in educating and training people to reduce GHG emissions, invest in mitigation policies and infrastructure and adaptation measures. This should maintain the sea level rise at 0.5m by the end of the century. If, however there is no further investment or worse still, a reduction in climate change investment, the projected sea level rise of 0.5m may be exceeded resulting in moderate impacts on the communities of Oranmore and Tawin, as referred to already in this section.

In the worst case scenario of a 2m sea level rise, fiscal investment in climate change will help to mitigate against and adapt to any adverse impacts in the form of natural coastal defence and engineering works. Conversely, a reduction in investment in climate change will result in sea level increases worse than 2m and severe impacts on Oranmore and Tawin communities.

Climate Science

In the literature review outlined in Chapter 3, it was apparent that as technology and science advance, so do the accuracy of measurements and climate model projections. In this regard, further progression in these disciplines will give a more precise forecast of the likely impacts from climate change.

In the best case scenario, it may be revealed that a 0.5m sea level rise was too excessive of a projection and that a smaller increase is to be expected by the end of the century. This will reduce the risks for the communities of Oranmore and Tawin Island. If however, future scientific evidence reveals the 0.5m projection as an underestimate, then the impacts on both communities will be exacerbated.

In the worst case scenario, if future technology or scientific evidence reveals a reduced sea level rise than 2m, then the potential impacts will be diminished. However, if the future evidence implies that a much greater increase in sea level rise than 2m can be expected, the outcome for the communities of Oranmore and Tawin Island will be very grave indeed.

Figure 15: New mixed use development site at Innplot, Oranmore.

The photograph in Figure 15 was taken at high tide on the 9th September 2020. The estimated height of the tide was approximately 5.5m.[33]

Figure 16: View along the coast road, Oranmore (9th September 2010)

Flooding along the Coast Road at high tide is already evident in Figure 16.

[33] http://www.irishtimes.com/weather/tides.html

Figure 17: Pumping station and Garda station, Oranmore to the right of Photograph

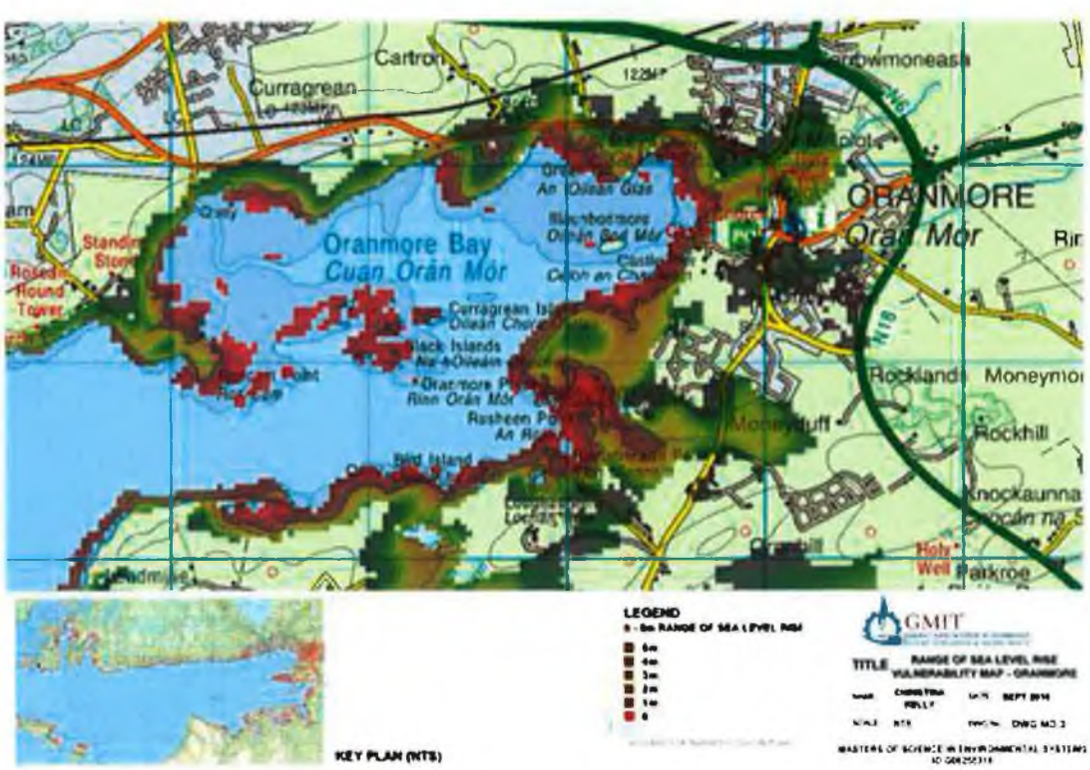
The site boundary of the mixed used development at Innplot, Oranmore under water to the front of the photograph.

Figure 18: Photograph taken on the SAC lands to the northwest of the new development at Innplot.

This photograph was taken at low tide on the 14th August 2010. From the photographs in Figure 15 and 17 it is evident that this land, right up to the development site boundary, regularly floods at high tide.

Figure 19: Lands zoned for 'Town Centre' and 'Residential' uses to the east of Millplot Bridge

Figure 20: Copy of Dwg No. 3 - Range of Sea Level Rise Vulnerability Map- Oranmore



*Please refer to Appendix 2 for larger map.

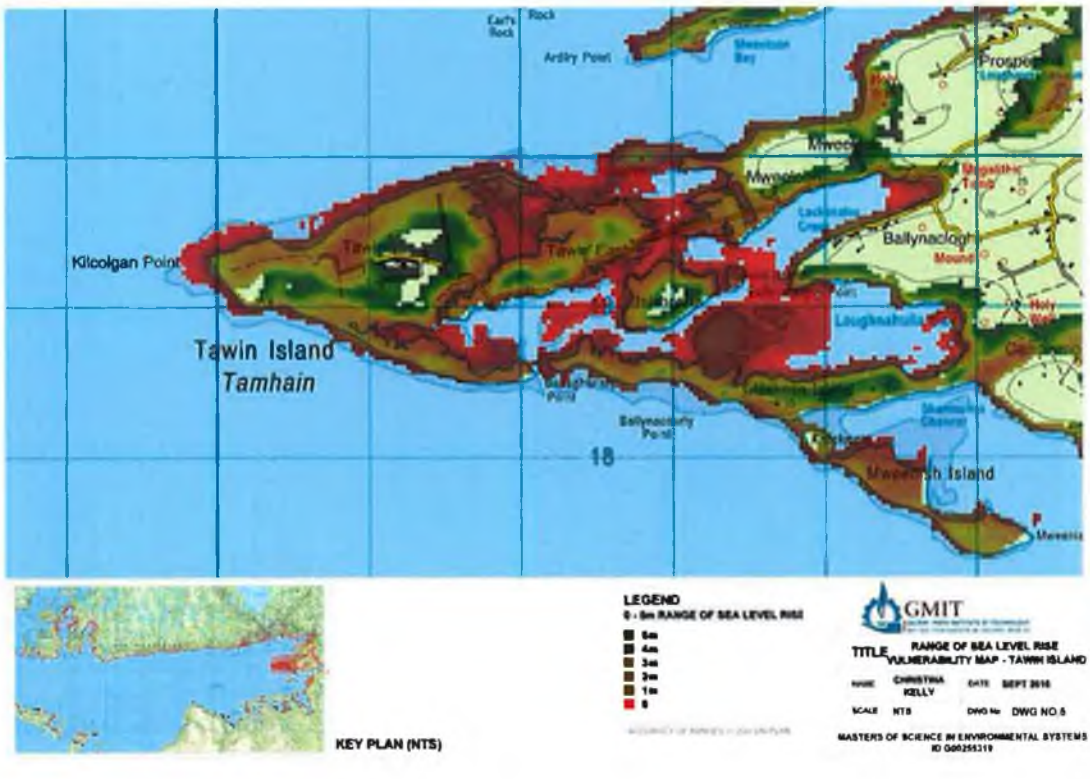
Figure 21: View of exposed nature and low lying topography of Tawin Island

Figure 22: Photo taken at bridge over to Tawin Island. Metre staff indicating 1m from the high tide mark.

Figure 23: Metre staff indicating 2 metres from high tide level week beginning 9th August 2010 (seaweed line used as reference)

The photos in Figures 21 and 22 indicate that an increase of 1m or 2m in sea level will result in a cut-off of road access to the island.

Figure 24: Copy of Dwg No. 5 - Range of Sea Level Rise Vulnerability Map- Tawin Island



6. Conclusions

The literature review provided an extensive and informative overview of the current state of knowledge on climate change. The outlook is bleak. The same pattern of steadily increasing concentrations of CO_2 that were witnessed in the 1960s has continued annually for almost a half century. Recent records of current levels of atmospheric CO_2 were reportedly 380 ppm (Marshall 2007) and even as high as about 392ppm (Gibbons 2009). To make matters worse, when other GHGs such as methane and nitrous oxide are tallied, the real figure is about 460ppm. This pushes us over the 450ppm line that the IPCC warned we must stay below to avoid catastrophic climate impacts. Nevertheless, recent records indicated that we are now registering the highest levels of CO_2 in 400,000 years (Marshall 2007).

All of this scientific evidence demonstrated that as global temperatures increased and decreased, so did the levels of atmospheric CO_2. The two appeared to be inter-related. Since the last IPCC report AR4 in 2007, it was announced that updated trends in surface ocean temperature and heat content showed that the ocean has warmed significantly in recent years (Richardson 2009). In fact, it was reported that current estimates indicated that ocean warming was about 50% greater than had been previously reported by the IPCC in 2007. As a consequence, the new estimates were said to have helped to better explain the trend in sea level that had been observed in recent decades as most of the sea level rise observed until recently had been the result of thermal expansion of seawater.

Progressive science and technology advancements pointed towards a sea level rise of around 1 metre or more by 2100 (Richardson 2009). These projections of 1 metre by the end of the century have been supported elsewhere in scientific publications (Uhel 2009, Vermeera 2009) with some estimates as high as 2m (The Pew Centre 2009). Moreover, it has been reported that the chances of abrupt, large-scale sea level rise may be greater than previously understood and that the collapse of the West Antarctic Ice Sheet could cause global sea level to rise rapidly by more than 3 metres (The Pew Centre 2009). Therefore it would appear that global sea level rise is expected to be around 1- 1.5m by 2100.

Given these stark projections in terms of GHG emissions and resultant sea level rise, it was important to review what was being done on a European level to deal with the looming climate change. It would appear that since the Kyoto Protocol in 1997 which expires in 2012 there has been no other commitment in place. At the most recent United Nations

Climate Change Conference held in December 2009, there was a real chance for international countries to commit to a legally binding treaty on GHG emissions however, this did not happen. Instead, the Copenhagen Accord was reached. This document recognised that climate change was one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2°C. Nevertheless, the document was not legally binding and did not contain any legally binding commitments for reducing CO_2 emissions.

So aside from Europe, it was time to investigate what the climate change implications would be for Ireland. It would appear that Ireland is in line for increased temperatures; warmer, drier summers; wetter autumns and winters; increase in cyclones; increase in ocean warming; sea level increases; increase in storm surge; increase in extreme wave heights; and increase in winter stream flows (increasing risk of flooding) and decrease in summer flows (Dunne 2008). As implied, it would appear that Ireland has a grim future ahead. Unless of course, Government policy on climate change helps to mitigate against or adapt to projected impacts.

Looking at sea level rise specifically; to determine exactly how vulnerable Ireland is to sea level rise proved to be quite complex, giving the variation in projections (Sweeney and Charlton 2008, Dunne 2008, Desmond 2009, The Marine Institute 2009). Nevertheless, working with a range between 0.5m and 2m in a scenario building exercise for Galway Bay proved to be useful and insightful in predicting the future impacts. Before embarking on this scenario-building exercise it was necessary to identify the other potential coastal impacts that may have implications for Galway Bay.

In addition to sea level rises, it was projected that there would be an increase in storm surge, extreme wave height and increased precipitation (Marine Institute 2009, Farrell 2009). In combination, tides and surges on their own generate high still water levels and flood low lying areas by simply flowing onto them (Farrell 2009). Conversely, waves when driven by storms, can pound coastal defences, erode beaches and dunes, run up sea walls and embankments and flood hinterland areas by overtopping (Farrell 2009). The effect of these storms is greatly exaggerated when they correspond with high spring tides and surges.

With regards to the implications of a rise in sea level on natural heritage it was assumed that coastal ecosystems around Ireland will be very vulnerable to extreme weather events

and sea level rise (Desmond 2009). This may result in damage to and/ or loss of coastal habitats. Coastal flood plains will also be at risk where high tides and storm surge coincide with intense rainfall and result in flooding, coastal erosion and damage to exposed fisheries and aquaculture. In addition, coastal wetlands and estuaries will be vulnerable to saltwater intrusion, resulting from sea level increases. This will have grave implications for County Galway as the second largest county in Ireland with an area of 6,148 square kilometres and a coastline of 689 kilometres and many off shore islands (Galway County Council 2004).

The implications of sea level rise on coastal communities and infrastructure included potential damage to homes, businesses, roads, bridges, telecommunications etc. Some industries may also be affected such as shipping, fisheries and aquaculture. Therefore these impacts point towards serious social and economic implications for Ireland. At the recent EPA conference on climate change it was noted by the author that there appeared to be some frustration among engineers in terms of mitigation against coastal impacts such as inundation. It seemed they had to progress engineering mitigation and adaptation measures without any guidance from Government.

In this respect, a review of Irish climate change policy revealed that there is no strategic policy or plan on climate change yet. However, it was noted that a Climate Change Bill was pending. Therefore it was of no surprise to the author that there was no adaptation framework for climate change, albeit one is pending. Furthermore, there is no dedicated central unit on climate change in Ireland either. There is also no Integrated CZM plan or policy for Ireland's coast. Of particular concern however, was Minister of State, Ciaran Cuffe, with responsibility for Sustainable Transport, Horticulture, Planning and Heritage at the recent climate change conference announcing a planned reduction in GHG emissions of 30% by 2020 while his colleague Mr Owen Ryan, begged to differ. His understanding was a target of 20% by 2020. Surely, at Government level, with the 'pending' Climate Change Bill, the emissions targets would be clear? Is climate change still in its infancy here in Irish politics? It doesn't instil much confidence in what to expect from the Government over the next few months in terms of policy and adaptation....when they are eventually published. Notwithstanding, it is noted that some good work has been done in terms of sustainable energy and energy management in terms of the White Paper (Department of Communications 2007a) and NEEAP (Department of Communications 2010).

Despite a lack of climate change policy it was evident that there was a lot of research being carried out at the moment which will inform the next stage of identifying vulnerability and preparing for adaptation. Current projects include the national COCOADAPT project work; preliminary flood risk assessment mapping; SmartBay; and ongoing climate studies being carried out by the likes of ICARUS, C4I and other organisations such as the OPW and Irish Academy of Engineers. Of note however, is that the preliminary flood risk assessment produced in draft for the east and south coast and underway for the west coast does not yet incorporate the future or climate change scenario. Notwithstanding this latter work has commenced on the east and south coast and is likely to be available by end of 2010. Nonetheless, it is expected to be 2011 before the same information is available for the west coast. Other research work being carried out at a local level included the heritage mapping in Galway County Council.

As it became apparent there was no strategic policy on climate change, the author reviewed the spatial planning context of Ireland in search of reference to climate change. In the NSS (Department of the Environment 2002) it was noted that there was no specific policy on climate change although it was stated that there was cognisance of the National Climate Change Strategy. In the Draft RPGs for the West Region, there was no specific policy on climate change either, a poor indication, in the author's opinion, of the future planning framework for the region up to 2022. It was noted however, that there were some strong policies included in the Draft RPGs in relation to flood risk assessment and management.

At a local level, there were no climate change policies in the Galway County Plan or Oranmore LAP. Therefore, it is evident that climate change would also appear to be in its infancy in terms of spatial planning. Perhaps this was an indication as to why there were no planners in attendance at the recent conference EPA conference on Climate Change.

A review of the main planning policies in the Galway County Plan and Oranmore LAP in relation to spatial settlement implied that growth and economic development were at the forefront of the agenda on strategic planning for County Galway, largely in accordance with its designation as a Gateway in the NSS. For example, under the current Oranmore LAP enough land was zoned for residential development to accommodate an increase in population of 12,000 persons, representing a potential increase of 120% on the 2005

figure. The total population recorded within the Oranmore LAP in 2005 was 5,462 (Galway County Council 2006).

In terms of the natural environment and designated heritage sites, it was apparent that Galway Bay was a unique amenity given its protective status under the EU Habitats Directive and national (wildlife) legislation as a SAC, SPA and NHA. In both the County Plan and Oranmore LAP a range of policies were included for the protection and conservation of Galway Bay's designated status. However, the author cannot help but think that these policies were very generic and not at all site specific. Nevertheless, it is noted that there were some good policies in terms of identification and protection of ecological networks such as Policy HL37 in the County Plan and Policies 3.1.2 to 3.1.4 in the Oranmore LAP. This was considered to be very important for future migration of species as a result of climate change, in accordance with Dr Bourke, NUIG.

With regards to coastal management, DM 39 in the County Plan is considered by the author to be a very appropriate development control for the future development of the Galway Bay coastline, if implemented fully. However, the author cannot help but think that this may be a bit late in the case of Oranmore.

From a review of land use zonings within the Oranmore LAP and recently permitted developments, it is the opinion of the author, that this is a poor reflection of natural heritage and environmental protection; coastal zone management, flood risk assessment and management and, in general, a poor reflection of bad planning. Lands subjected to annual flooding, as reported by Galway County Council's engineer in May 2005 (please refer to Appendix 6) were subsequently zoned: for residential and town centre development at Millplot, Oranmore; for town centre development on the opposite side of the town at St Mary's Quay, Oranmore and at Innplot, Oranmore. The latter site is currently under construction for a large scale mixed- use development and is the most significant development permitted in the town over the last 7 years. What is more, in the opinion of the author, is that this site is also the most vulnerable to flooding and sea level rise. Here, one can see the conflict between economic development and environmental protection – and economic development wins to the detriment of the designated heritage site that is Galway Bay. What will the legacy of this site be in the future? To answer this question, a scenario-building exercise was carried out to determine the implications of sea level rise on coastal communities in Galway Bay.

The scenario-building exercise looked at two case studies: 1) Oranmore, a dense urban settlement located to the east of inner Galway Bay; and 2) Tawin Island, a dispersed rural settlement located to the southeast of inner Galway Bay. Using a projected sea level rise of between 0.5m (best case scenario) and 2m (worst case scenario) by the end of the century, based on the findings of the literature review, a risk assessment was carried out. The risk assessment determined the impacts of sea level rise using a number of indicators – human beings, the environment and the economy whilst rating the vulnerability of land uses within the area. Taking into account some external factors such as a spring high tide, a storm surge of 0.5m and increased precipitation along with sea level rise implied that even in the 'best' case scenario, Tawin Island is likely to experience 'moderate' to 'severe' impacts in terms of the local community, environment and economy. Homes and the main access road will be extremely vulnerable to inundation. At a 'worst' case scenario i.e. 2m sea level rise, Tawin is likely to be permanently flooded and, more than likely, abandoned in the absence of any national climate change policy or adaptation plan.

With regards to Oranmore, it was considered that in a 'best' case scenario, comprising a sea level rise of 0.5m there will be 'slight' to 'moderate' impacts on the local community, environment and economy in terms of temporary disruption to road infrastructure; inaccessibility to homes and services; potential risk of damage and contamination; and temporary damage to habitats. In terms of the 'worst' case scenario of 2m sea level rise, it was anticipated that the impacts will be 'moderate' to 'extreme' due to long term road closures, flooding and damage to properties, and increased health risk hazards due to stress and injury. The environment is envisaged to suffer in terms of soil erosion, bank erosion and habitat damage. In terms of the impact to the local economy, long term disruption to infrastructure, services and properties will be envisaged.

In terms of vulnerability, the Garda station, pumping station and residential properties along St Marys Quay are extremely vulnerable and likely to be flooded on a regular basis. The commercial mixed-use development at Innplot will also suffer from inundation and flooding. This development however, has been designed to a degree, to manage some of the impacts from climate change such as the inclusion of raised finished floor levels, the provision of a 5m coastal wall, walled armour and infilling into Oranmore Bay. Nevertheless, it is important to note that by infilling into a floodplain, the displacement of storage floodwater will occur elsewhere and further exacerbate the problem of flooding across Oranmore Bay (Department of Environment 2009b).

Therefore, it is obvious that significant investment will be required over the coming years to 'climate proof' all of the developments permitted planning and constructed within the floodplain of Oranmore Bay including the pumping station and Garda station, otherwise these properties will have to be abandoned. So can one expect to see Oranmore's Tesco and Aldi on stilts in the future? Given the potential for exacerbated climate change projections resulting from other external impacts such as a change in timescale, lack of future climate change policy or a continued decline in the national economy, this may be the only alternative to property abandonment otherwise.

The errors of bad planning decisions in flood risk areas must be taken into account now with respect to future climate change projections. Ireland already has a number of ghost estates emanating from the Celtic Tiger legacy, it is important not to create another similar 'Climate change' legacy on the landscape. Therefore, it is vitally important that all spatial planning at strategic, regional and local level take account of the most up-to-date climate change projections. Planning professionals and those involved in making planning decisions should be educated and trained on the implications of future planning decisions on climate change. However, this will not be achieved until a strategic and integrated climate change policy and adaptation plan is prepared for the island of Ireland that recognises the importance of integrated land use and spatial planning in terms of mitigation and adaptation to climate change. Only then can the infancy of climate change and planning practice mature together.

Bibliography

Aalen, F. H. A., Whelan K. and Stout, M. (Ed) (1997). *Atlas of the Irish rural landscape*. Cork University Press

Aleklett, K., M. Höök, et al. (2010). *The Peak of the Oil Age - Analyzing the world oil production Reference Scenario in World Energy Outlook 2008*. Energy Policy 38 (3): 1398-1414.

Alley, R. B. (2004). *Abrupt Climate Change*. Scientific American (November 2004): 62-69.

Alley, R. B. a. B., M. L (1998). *Greenland Ice Cores: Frozen in Time*. *Scientific American* (February 1998): 80-85.

Babiker, M. H., H. D. Jacoby, et al. (2002). *The evolution of a climate regime: Kyoto to Marrakech and beyond*. Environmental Science & Policy 5(3): 195-206.

Barca, S. (2010). *Energy, property, and the industrial revolution narrative*. Ecological Economics In Press, Corr. Proof.

Biesbroek, G. R., R. J. Swart, et al. (2009). *The mitigation-adaptation dichotomy and the role of spatial planning*. Habitat International 33(3): 230-237.

Biesbroek, G. R., R. J. Swart, et al. (2010). *Europe adapts to climate change: Comparing National Adaptation Strategies*. Global Environmental Change 20(3): 440-450.

Bridge, G. (2010). *Geographies of peak oil: The other carbon problem*. Geoforum 41(4): 523-530.

CAAS Enviromental Services. (2009). *SEA Statement of the Galway County Development Plan 2009-2015*. (Unpublished) Strategic Environmental Assessment. [online] http://www.galway.ie/en/Services/Planning/DevelopmentPlans/GalwayCountyDevelopmentPlan2009-2015/CountyDevelopmentPlan2009-2015/ (Accessed: June 2010)

Caprani, P. (2005). *An Bord Pleanála Inspector's Report. PL 07.209434*, An Bord Pleanála.[online] http://www.pleanala.ie/casenum/209434.htm (Accessed: August 2010)

Carson, R. (1962). *Silent Spring*. Penguin.

Central Statistics Office Ireland. (2006). *2006 Census Small Area Population Statistics*. [online] http://www.cso.ie/census/ (Accessed: August 2010)

Collins, W., Colman, R., Haywood, J., Manning, M. and Mote, P. (2007). *The Physical Science behind Climate Change*. Scientific American 297(2): 64-73.

Comhar Sustainable Development Council. (2009). *Towards a Green New Deal for Ireland*.[online] http://www.comharsdc.ie/_files/2009_TowardsAGreenNewDealComhar_rpt.pdf (Accessed: August 2010)

Commission of the European Communities. (2009a). *Commission Staff Working Document accompanying the White Paper Adapting to climate change: Towards a European framework for action. Climate Change and Water, Coasts and Marine Issues Brussels.* [online] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009SC0386:EN:NOT (Accessed: July 2010)

Commission of the European Communities. (2009b). *White Paper. Adapting to climate change: Towards a European framework for action* [online] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009DC0147:EN:NOT (Accessed: July 2010)

Cunningham, E. (2010). *Doubling of Mutton Island plant capacity gets go-ahead.* The Connaught Sentinel. [online] http://www.galwaynews.ie/12403-doubling-mutton-island-plant-capacity-gets-go-ahead (Accessed: September 2010)

Dáil Éireann, (1994). Parliamentary Debates - Volume 438 - 03 February, 1994 - Adjournment Debate. *County Galway Coastal Erosion* [online] http://historical-debates.oireachtas.ie/D/0438/D.0438.199402030071.html. (Accessed: June 2010).

Delli Priscoli, J. (2000). *Water and civilization: using history to reframe water policy debates and to build a new ecological realism.* Water Policy 1(6): 623-636.

Department of An Taoiseach, (2008). *Building Ireland's Smart Economy: A Framework for Sustainable Economic Renewal.* Dublin, Stationary Office.[online] http://www.taoiseach.gov.ie/eng/Building_Ireland's_Smart_Economy/Building_Ireland's_Smart_Economy_.pdf (Accessed: June 2010)

Department of Communications Energy and Natural Resources. (2007a). *Irish Government White Paper: Towards a Sustainable Energy Future for Ireland. The Energy Policy Framework 2007-2020.* [online] http://www.dcenr.gov.ie/NR/rdonlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/27356/EnergyWhitePaper12March2007.pdf (Accessed: May 2010)

Department of Communications Energy and Natural Resources. (2007b). *Green Paper. Towards a Sustainable Energy Future for Ireland.* [online] http://www.dcenr.gov.ie/NR/rdonlyres/54C78A1E-4E96-4E28-A77A-3226220DF2FC/27359/EnergyGreenPaper1October2006.pdf (Accessed: May 2010)

Department of Communications Energy and Natural Resources. (2010). *Maximising Ireland's Energy Efficiency - The National Energy Efficiency Action Plan 2009 – 2020.* [online] http://www.dcenr.gov.ie/NR/rdonlyres/FC3D76AF-7FF1-483F-81CD-52DCB0C73097/0/NEEAP_full_launch_report.pdf (Accessed: May 2010)

Department of the Environment (1997). *Sustainable Development. A Strategy for Ireland.* Government of Ireland [online] http://www.environ.ie/en/Environment/SustainableDevelopment/PublicationsDocuments/FileDownLoad,1825,en.pdf (Accessed: June 2010)

Department of Environment, Heritage and Local Government and Environmental Protection Agency (1999). *Groundwater Protection Scheme. [online]* http://www.gsi.ie/Programmes/Groundwater/Projects/Protection+Schemes+Guidelines.htm (Accessed: May 2010)

Department of Environment, Heritage and Local Government (2002). *Making Ireland's Development Sustainable. Review, Assessment and Future Action.* . Dublin Stationary Office. [online] http://www.environ.ie/en/Environment/SustainableDevelopment/PublicationsDocuments/FileDownLoad,1839,en.pdf (Accessed: August 2010)

Department of Environment, Heritage and Local Government (2002). *National Spatial Strategy 2002-2020.* Department of the Environment. Dublin, Stationary Office. [online] http://www.nss.ie/ (Accessed: August 2010)

Department of Environment, Heritage and Local Government. (2004). *Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment. Guidelines for Regional Authorities and Planning Authorities.*[online] http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,1616,en.pdf (Accessed: August 2010)

Department of Environment, Heritage and Local Government. (2004). *Local Government Act, 2001. Code of conduct for Councillors.[online]* http://www.environ.ie/en/Publications/LocalGovernment/Administration/FileDownLoad,1956,en.pdf (Accessed: August 2010)

Department of Environment, Heritage and Local Government. (2004). *Local Government and Elected Members.* Dublin, Stationary Office. [online] http://www.environ.ie/en/LocalGovernment/LocalGovernmentAdministration/PublicationsDocuments/FileDownLoad,1961,en.pdf (Accessed: September 2010)

Department of Environment, Heritage and Local Government. (2007a). *Development Plans. Guidelines for Planning Authorities.* [online] http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,14468,en.pdf (Accessed: August 2010)

Department of Environment, Heritage and Local Government. (2007b). *"National Climate Change Strategy 2007-2012."* [online] http://www.environ.ie/en/Environment/Atmosphere/ClimateChange/NationalClimateChangeStrategy/. (Accessed July 2010)

Department of Environment, Heritage and Local Government. (2009a). *Guidelines for Planning Authorities. Sustainable Residential Development in Urban Areas (Cities, Towns & Villages).* [online] http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownLoad,19164,en.pdf (Accessed: August 2010)

Department of Environment, Heritage and Local Government and the Office of Public Works. (2009b). *The Planning System and Flood Risk Management: Guidelines for Planning.* Dublin, Stationary Office. [online] http://www.flooding.ie/en/media/The%20Planning%20System%20and%20Flood%20Risk%20Management.PDF (Accessed: May 2010)

Department of Public Information (1997). *Earth Summit.*[online] http://www.un.org/geninfo/bp/envirp2.html (Accessed: August 2010)

Desmond, M., O'Brien, P. and McGovern, F. (2009). *A Summary of the State of Knowledge on Climate Change Impacts for Ireland. Climate Change Research Programme (CCRP) 2007-2013* Report Series No. 1, Environmental Protection Agency, Ireland.

Devoy, R. (2008). *Coastal Vulnerability and the Implications of Sea Level Rise for Ireland.* Journal of Coastal Research 24(2), 325–341

Diamond, J. (2005). *Collapse: How societies choose to fail or survive.* Penguin Group.

Dunne, S., Hanafin, J., Lynch, P., McGrath, R., Nishimura, E., Nolan, P., Venkata Ratnam, J., Semmler, T., Sweeney, C., Varghese, S. and Wang, S. (2008). *Ireland in a Warmer World. Scientific Predictions of the Irish Climate in the Twenty-First Century.* McGrath, R. and Lynch, P. Eds. Community Climate Change Consortium for Ireland (C4I).

Environmental Protection Agency (2010). Climate Change Conference. Climate Change Conference Aviva Stadium, Lansdowne Road, Dublin [online presentations] http://www.slideshare.net/EPAIreland/slideshows/2

European Commission (2010a). *Climate Change.* [online] http://ec.europa.eu/environment/climat/home_en.htm.(Accessed: August 2010)

European Commission (2010b) *A New EU Floods Directive.* [online] http://ec.europa.eu/environment/water/flood_risk/index.htm. (Accessed: August 2010)

European Environment Commission. (2008). *Management of Natura 2000 sites: Guidance. Article 6 - Managing and protecting Natura 2000 sites.* [online]

http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm. (Accessed August 2010)

European Environmental Agency (2009) *Cities of the future — how will European cities adapt to new climate conditions?* [online] http://www.eea.europa.eu/articles/cities-of-the-future-2013-how-will-european-cities-adapt-to-new-climate-conditions. (Accessed: September 2010)

European Environmental Agency (2010a). *Europe's coasts: reconciling development and conservation* [online] http://www.eea.europa.eu/highlights/europe2019s-coasts-reconciling-development-and-conservation. (Accessed: September 2010)

European Environmental Agency (2010b). *Putting a Value on Nature.* [online] http://www.eea.europa.eu/highlights/putting-a-value-on-nature. (Accessed: September 2010)

European Union, EU Water Framework Directive (2000). *Integrated river basin management*[online] http://ec.europa.eu/environment/water/water-framework/index_en.html (Accessed: April 2010)

Farrell, G. J. (2009). *Climate Change Impacts on Coastal Areas*, Department of Communications, Marine and Natural Resources.[online] http://www.iae.ie/site_media/pressroom/documents/2009/Jun/09/Coastal_Areas.pdf

Fealy, R., Murphy, C., Penk, M., Brophy, J., Nash, R., Kelly, B., Bullock, C., Stack, M. and Mathews, P. (2009). *Climate Change, Heritage and Tourism Implications for Ireland's Coast and Inland Waterways:Summary document.* Kelly, B. and Stack, M. Eds. The Heritage Council and Fáilte Ireland.

Fernandez Diez-Picazo, M. (2009). *The maritime dimension of climate change* Conf. Paper UNFCCC COP 15 Side Events Programme. EU Pavilion Copenhagen.[online] http://ec.europa.eu/maritimeaffairs/climate_change/mare_en.pdf (Accessed: September 2010)

Foley, J. (2010). *Boundaries for a Healthy Planet.* Scientific American 302(4): 54-57.

Friends of Coole and Galway Rural Development (2010). *Reading and Understanding the Landscape.* Unpublished – Galway County Council Heritage Course.

G. Nolan, Gillooly, M. and Whelan, K (2009). *Irish Ocean Climate and Ecosystem Status Report Summary 2009,* Marine Institute

Galway City Tribune, (2008). '*Mutton Island upgrade to cost €160m'*, [online] http://www.galwaynews.ie/6011-mutton-island-upgrade-cost-€160m. (Accessed: August 2010).

Galway County Council (2004). *Galway County Heritage Plan 2004-2008.* [online] http://www.galway.ie/en/Services/Heritage/HeritagePlan2004-2008/TheFile,626,en.pdf (Accessed: August 2010)

Galway County Council (2006). *Oranmore Local Area Plan 2006-2012.*[online] http://www.galway.ie/en/Services/Planning/DevelopmentPlans/LocalAreaPlans/AdoptedPlans/OranmoreLocalAreaPlan/ (Accessed: March 2010)

Galway County Council (2009). *Galway County Council County Development Plan 2009-2015.*[online] http://www.galway.ie/en/Services/Planning/DevelopmentPlans/GalwayCountyDevelopmentPlan2009-2015/CountyDevelopmentPlan2009-2015/ (Accessed: March 2010)

Geological Survey of Ireland. *Groundwater Public Viewer* [online] http://spatial.dcenr.gov.ie/imf/imf.jsp?site=Groundwater. (Accessed: August 2010)

Gibbons, J. (2009). *Political paralysis as clock ticks on climate change.* The Irish Times. Thu 06 Jun 2009

Gillham, B. (2000a). *Case study research methods.* Continuum

Gillham, B. (2000b). *The research interview.* Continuum

Gillham, B. (2000c). *The research interview.* Continuum

Gore, A. (2006). *An Inconvenient Truth.* Rodale Press, Inc.

Grothmann, T. and A. Patt (2005). *Adaptive capacity and human cognition: The process of individual adaptation to climate change.* Global Environmental Change Part A 15 (3): 199-213.

Hansen, J. (2004). *Diffusing the Global Warming Timebomb.* Scientific American (March 2004): 70-77.

Hansen, J. (2007). *Scientific Reticence and Sea Level Rise.* Environmental Research Letters (Environ. Res. Lett. 2 (2007) 024002 (6pp)).

Howley, M., Ó Gallachóir, B. & Dennehy, E. (2008). *Energy in Ireland 1990 – 2008. 2009 Report.* Sustainable Energy (Authority) Ireland.[online] http://www.seai.ie/Publications/Statistics_Publications/EPSSU_Publications/Energy_in_Ireland_2009.pdf (Accessed: August 2010)

Howley, M., Ó Gallachóir, Dr B. and Dennehy, E. (2009). *Energy in Ireland 1990-2008. 2009 Report.* Sustainable Energy Ireland: Energy Policy Statistical Support Unit.

Huang, H.-F. and Lo, Shang-Lien (2010). *Review and classify the GHGs-related indicators. Renewable and Sustainable Energy Reviews.* In Press, Uncorrected Proof.

InterAcademy Council. (2010). *Climate Change Assessments. Review of the Processes and Procedures of the IPCC Committee to Review the IPCC*

[online] http://reviewipcc.interacademycouncil.net/report/Climate%20Change%20Assessments,%20Review%20of%20the%20Processes%20&%20Procedures%20of%20the%20IPCC.pdf (Accessed September 2010)

Intergovernmental Panel on Climate Change (1990). *Climate Change The IPCC Scientific Assessment.* Working Group I. [online] http://www.ipcc.ch/publications_and_data/publications_and_data_reports.htm#1 (Accessed July 2010)

Ireland, Department for Environment Heritage and Local Government (2010) *Planning and Development Act (Amendment).* Dublin: Department for Environment Heritage and Local Government.

Irish Academy of Engineers and Engineers Ireland (2010). *Infrastructure for an island population of 8 million Summary Report.* Irish Academy of Engineers and Engineers Ireland [online] http://www.iae.ie/site_media/pressroom/documents/2010/Feb/26/IAE_ReportSUMMARY_web.pdf (Accessed: August 2010)

Irish Committee on Climate Change. Royal Irish Academy. (2010) *3rd Scientific Statement. Climate and Sea Level Change.* [online] http://www.ria.ie/getmedia/350b0814-82d0-4186-968b-f338b4a8e9cc/3statement.pdf.aspx (Accessed: August 2010)

Irish Government (2007). *National Development Plan 2007-2013. Transforming Ireland.* Dublin, Stationary Office.

Juniper, T. (2007). *Saving Planet Earth*. Collins

Karl, T. R and Trenberth, K. E (1999). *The Human Impact on Climate.* Scientific American (December 1999): 100-105.

Keane, B. (2009) *Urban planning and development in modern times : a case study of Oranmore, County Galway*, unpublished (B.A), Galway Mayo Institute of Technology

Kennelly, M. (2010). Inspector's Report. PL 07.235842. An Bord Pleanála [online] http://www.pleanala.ie/casenum/235842.htm (Accessed: August 2010)

Kiely, G., Leahy, P., Ludlow, F., Stefanini, B., Reilly, E., Monk M. and Harris, J. (2010). *Extreme weather, climate and natural disasters in Ireland, Climate Change Research Programme (CCRP) 2007-2013, Report Series No. 5,* Environmental Protection Agency.

Kotlyakov, V. M. (2010). *Global Causes and Effects of the Climate Change and Glaciations on the Earth* (A Review),(IOP Conf. Series: Earth and Environmental

Science 13 (2010) 012001. http://iopscience.iop.org/1755-1315/13/1/012001/pdf/1755-1315_13_1_012001.pdf (Accessed: August 2010)

Lovelock, J. (1988). *The Ages of Gaia,* Oxford University Press.

Lunenburg, F. C. *Writing a successful thesis or dissertation: tips and strategies for students in the social and behavioral sciences*. Thousand Oaks. London SAGE,

Lynas, M. (2008). *Six Degrees. Our future on a hotter plane.* Fourth Estate

Marine Institute. (2010). *SmartBay.* [online] http://www.marine.ie/home/services/operational/SmartBay/ (Accessed: August 2010)

Marshall, G. (2007). *Carbon detox. Your step-by-step guide to getting real about climate change.* Octopus Publishing Group

Moss, B. (2008). *The Water Framework Directive: Total environment or political compromise?* Science of the Total Environment 400 (2008) 32 – 41

Murray, R. (2002). *How to write a thesis.* (2nd Ed.)

Nairn, R. (2005). *Ireland's coastline: exploring its nature and heritage.* The Collins Press

Nakicenovic, N. and Swart R. (Eds) (2000). *Emissions Scenarios. Summary for Policymakers, IPCC.* Cambridge: University Press.[online] http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=0 (Accessed: August 2010)

National Parks and Wildlife Service (2001) *Galway Bay SAC Complex. Site Synopsis. Site Code: 000268* [online] http://www.npws.ie/en/media/Media,3908,en.pdf (Accessed: July 2010)

National Parks and Wildlife Service (2001) *Inner Galway Bay SPA. Site Synopsis. Site Code: 0004031* [online] http://www.npws.ie/en/media/Media,4445,en.pdf (Accessed: July 2010)

National Parks and Wildlife Service '*Special Areas of Conservation* (SACs)' [online] http://www.npws.ie/en/ConservationSites/SpecialAreasofConservationSACs/. (Accessed: August 2010).

National Parks and Wildlife Services, '*Available Conservation Plans'*, [online] http://www.npws.ie/en/PublicationsLiterature/ConservationManagementPlans/FullCPs/. (Accessed: August 2010).

Observer Editorial (2009). *The outcome at Copenhagen was disappointing. But if we work hard, there is still a way forward*. Observer Newspaper UK [online] http://environmentalresearchweb.org/cws/article/news/41289 (Accessed: September 2010)

Office of Public Works, '*Flood Risk Management Planning'* [online] http://www.opw.ie/en/FloodRiskManagement/BackgroundPolicy/ManagingFloodRisk/FloodRiskManagementPlanning/. (Accessed: June 2010).

Pachauri, R.K. and Reisinger, A. (Eds.) (2007). *IPCC Fourth Assessment Report: Climate Change 2007*. Synthesis Report. Intergovernmental Panel on Climate Change. [online] http://www.ipcc.ch/publications_and_data/ar4/syr/en/main.html (Accessed: December 2009)

Parry, M. L., Canziani, O.F, Palutikof, J.P, Van der Linden, P.J. and Hanson, C.E. Eds. (2007). *IPCC, 2007*: *Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. [online] http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html (Accessed: August 2010)

Patt, A. and S. Dessai (2005). '*Communicating uncertainty: lessons learned and suggestions for climate change assessment.*' Comptes Rendus Geosciences 337(4): 425-441.

Plimer, I. (2009) '*The Natural History of Climate Change'* Institute of Public Affairs (Australia). [online] http://www.ipa.org.au/publications/1709/the-natural-history-of-climate-change (Accessed: August 2010)

Pracht, M. (2004). *Geology of Galway Bay: a geological description to accompany the bedrock geology 1:100,000 map series, sheet 14, Galway Bay*. Dublin: Geological Survey of Ireland.

Richardson, K., Steffen, W., Joachim Schellnhuber, H., Alcamo, J., Barker, T., Kammen, D.M., Leemans, R., Liverman, D., Munasinghe, M., Osman-Elasha, B., Stern, N., Wæver, O., (2009). *Synthesis Report. Climate Change. Global Risks, Challenges and Decisions*,

University of Copenhagen. [online] http://climatecongress.ku.dk/pdf/synthesisreport (Accessed: August 2010)

Rozanski, K. and Gonfiantini, R. (1990) '*Isotopes in Climatological Studies*'. IAEA Bulletin, pp 9-15.[online] http://www.iaea.org/Publications/Magazines/Bulletin/Bull324/32406880915.pdf (Accessed: September 2010)

Ruddiman, W. (2005). '*How did humans first alter global climate*?' Scientific American pp 46-53.

Scripps CO_2 Program. (2010). '*The early Keeling curve'*, [online] http://scrippsco2.ucsd.edu/program_history/early_keeling_curve_3.html. (Accessed: July 2010).

Silverman, D. (2000). *Doing qualitative research: A practical handbook.*

Spatial Planning Unit. Department of Environment and Local Government (1991). *Coastal Zone Management.* Department of Environment and Local Government.

Steele-Dunne, S., P. Lynch, et al. (2008). '*The impacts of climate change on hydrology in Ireland*.' Journal of Hydrology 356(1-2): 28-45.

Stern, N. (2006). *The Stern Review. The Economics of Climate Change*. Executive Summary. [online] http://siteresources.worldbank.org/INTINDONESIA/Resources/226271-1170911056314/3428109-1174614780539/SternReviewEng.pdf (Accessed: September 2010)

Sweeney, J. (2007). *Climate Change and Irish Tourism*. National Tourism Conference.

Sweeney, J. (2010). *Climate Change and What It Means for the West of Ireland.* An Taisce Galway Lecture on Climate Change. Bridge Club, St Mary's Road, Galway City.

Sweeney, J., Albanito, F., Brereton,A., Caffarra, A., and R. Charlton, Donnelly,A., Fealy, R., Fitzgerald,J., Holden, N., Jones, M., and Murphy, C. (2008). '*Climate Change – Refining the Impacts for Ireland*'. STRIVE Report, Environmental Protection Agency.

Sweeney, J., Brereton, T., Byrne, C., Charlton, R., Emblow, C., Fealy, R., Holden, N., Jones, M., Donnelly, A., Moore, S., Purser, P., Byrne, K., Farrell, E., Mayes, E., Minchin, D., Wilson, J., and Wilson, J. (2003). *Climate Change Scenarios & Impacts for Ireland.* Department of Geography, National University of Ireland, Maynooth for the Environmental Protection Agency.

The 'Inconvenient Truth' Effect In Google Earth: Animated Sea Level Rise Flooding Of Lower Manhattan With An Added Depth Effect [Online] http://freegeographytools.com/2007/the-inconvenient-truth-effect-in-google-earth-animated-sea-level-rise-flooding-of-lower-manhattan-with-an-added-depth-effect (Accessed: August 2010)

The Irish Times, (2010). '*Crannóg site revealed after lake's level drops'* (29th June 2010)', [online] http://www.irishtimes.com/newspaper/ireland/2010/0629/1224273556107.html. (Accessed: July 2010).

The Pew Centre. (2009). *Key Scientific Developments since the IPCC Fourth Assessment Report.* Science Brief 2.[online] http://www.pewclimate.org/docUploads/Key-Scientific-Developments-Since-IPCC-4th-Assessment.pdf (Accessed: December 2009)

Uhel, R. (2009). '*Climate change impacts on the European seas & coasts: what do we observe?*' UNFCCC –COP15. Copenhagen. [online] http://ec.europa.eu/maritimeaffairs/climate_change_en.html (Accessed: August 2010)

United Nations Environment Programme. (1997) '*Special Session of the General Assembly to Review and Appraise the Implementation of Agenda 21'*, [online] http://www.un.org/esa/earthsummit/index.html. (Accessed: August 2010).

United Nations Framework Convention on Climate Change (1997) Kyoto Protocol [online] http://unfccc.int/kyoto_protocol/items/2830.php (Accessed: 2010)

Verbruggen, A. and M. A. Marchohi (2010). '*Views on peak oil and its relation to climate change policy'.* Energy Policy 38(10): pp 5572-5581.

Vermeera,M. and Rahmstorfb, S.. (2009). '*Global sea level linked to global temperature.*' Proceedings of the National Academy of Science of the United States of America (PNAS).[online] http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf+html (Accessed: September 2010)

West Regional Authority (2010). *Draft Regional Planning Guidelines for the West Region 2010-2022*.[online] http://www.gaillimh.ie/en/media/Draft%20Regional%20Planning%20Guidelines%202010%20-%202022.pdf (Accessed: June 2010)

Whilde, T. (1986) *Galway Bay ecotour*. Corrib Conservation Centre: Rosscahill.

APPENDIX 1

Interviews and correspondence

Questions for Mr Derrick Hambleton, An Taisce, Galway Association

Date: 5th August 2010

Overview of MSc in Environmental Systems Thesis:

Investigating the long term planning framework for the protection of coastal environments and communities within Galway Bay from the anticipated implications of environmental change including climate change and oil dependency.

Broad Question, national org 26 diff groups,

An Taisce, Galway residents' group deal with Galway City applications while An Taisce, Dublin deal with County applications - due to pressure created by level of planning apps Connemara, County and City.

Nevertheless both groups monitor.

City Dev Plan submission and comment on County Dev Plan

Reference made to Climate change (CC) and Coastal Zone Management (CZM) in the written publication but suggests that in terms of activity and action little has been done in terms of reducing negative aspects of climate change

An Taisce concerned about One Off Houses (OOH) and their impact upon CC in terms of travel and car ownership. Leading to increases in production of CO2 due to burning of petrol and diesel.

OOH's impact due to Septic Tanks knock on effects Lough Corrib, Flooding, Eutrophication etc

€40million spent on additional cleansing of water due to these activities, which could have been alleviated with proper planning, development and management of Lough Corrib. This is a knock on of over development and over planning.

Docks?? 1km Causeway/New Pier (peninsula) current usage fuels, bitchumen, etc bigger docks=bigger tankers, economies of scale. He is suggesting that Cruise liners are a cover due to lack of economic benefit, passengers bussed to Connemara and don't spend money in the city. Developers suggest if liners can moor alongside a new pier then money will be spent in the city by passengers. However, Hambleton suggests that the plan is a route to increasing the amount of fuel oil from 4,500tonnes to 30,000-40,000tonnes. Same as the Betelgeuse that blew up in Bantry bay in the 70's, is this the trade we want in Galway?

In order to accommodate these ships is massive, in comparison to Nimmo's or the current Docks; this will have impacts on water movements, impacting on Ballyloughane Beach due to the clockwise movement of water in Galway Bay. Previous reports have suggested this. Planning for new docks have to take account of this and other possible impacts.

Salmon Weir, no energy collected, just Corrib levels changed

GLUAS proposers suggest providing their own energy through use of water courses and small wind turbines at either end of the line.

CK: Is there sufficient guidance in LAP CDP in relation to Climate Change?

Obviously from what we have seen, I don't honestly think it has been taken on board, all the measures to avoid or turn back flooding on coast or sea or lake or river. In 2003 he wrote to Ballinasloe TC to warn of possibility of flooding if planning for housing estates and hotel went ahead. The hotel flooded last winter. The warnings weren't heeded. RTE in contact with An Taisce to obtain copies of letters.

Lack of or too much engineering has the potential to cause flooding

Settling (attenuation) ponds for motorways to collect flood waters, are they large enough, do the have adequate outflows or too large? Only time will tell??

Political talk about the Clare and Clarinbridge rivers, which flood every year as the rivers become lakes. Between Clarinbridge and Kilcolgan the river floods due to blocking of swallow holes by black plastic. Flooding blocked the main Limerick Galway Road at this time and last year.

OPW has to put in more funds to alleviate this problem.

River Clare has flooded recently, Claregalway is a satellite town that has seen many developments housing estates, hotels, etc in recent years which were underwater the past year, "the chickens are now coming home to roost" Instead of proper planning, forward planning national dvpt strategies etc suggest that these towns should be developed to shift financial pressures from home buyers who need to work and live near Galway.

By agreement between between GCC and GCoCo an annual housing strategy was agreed, which has been exceeded in every case. Can't remember stats but suggests Moycullen 200 houses agreed =600 built , Oranmore 500=2000

No monitoring of the environment has taken place on impacts to river streams coasts etc.

Oranmore - No sewage treatment, estates still on septic tanks, potential for problems and pollution events and impact on Galway Bay still not managed (31mins)

CK – Has An Taisce done any research etc on this topic?

An Taisce has no money, unlike EU heritage/environmental NGO's for core activities. Money does come in for Green-Schools, Blue Flag and IBAL litter surveys.

But youth is one thing, it does deal with the ignorance that there is around. I.e. animal carcases dumped in rivers

An Taisce seen as anti rural and anti dvpt we want to see developments that take account of the environmental and social impacts. The policies that have been adopted see towns and villages as centres of the rural community; recently we have seen the opposite of this post offices closing etc rural towns and villages are being emptied out as economic development centres around larger centres and cities. Now thousands of people travel into Galway daily to work. They only exist in rural areas they don't live in them due to commuting time etc.

Stories about storm incidences and flooding of the long walk Spanish arch etc.

Weather has changed from stormy to wet, all year round. Leading to ground water levels increased and knock on flooding.

Changes in rainfall patterns averages are changing.

Quality of the building that has happened over the past few years has not been tested.

This has been replicated in the City and County.

Restoration of Tyrone House.

We haven't had any real storms in years, if we have a change back to stormy weather flooding and damage will occur.

An Taisce have no money all they can do is lobby.

Research needs to be done, money needs to be spent.

Insurance problems, family problems, physcological effects of flooding are terrible! Can it be avoided? Yes it can.

OPW flooding reports, funding was withdrawn, but now reallocated to complete reports on flood sensitive areas. However development continued in the absence of these reports

An Taisce Dublin made submissions to GCoCo.

Tailors Hall made submissions on the EIA process and Local Org made submissions also.

Emission Reduction? Planned and dispersed communities.

Unless we act, bad things are going to happen.

Houses built are not future proofed!!

Some Councils are better than others, attitudes are better in other counties...

Fwd: MSc Thesis on Planning and Climate Change

From:	"Jim Casey" <jim.casey@opw.ie>
To:	<G00255319@gmit.ie>
CC:	"BOLGERT" <tom.bolger@opw.ie>, <paul.walsh@opw.ie>
Date:	Friday - July 16, 2010 10:04 AM
Subject:	Fwd: MSc Thesis on Planning and Climate Change
Attachments:	Mime.822

Christina,

Thanks for your enquiry and good to talk with you yesterday.

I am glad you found the Lee CFRAM project website of interest for your studies.

In relation to the Galway Bay area we are currently working to produce preliminary flood risk assessment (PFRA) mapping for the whole of Ireland (refer eu floods directive and SI 122). However this is currently focussed on consideration of existing risk. Future scenario PFRA maps to take account of climate change are being considered and if proceeded with are unlikely to be available until latter part of 2011.

In relation to plans for a CFRAM covering the Corrib and Galway Bay area this is not likely to commence until early 2011.

The only other information we are working on of relevance is the Irish Coastal Protection Strategy Study (ICPSS) which is producing strategic coastal flood hazard and potential risk mapping for coastal areas. Whilst much of this information is has been produced in draft for the east and south coast and is underway for the west coast it does not yet incorporate the future or climate change scenario. This latter work has commenced on the east and south coast and is likely to be available by end of this year. However it will be 2011 before same information is available for the west coast.

You may also wish to contact the Marine Institute in relation to the work they are doing on the Smart Bay project and perhaps Dr. Mike Hartnett of NUI Galway who may be able to assist you further in respect of surge in this area and possible future changes.

You are probably aware also of the following 'Planning System and Flood Risk Management' guidelines which may also be of relevance:

http://www.opw.ie/en/media/Planning%20System%20&%20Flood%20Risk%20Management%20-%20Guidelines%20301109.pdf

Also the following C4i publication may be of interest:

http://www.c4i.ie/docs/IrelandinaWarmerWorld.pdf

Dr Dave Bourke, NUIG, COCOADAPT Project

Interview held on 9th August 2010

Discussed with Dave Bourke the heritage mapping and database project of Galway Co. Co.

Dave has been involved in the EPA funded project – COCO-ADAPT. It looks at potential impacts on biodiversity. But there are so many impacts, Dave is the only person working on this project in Galway so there has been no time or resources to collect real evidence or set up monitoring. Very difficult then to collate actual scientific evidence. You would need baseline data from maybe 30 years ago, to see if there are now changes from climate change but there isn't. In some countries there are baseline data to show conclusively that there are changes on where things are found, where they are moving. They are moving up higher, mountains, and higher latitudes. The timing and phenology of biodiversity are changing as a result of biodiversity. There are small increases in sea level (mm at the stage). Focus of his project was to look to the future and project using models what may happen in 50 and 100 years time. Looking at potential changes in rainfall over 100/150 years time. Working with Professor Sweeney's team and their projections. Looking at change in temperatures and what may happen plants and animals and their habitats in the future. They are looking at bad and good examples.

Some things will benefit- they won't necessarily benefit – warmer climate might actually be good for them. As in they won't be vulnerable – there won't be a risk of extinction. Other species such as Arctic Alpine plants – typically found in very high elevation areas, high mountain ranges in Europe, top of the Alps and up in the Arctic. We have a selection of those living in Ireland. We have very specific habitat conditions in Ireland that are suitable to those types of conditions – colder conditions which will be at risk in the future. If temps warm considerably plants will have to move up mountains to colder conditions that wouldn't normally live at the top of Irish mountains. These might out-compete those rarer alpine species. There is potential for loss of many habitat species in Ireland.

Are you looking at Galway in particular?

No, it's just a national project. They hope to expand it out to a lot range of a particular species e.g. from the west of Ireland across to Europe. Trying to understand the conditions a certain plant is found in across Europe. It a species is found in other places across Europe it may be an indication that species have the ability to adapt to warmer conditions/ drier conditions/ wetter conditions depending on what your climate holds. It's important to look at how these plants and animals live across Europe and further afield. But their focus in mainly on a national level. One issue of biodiversity from a planning perspective is that many of the biodiversity plans/ organisations are operating on a regional/ national scale – SACs are designated at national scale or European scale. Mismatch with local

they are supposed to do is take all that they have learned from all the separate components and implement a case study likely to be Mayo County Council at this stage and try and identify specifically the impacts that will be in that area – national scale, general kinds of impacts here and then make adaptation or mitigation recommendations in terms of how they would adapt or mitigate against climate change in their area. This is hopefully going to happen over the next 6 months. The report is meant to be delivered by the end of the year or next year. So the case study needs to be delivered at the same time.

Mentioned the lack of expertise in Galway County Council and the Biodiversity course with NUIG

It's more to do with appreciation of biodiversity and say appreciating the impacts of say construction on biodiversity. The can appreciate the damage if they understand more what biodiversity is and how important it is etc. Also allows the ecologists to understand the difficulties engineers, developers, planners have with their jobs.

Discussion

Dublin City Council has been driven by economics in terms of climate change. There is a mismatch between economic drivers and biodiversity drivers. It's more difficult for an ecologist to attached an economic value to biodiversity even though there undoubtedly is in terms of ecosystem services that biodiversity provides. In particular on the west coast in terms of water quality, water management. If we could attach an economic value then there might be a greater appreciation. But DCC is very much aware that it is within an economic zone. They have to protect against high tides as most of it is built on mud flats or salt marshes or so on. So Dublin is particularly vulnerable and would be to storm surges and so on. So the same should be done for other County Councils like Galway, Clare, Mayo that have a lot of biodiversity and natural resources.

In terms of Galway and its soft coastline – how vulnerable do you see it?

He took some students out to Tawin Island last year and gave some lectures on climate change to biodiversity – wasn't very quantitative – just wanted to show them the salt marshes and get them to think about what happens to this place in the case of 1m rise – it's totally destructive to Tawin. Not just biodiversity but to the people who live out there. The island is totally flat – no more than a 1m above sea level. From a habitats point of view the salt marshes will almost disappear. So the question he put to students is what happens – do we lose them and their species altogether – do the species and plants have time to adapt? Do they have time to move to higher elevations? Will they be able to recreate themselves in higher elevations? Certainly existing habitats would be lost. These salt marsh sites are designated as well as sand dunes etc but how much do you do? Difficult question. These

Funding – discussed the habitat mapping in Kinvara by Galway County Council and how Marie Mannion mentioned how expensive it was, even though it was very worthwhile.

Dave felt that funding was being cut everywhere. The budget of NPWS was cut by 40%. Of the total budget 60% was fundamental to funding staff, resources etc while the other 40% was for projects, research etc. While the EPA have advertised funding these have been very specific and mostly scoping studies – not really full projects. They just want short snappy projects that give them recommendations. Not funding full scientific projects where you go out and gather real evidence, real data. They are more about reviews.

The COCO ADAPT project is hoping to identify specific species that will require special protection and they hope to make recommendations in their report and prioritise. They will try to rank species in order of most vulnerable to least vulnerable however; many will be subject to change. For example wetlands and peatlands in a drier climate will be very vulnerable. These are very important in terms of the eco services they provide. For example wetlands for carbon storage, water management - free services. If boglands are lost it will be a huge cost to the Irish Government. Another example is pollination – worth X billion to the world economy every year – food, agriculture.

Interview with Dr. Margaret Desmond, EPA

Date: 8th July 2010 @12pm @ UCD

Questions

1. **As lead author of publication Current State of Knowledge on Climate Change Impacts – could you please discuss the key impacts for coastal areas i.e. sea level, storm surges, precipitation. Discuss the evidence and projections in particular.**

EPA does not investigate the science – they take the science from what is available and have included them in their report. Question of 1m sea level increase which came up at the conference and was asked by the same person a year ago, in Ireland it can be difficult to calculate but these are the figures that we are going with. Apart from the Marine Institute MD is not aware of who else would be doing the calculations. So if they come out with a report on those changes, they will update their report. If you want to dig deeper into these figures, you will need to talk to the Marine Institute. EPA do not commission this type of work. Glen Nolan, Marine Institute, is a good person to talk to about sea level increases. They have a new report out with figures on sea level rises. But they would have seen the EPA report and would stand over those figures.

2. **Have any studies been carried out of vulnerable areas?**

In my own experience I have been looking for mapping/ detail on coastal vulnerability and there does not appear to be any work done.

OPW have been doing some coastal work – coastal mapping. Not sure if they have completed mapping for the entire coast but have definitely finalised for east and south coast. Worthwhile talking to them and Jim Casey, OPW. He is the main person responsible for coastal mapping and flood risk mapping. But it is correct. You need to first see what the impacts are and then how vulnerable you will be. For MD to make any sense, you need to do an impact assessment, looks at the state of your environment, baseline and from a climate perspective, is it vulnerable, is it at risk? If you don't know that, how can you make an informed decision? Nationally we do not have a vulnerability assessment but is aware that there is a knowledge gap. EPA have a research call out at the moment - it is a first stab at establishing what our national vulnerabilities are so the idea is to just carry out a desk review, gather up all the literature, have a stakeholder consultation on what the key areas of vulnerability are and to focus on in the short term. MD's main feeling is without pre-empting the study is that the main vulnerability will be water and in terms of areas it will be geographic/ coastal areas. These would be the key areas along with critical infrastructure. These are all intertwined which is the critical thing. That piece of work won't commence until September but would hope to have results then within a year. So that will be good and will form part of the building blocks. It will provide support for building of policy. Ireland needs to know where to focus on. Ireland isn't the only country to go through this process.

will also feed into the thinking which is going on in the Department. So support Govt quite a lot as they have a good range of expertise in this area. Tara Shine is doing a lot of work on the international side of things on climate change for years so she is very familiar with what is happening on the international scene, UNFCCC. Also working with the Developing Nations so its valuable experience to bring back into the unit, able to incorporate her views and send it on. Interesting thing is that the Developing countries are much further advanced in terms of climate change which is an irony due to their circumstances where they have had to do something. They are already being severely impacted and have had to develop national adaptation plans and have all been required to them if they want to access funding. The work going on in these countries which Tara experienced is very good in adapting and so is a very good resource.

EPA are not the only people they consult with. Once the Framework comes out then that will go to consultation. To date they have been gathering a lot of information from stakeholders including industry

6. **In terms of my own experience, it would appear that Galway County Council's Development Plan contains very generic planning policies. What types of policy do you envisage being developed? What about Coastal Zone Management and the SEA Process? Any cases studies from their own research?**

It is very sparse. Try to understand where the impacts and adaptation research – look at a continuum of where research has evolved in the last 10 yrs, even 20 yrs has to how climate change has evolved. Started back 20 yrs ago with the basic science – trying to figure out what was happening in the atmosphere, looking at basic parameters around GHGs and emissions and how this was affecting the atmosphere. Started to understand from that what was happening within climate – it was heating up. More precipitation, increased sea levels occurring, extreme events occurring, more intense – a lot of money went into that research. So the last 10 years a lot of money has went into impacts. EPA funded NUIM to look at indicators and impacts in other sectors. Done a lot of work on the impact to water and more recently impact to water at a catchment level. They have been bringing down the resolutions to a much finer detail to try and get much more localised effects. Research still happening in effect but is moving more into vulnerabilities and adaptive capacity and into adaptation options. Still a lot of gaps that need to be filled. But within this continuum the background science is still ongoing but you will never know enough science. In the meantime there is now a shift in funding towards understanding capacity and vulnerability and adaptation options. The next stage for EPA to be considering would be costing. EPA know nothing on costs of impacts, or the costing of adaptation options and its is something that other countries are starting to think about but hasnt been really developed. For example, in the UK they are doing a national cost benefit analysis but is a year away from completion because a lot of issues around methodology – how you cost for uncertainty, costing for 50-100 years into the future, so a lot of issues going on there. This is the way MD sees research going. MD has been in the unit for 1.5 years and before that there was no dedicated person in the unit. Internationally there was no push for this type of work. AR4 and the report on Vulnerabilities and Adaptation has put a push on actions and groups like the EPA. We had

Questions for Professor John Sweeney, ICARUS, National University of Maynooth

Date: 9th July 2010

Overview of MSc in Environmental Systems Thesis:

Investigating the long term planning framework for the protection of coastal environments and communities within Galway Bay from the anticipated implications of environmental change including climate change and oil dependency.

Current State of Knowledge on Climate Change for Ireland (EPA, 2009)[1]

***Biodiversity**: This is a measure of the ecological health of natural systems. It represents the degree of genetic variety and the degree of resilience of the system. The main climatic drivers for change are precipitation, temperature and extreme weather, which impact on soil condition, plant growth and animal welfare.*

***Coastal and marine resources**: Sea-level rise is a major issue for coastal zones, including urban, agricultural and natural systems. However, more dramatic impacts will be felt due to increased storm intensity and surge.* (Chapter 3 Sectoral Impacts: Current State of Knowledge, p.7)

European Policy – Energy and Climate Change Package, 2007

Commitments:

- 30% emission reduction target by 2020 compared to 1990 levels, providing that other developed countries did the same
- A firm and independent commitment to achieve at least a 20% reduction by 2020 based on 1990 levels
- 20% of energy consumption to come from renewables by 2020
- A further objective to reduce emissions by 60-80% by 2050

Questions for Professor John Sweeney

1. **What are the most up-to-date climate change projections for Ireland?**

Sea level increases 0.5/1m or 3.2mm/year

JS: Ray Bates is very conservative. Most up to date projections are those published by ICARUS a couple of years ago Refining the Impacts – using a mixture of 3 global climate models and taking the best results to downscale them for Ireland. What they came up with was a range in increases in temperature ranging from 1.5 to 2 degrees by 2050 as opposed to the 1961-90 levels and changes in rainfall which confirm earlier work that winters are likely to get significantly wetter; and summers are likely to get significantly drier as well especially in the east and south. Those kind of findings confirm the earlier work also of Met Eireann's team C4I who use a different approach, using regional

[1] EPA, 2009, 'Climate Change Research Programme (CCRP) 2007-2013, Report Series No. 1', 2009

we often have, when the NEO is positive we can get extremely wet conditions in places like Gort and around the eastern side of the Bay itself. So the flood problems are going to be considerably enhanced in that region as a result of that. Equally so in the summer time the drier summers will probably be less of a problem for the Galway region and for places for example further to the east and so means that impacts for example agriculture in the Galway Region will perhaps be less than they would be in many other parts of Ireland. So while we are worried about for example agriculture impacts in terms of growing potatoes and some other crops in the east here, they will do relatively well west of the Shannon where there will be that extra winter, well relatively more moisture in the summer than exists in the east. Agriculturally – it's a region that won't do too badly. In the end we would expect to see for example maize becoming quite prevalent in the Galway Region.

Apart from the floods the other issue that is important other than drier summers, is the effect of sea level rise and the increase or decrease in storm surges. They do expect sea level to rise between 0.5 and 1m. The estimates that were published in the IPCC Report were in the 0.5m range and the estimates have been falling for the past few years but they have now become to stabilise and more recent suggestions are that we might get up to 1m. And its recognised that the IPCC sea level rise estimates were rather conservative – they left out what might happen in Greenland and Antarctica (as they weren't sure) but the expectation is that we can get anything up to 1m. It doesn't too much but in any areas of soft coastline it means the potential energy of wave attack will be increased and for Galway Bay, again the softer coastline, as in the interior of the BAY, may well therefore suffer regression just like further north in Clew Bay for example where the drumlins in Clew Bay may be more aggressively eroded on the seaward side as sea level increases. There are parts of the Galway Bay area especially that are vulnerable to increase and coastal flooding but what is not clear is and here there is a great deal of uncertainty is how much storm surges will change in that part of the world. It's fair to say that the jury is still out on whether a warmer Ireland will be a stormier Ireland or not, and there are 2 reasons for that:

1. We do expect that when the earth gets warmer, especially at the Poles, there is less need for storm activity to drive heat from the equator to the Poles so storming should decrease on a warmer world because of that and indeed the storm tracts should move north away from Ireland.

2. As the ocean gets warmer it has more energy to release and therefore potentially could have more in the way of storm generating capacity.

These are 2 things which may cancel eachother out. We don't really know but nobody as yet has come to terms with which of the two are dominant so it's not really up to anyone to say that we're going to get increased storm surges in the Galway Bay area yet. But it is a Bay area and because of its configuration concentrates wave attack in the interior of the Bay just like a funnel so if we were to get increased storm surges it would enhance that erosive capability. It's one of the most intensely monitored bays in the world at this stage with SMART Bay and monitoring streams all over the place in the bay and any changes in frequency will be detected fairly quickly as a result of that. But certainly if it was to show signs of increased storm activity plus increased sea level then there would be perhaps a question of looking at infrastructure and looking at where exposed infrastructure along the coast may be effected and maybe to take protective measures there but at this stage it makes no sense to start defending the coastline around Galway Bay outside of the City against increase wave attack because it is simply not just cost beneficial to do it but it may that there are areas close to the city where there is very high value real estate where it is exposed there may be a case for more protective measures. But in his opinion it's too early to take those steps just yet, need to wait and see

which should be really addressed. Now there are for example a number of planning recommendations which have been adopted by local authorities, for example in the case of Dublin, he thinks the plan is to take storm surge of about 2.9m onto the sea level, onto the 100 year high level and restrict development below the contour line that that results in and that basically the once in a century event which is being used – he thinks this is very sensible. LAs have to start thinking in terms of the probability of inundation on that kind of frequency because infrastructure or settlement is generally going to be something that around in a century or several decades so you have to take a more long term strategic view and that will be the crunch issue for LAs in terms of planning, especially urban areas. Flooding in rural areas and flooding of agriculture land is not too critical at the moment in terms of the loss in value relative to the cost of defending it. For the urban areas, a much more strategic longer term view is necessary. There is a lot of elaborate wave climate modelling going on at the moment; there is lot of elaborate analysis of coastal sediments going on so he thinks LAs are starting to come to terms with it but it is simply incorporating all of this into a coherent climate change adaptation plan that still has to take place and of course that involves authorities that may be competing with eachother for development; involves authorities trying to get infrastructure like sewage works in Galway Bay for example into position, involves issues of roads, railways and so on; so he thinks there is a long way to go there but he thinks there are signs that people have begun to waken up to the fact that adaptation is going to be essential for areas to remain competitive in the future and in the coastal zone in particular is coming under so much pressure from both development from housing, industry and from tourism that he thinks it is essential that it is treated with a high degree of sensitivity in planning in the years ahead more so than perhaps it has in the past.

8. **With regards to local authorities and the developing of planning policy to manage environmental change, what has current research determined by way of progress?(Jackie McGloughlin)**

The driver at the moment is that there has been a European White Paper on Adaptation. There is preparation of an Irish Government White Paper on Adaptation which will come after the Climate Change Bill has been passed hopefully at the end of the year. At the moment some LAs are taking the bull by the horns, and are quite well established with climate change strategies e.g. North Riding in Tipperary is the one which stands out as being one of the better ones. Others may have a problem in that they may lack the expertise in personnel and in particular the resources to devote to it and is a problem that affects many local authorities. But the thinks there are signs of movement taking place – he thinks the LAs will ultimately only really move significantly once they have guidance and some direction from the Dept of Environment. He thinks what is going to happen there is the Dept is going to simply us the Climate Change Bill regulations to give that kind of straight jacket to local authorities to put more backbone into the SEA procedures and Dev Plan procedures and that's how he sees them being galvanised into action – really has always from above than below. So he thinks that we will see after the turn of the year LA s taking the problem much more seriously than perhaps they have been up until now. But having said that there are some really good LAs who have set up joint committees among the various divisions who have banged heads together in terms of solutions to particular problems - The engineers, the water engineers, the tourism people maybe are at loggerheads over. So there are some good things happening. But for many they are waiting for guidance from above. The Regional Planning Guidelines for example don't say very much about climate change; the NSS said absolutely nothing about climate change so there is a certain reluctance on the part of LAs to take on things they are not obliged to in the present straightened financial situation they are in. It will really only be when the current climate change bill passes. When that bill passes there will be an office of

10. Given Ireland's emission reduction targets of 20% by 2020 under EU policy, do you consider current land use planning and transportation policy to be effective in accommodating this low carbon environment having particular regard to existing and planned coastal communities?

He thinks there are 2 emission limitation criteria; the first one being the UNFCCC Kyoto one which is the 13% increase by 2012. The recession means that we will comply with that without having to buy extra quota which gives the Exchequer several hundred million a year which they had actually been earmarked by the emission quota from, he thinks one of the Eastern European countries but it is much more difficult to reach the 20% reduction value – that entails a much more draconian change in the way we organise society. And of course if there is an agreement, which is very unlikely now at either Cancun or South Africa the following year then 30% becomes the target and even more difficult to reach for Ireland. We have shelled off a lot of our emissions into the ETS system now so the fight is a very simple one to attain that value. It is a fight between cars and cows in a nutshell. That means that we have to perhaps tackle both of them. Of the two, the agricultural one is going to be an almost impossible one to come to terms with – there are very few options available in agriculture apart from changing feedstocks and so on. They can certainly reduce emissions in agriculture but its doubtful whether you can reduce it by 20/30% so a lot of the hard reality comes from the need to reduce vehicle emissions. Now land use transportation policies have traditionally in Ireland lacked a coherence in terms of integrating planning along those lines. They have looked, for example in the Greater Dublin region at landuse models of change for the Dublin region using a model called Moland which is a GIS model which shows projected changes in the urban landuse and they have tied that to the POWCAR data from the census (Place of work records) and have estimated that if in the Dublin region alone there is no coherent land use policy to produce a compact city future as opposed to a dispersed city future then the emissions increase would be around 30% from transport alone though there is quite a capacity for going really bad wrong if we don't have a tight landuse planning strategy. He thinks we have failed to enforce a proper rural settlement strategy in Ireland over the past 20 years. There has been a lot of talk about RPGs and of gateway towns and growth poles but underneath it all the growth in rural housing, once off rural housing has been huge and has continued relatively unabated in many counties such as Galway, Meath, Kildare and has run amuck in counties such as Monaghan and Laois so there is an urgent need to stop that getting completely out of control elsewhere in the island and if nothing else because socially it is very undesirable if you look 30 yrs down the road the impact of a car-less society – the impact of old people stranded without public transport in remote locations – the cost of providing services even energy, power, day to day living services like health services, even food, it is hugely inefficient to do it that way and by being hugely inefficient we also mean its extremely expensive in terms of CO2 and emissions. There is an urgent need to tackle that problem now. We haven't really grasped the nettle there, he doesn't see any signs politically that we are going to overcome that problem without a great struggle. He thinks there will be mechanisms to enforce the RPGs for example, which may assist that mechanism, such as a tightening of the septic tank requirements for example will help. There may even be mechanisms such as taxation. He thinks we cant victimise genuine cases where people live and work in the country and he thinks we have to encourage a vibrant rural community and he is very much in favour of that but at the same time we cannot encourage long range commuter developments which are car dependent. We have seen the folly of doing that in the past 20 years so he thinks that is where the discrimination has to come and he doesn't think we have grasped the nettle there yet because our decisions on land use policy are made at local level and they respond to local pressures; they respond

Interview with Marie Mannion, Heritage Officer, Galway County Council

Location: Galway County Council Offices

Date: 2nd July 2010 at 10:00

Overview of thesis:

Investigating the long term planning framework for the protection of coastal environments and communities within Galway Bay from the anticipated implications of environmental change including climate change and oil dependency.

Current State of Knowledge on Climate Change for Ireland (EPA, 2009)[1]

***Biodiversity**: This is a measure of the ecological health of natural systems. It represents the degree of genetic variety and the degree of resilience of the system. The main climatic drivers for change are precipitation, temperature and extreme weather, which impact on soil condition, plant growth and animal welfare.*

***Coastal and marine resources**: Sea-level rise is a major issue for coastal zones, including urban, agricultural and natural systems. However, more dramatic impacts will be felt due to increased storm intensity and surge.* (Chapter 3 Sectoral Impacts: Current State of Knowledge, p.7)

Questions

1. **Given the current state of knowledge on climate change for Ireland, what policies or actions are Galway County Council (the Council) pursuing to mitigate and adapt to such projected changes?**

CK: Indication of 3.2mm/ year (30cm/100 yr) EPA conference (30th July 2010). In addition to storm surges, extreme weather events.

MM: From heritage perspective the Council is undertaking a coastal audit of the whole county and part of it includes the climate change issues. Reason for doing it is to have a one stop shop for all the information and data sets - in order to deal with environmental change/ climate change '*you need to have knowledge and knowledge is power*' . From heritage perspective the one stop shop will collate all the information and see where the gaps exist. The Council has Compass Systems working for them with 5 other local authorities looking at data sets and whats available. From heritage perspective, 95% of heritage – archaeological and built heritage along the coast is unknown. Reference to Michael Gibbons article in Irish Times[2] uncovered recently a lot of information (crannogs) up near Carna, Paul Gosling, GMIT is working on Island Eddy and has come across a lot of undocumented archaeology. For the council, the first stage is collation of data and to know what we have. In order to prepare yourself for climate change, if you do not know what you have, then how do you know how to deal with it. So looking at datasets, gaps and part of the process Council hopes to take study to applied level where the Council will test various parts of the coast to see what it

[1] EPA, 2009, 'Climate Change Research Programme (CCRP) 2007-2013, Report Series No. 1', 2009
[2] http://www.irishtimes.com/newspaper/ireland/2010/0629/1224273556107.html

projects the council are doing – while not specifically for climate change will all trickle down to that. Once again, it all goes back to information.

3. **With regards to the coastal communities around Galway Bay what is the preferred defence mechanism being considered by the Council – natural defence or engineering solutions?**

Basically it is Kevin Finn, coastal/ marine person who deals with this in engineering. But the question is too generic. Its on a cases by case basis. MM was previously involved with a local group in Roundstone on coastal defences, where the LA assisted where they got substantial funding from them and Govt agencies including the heritage council, where there was an active community there who started work themselves and if you look up at Inisboffin at the gabions. Suggest we talk to Kevin Finn, it is site specific. See what the needs and wants are and look for the best solution. It also has to be cost effective. Its not just a general engineering solution, it has to be site specific. Roundstone was a community initiative and Joe Rafferty is the name of the person out there to contact. Joe Rafferty, Yellow House, Roundstone. They produced a lot of documentation.

4. **Is there a Coastal Zone Management Policy in place for Galway Bay?**

Council has a policy in the Development Plan - Coastal Zone Management Policy which is in there. Would need to speak with Anton to get the full picture. You need to take full cognisance of whats happening and the most available information. You would have to look at the whole climate change issue. The reason for the coastal audit is that one informs the other. A lot of stuff in Galway – Heritage Plan, Biodiversity Plan are subsets of the County Development Plan. They are very big in terms of information gaps and making informed decisions. The more information that is available for people to make informed decisions is the better. The coastal audit will provide quality information to feed into overall CZM Plan.

5. **Considering the rich built heritage inherent to Galway Bay, how will the Council manage the protection and conservation of these valuable sites having regard to the impacts of Climate Change?**

First thing is the 95% of the built heritage of the coastal area is not known. So the first step will be when Compass come back to the Council will be to even just listening to people on the ground will be important. You cant save everything but look at what have we got, what is most vulnerable, and the most unique or rare and then prepare policies out of that. But if you don't know what you have got its hard to protect. But have very good policies already there.

6. **With regards to the outstanding and diverse natural heritage of Galway Bay, how is the local authority ensuring its conservation from the anticipated impacts of climate change?**

Telephone Conversation with Paul Geoghan, SMARTBAY, Marine Institute

Thursday 22nd July 2010

Asked Paul what information was being collated in terms of climate change

Paul is involved in a Pilot study which received PRTLI Award which is for certain work programmes at GMIT, NUIG

Climate Change research ongoing at Mace Head , Carna – there is a buoy out there monitoring levels of CO_2 in the sea (contacts Jevon Keane/ Brennan with Colin O'Dowd.

Storm surge data is being collated on a regular basis in terms of heights etc.

Tidal gauges are used – datasets for the last 2 years have info on wave heights, salinity. Some problems with data.

NUIG are using a high resolution model of Galway Bay using radar – not just point locations (contact Mike Hartnett, NUIG). This project should be erecting station monitor of waves at Mutton Island and Spiddal

Current modelling forecasts – 7 day period.

No sea level projections just yet.

Questions emailed to Mr Anton Martens, Planning Officer, Galway County Council

Date: 2nd July 2010

Email responses received 29th July 2010

Overview of MSc in Environmental Systems Thesis:

Investigating the long term planning framework for the protection of coastal environments and communities within Galway Bay from the anticipated implications of environmental change including climate change and oil dependency.

Current State of Knowledge on Climate Change for Ireland (EPA, 2009)[1]

***Biodiversity**: This is a measure of the ecological health of natural systems. It represents the degree of genetic variety and the degree of resilience of the system. The main climatic drivers for change are precipitation, temperature and extreme weather, which impact on soil condition, plant growth and animal welfare.*

***Coastal and marine resources**: Sea-level rise is a major issue for coastal zones, including urban, agricultural and natural systems. However, more dramatic impacts will be felt due to increased storm intensity and surge.* (Chapter 3 Sectoral Impacts: Current State of Knowledge, p.7)

European Policy – Energy and Climate Change Package, 2007

Commitments:

- 30% emission reduction target by 2020 compared to 1990 levels, providing that other developed countries did the same
- A firm and independent commitment to achieve at least a 20% reduction by 2020 based on 1990 levels
- 20% of energy consumption to come from renewables by 2020
- A further objective to reduce emissions by 60-80% by 2050

Questions for Mr Anton Martens

The comments below relate mainly to Forward Planning, which deals primarily with land use plans.

1. **Given the current state of knowledge on climate change for Ireland, what planning policies or actions are Galway County Council (the Council) pursuing to mitigate and adapt to such projected changes?**

The Galway County Development Plan (GCDP) 2009-2015 includes a number of policies, objectives and standards to deal with climate change across a range of sectors, including planning, transport, infrastructure, energy, heritage, coastal development, etc. This includes policies and objectives in relation to private developments and the public investment and activities carried out by the County Council.

[1] EPA, 2009, 'Climate Change Research Programme (CCRP) 2007-2013, Report Series No. 1', 2009

environmental protection, etc. DM Standard 39 of the GCDP provides guidance in relation to coastal management and protection.

5. **Conversely, in terms of dispersed rural communities located along the coast of Galway Bay, for example Tawin Island, how will current planning policy allow for protection of existing infrastructure such as housing, roads, utilities, piers, harbours etc.?**

The GCDP includes policies and objectives in relation to dealing with climate change, reducing emissions, undertaking flood risk assessment, promoting smarter travel, providing and protecting infrastructure, etc., all of which will contribute to the protection of existing infrastructure in the County. The GCDP also includes objectives in relation to preparing coastal zone management studies for the coast and islands. DM Standard 39 of the GCDP provides guidance in relation to coastal management and protection. Where specific issues arise in relation to existing infrastructure, these would be dealt with either through the Road Design Section (Marine), local engineers or other agencies outside of the County Council.

6. **How effective are current Coastal Zone Management Policies for Galway Bay in terms of protection and management of anticipated impacts arising from environmental and climate change?**

The GCDP includes broad policies in relation to coastal zone management (CZM) in the County, objectives in relation to preparing coastal zone management studies for the coast and islands and standards in relation to coastal management and protection. These studies would improve the information base, guidance and effectiveness of coastal protection and management. It should also be noted that the existing CZM policies for Galway Bay are fragmented between different local authorities and other agencies and it is likely that there would be greater effectiveness through a joint CZM study and strategy for Galway Bay dealing with the varied and complex issues around climate change, coastal flooding, coastal development setbacks, integration of social, economic and environmental issues, etc.

7. **How have current Development Plan objectives and policies been evaluated in terms of mitigation and adaptation to environmental and climate change?**

A Strategic Environmental Assessment (SEA) was undertaken as part of the preparation of the GCDP, which includes considerations in relation to climate change, flooding, energy, emissions, etc. The SEA recommended a number of mitigation measures, which have been included in the GCDP where appropriate.

8. **Given Ireland's emission reduction targets of 20% by 2020 under EU policy, how does current land use planning and transportation policy accommodate this low carbon environment having particular regard to existing and planned built-up and dispersed communities within Galway Bay?**

Telephone call with Kevin Finn (KF), Engineer, Galway County Council, Roads and Transportation, 16th July 2010

Explained that I spoke with Marie Mannion, Heritage Officer and that she suggested I speak with KF with regards to the coastal environment.

Asked KF what research/ studies are being carried out in terms of project climate change impacts such as sea level increases for the mid to end of century.

Local authorities don't have much money and more like facilitators in that they facilitate Department of Community, Equality and Gaeltacht Affairs projects, for example, on the Aran Islands and Inisboffin. In this project they were asked to look at harbour development. This would critical for tourism, their livelihood as 99% of person pass through use the harbour and ferry.

Another example is the project at Inis Mor which almost 80% complete. This is a capital project using computational and physical modelling. The project is being carried out by specialist consultants. The criteria for the project includes designing for 50 years, therefore some predictions in terms of sea level increases must be included in addition to 1 in 20 year storms. The consultants (HR Wallingford) used are based in Wallingford, England and they would have the expertise in research and predictions ('probably copy and paste into report'). So there is some cognisance of climate change. However there have been no specific studies/ research done to date on the coast in terms of performance for next 50 years.

The projects are more specific to areas and the Islands would be the case examples where impacts are examined and what structures need to be put in place.

Previously KF was involved in the Roundstone Study in 2004. It was supported by Interreg. The report was on a granite island which was separated by a sand tombola which had been breached. The method used was a soft/semi-hard rebuilding of sand dune. It included use of sheep fencing (4ft) high being built. The report also looks at some aspects of erosion.

Again, projects are on a case by case basis.

LA has certain responsibilities in terms of policies and therefore liaise and work with other agencies such as the OPW.

Application for Inis Meain development had to go through Strategic Infrastructure process and had to consult with over 30 agencies when writing the EIS – was extremely frustrating and there was no alignment with NPWS etc. However at a more Macro level, this seems to moving more towards realignment with other agencies.

KF refers to the Corporate Plan 2009-2014 (NB this is unavailable on web) which looks at planning.

To meet with KF Thurs 22nd July @ 2.30pm to go through documents and see what can be copied etc.

KF noted at the **meeting 22nd July 2020,** that there is a marine department within Galway CoCo but only one person working there at the moment. There used to be up to 3 persons but given the Councils budget not at the moment. They are mainly dealing with repair works of existing structures. Galway CoCo has no money at the moment.

Telephone Conversation with Jackie McGloughlin, NUIM

Monday 19th July

Jackie's Findings from PhD on local authority capacity

JMG: Felt that Galway CoCo was a little bit worse than other LAs in terms of dealing with climate change. Maybe they have other challenges though.

JMG talked about Development Plans and that they were not being monitored in implementation.

JMG mentioned Dublin City Council and how they are looking into sustainability a lot. Ref Dick Gleeson

Key drivers – SEA process, public opinion

Look at the RPGs and OPW work

Dev Plan is a strategic document – Local authorities need to demonstrate synergies with sea level increases, critical infrastructure

Also need to remember that not all politicians subscribe to climate change theories

Look at best practice in UK, New Zealand. Mitigation in Scotland

Check IPCC website for Adaptation Plan for different countries

Noted that sometimes a good way of speaking to Local authorities is through their energy manager.

Good reference for SEA and Development Plans – Gonzalez Phd, DCU

Check out if Council have started drafting their next Dev Plan.

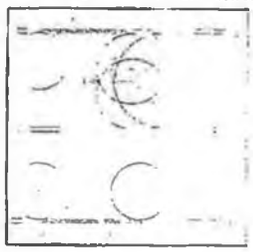
Jackie to finish PhD by the end of the year.

APPENDIX 3

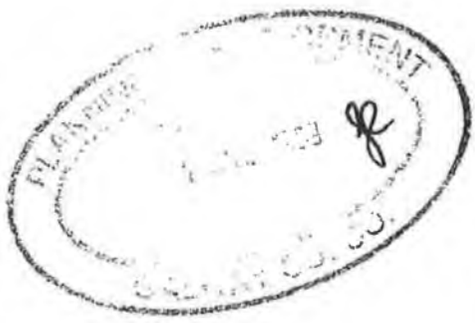
Planning Application Information

Our Ref:PL 07.106095
P.A.Reg.Ref:97/1952
Your Ref: Oldenway Limited

An Bord Pleanála



R.G. Greene & Associates,
4 & 5 New Docks,
Galway.



21 OCT 1998

Appeal Re: Mixed development - retail units,offices,supermarket,8 apartments, treatment plant,car parking,site works and free standing signage. Carrowmoneash and Millplot, Oranmore, Co.Galway.

Dear Sirs,

An order has been made by An Bord Pleanála determining the above-mentioned appeal under the Local Government (Planning and Development) Acts, 1963 to 1998. A copy of the order is enclosed.

Yours faithfully,

Maura Shehabeddin
Clerical Assistant

Encl:

NA 102
(LG)

Floor 3, Block 6
Irish Life Centre
Lower Abbey Street
Dublin 1

Tel: (01) 872 8011
Fax: (01) 872 2684
web:http//www.pleanala.ie
email:pleanala@indigo.ie

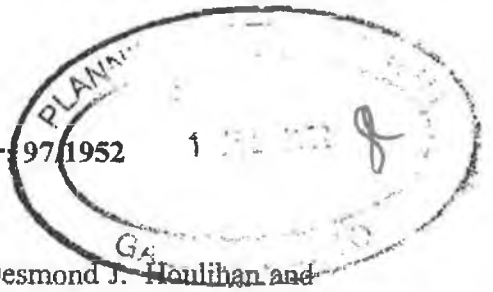
Úrlar 3, Bloc 6
Lárionad Irish Life
Sráid na Mainistreach Íochtarach
Baile Átha Cliath 1

AN BORD PLEANÁLA

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1998

County Galway

Planning Register Reference Number: 97/1952



APPEAL by Thomas and Maureen Macken care of Desmond J. Houlihan and Company of Salthouse Lane, Ennis, County Clare and by Oakfield and Ashbrook Residents' Association care of Mary Smyth of 32 Oakfield Estate, Oranmore, County Galway against the decision made on the 26th day of February, 1998 by the Mayor, Aldermen and Burgesses of Galway to grant subject to conditions a permission to Oldenway Limited care of Simon J. Kelly and Partners of Corrib Castle, Waterside, Galway for development comprising retail units, offices, supermarket, eight number apartments, treatment plant, car parking and ancillary site works and free standing signage at Carrowmoneash and Millplot, Oranmore, County Galway in accordance with plans and particulars lodged with the said Corporation:

DECISION: Pursuant to the Local Government (Planning and Development) Acts, 1963 to 1998, it is hereby decided, for the reason set out in the First Schedule hereto, to grant permission for the said development in accordance with the said plans and particulars, subject to the conditions specified in the Second Schedule hereto, the reasons for the imposition of the said conditions being as set out in the said Second Schedule and the said permission is hereby granted subject to the said conditions.

FIRST SCHEDULE

Having regard to the commercial/residential zoning of the site, it is considered that, subject to compliance with the conditions set out in the Second Schedule, the proposed development would not be prejudicial to public health, would not seriously injure the amenities of property in the vicinity, would be acceptable in terms of traffic safety and convenience and would, therefore, be in accordance with the proper planning and development of the area.

SECOND SCHEDULE

1. The proposed on-site treatment plant shall be omitted. The entire development shall be connected to the public sewerage facilities in accordance with the requirements of the planning authority and before any part of the proposed development is first occupied.

   Reason: In the interest of public health.

2. Before development commences, details of the following matters shall be agreed with the planning authority:-

(a) All external finishes.

(b) Surface water disposal.

(c) The surfacing and marking out of the car parking spaces which shall be completed to the satisfaction of the planning authority. The car parking spaces shall be available for use on the first occupation of the development.

(d) All external illumination on the building and within the site.

(e) Measures to be taken to protect the existing trees along the western site boundary during the construction phase on the site.

(f) The dense screening of the north-eastern and south-western site boundaries.

(g) Front (south-eastern) boundary treatment including the provision of a 900 millimetre high stone wall and a landscaping strip behind it.

(h) Finishes to the proposed pedestrian walkway to the entrance as shown on drawing number 1496-PA/02.

(i) A refuse containment area accessible to all uses on the site.

Reason: In the interest of visual amenity.

3. Other than the two free-standing signs shown on drawing number 1496-PA/02 and detailed on drawing number 1496-07, no other signs or logos shall be erected on the building or within the site which would be visible from public areas outside the site, without a prior grant of planning permission.

Reason: In the interest of visual amenity.

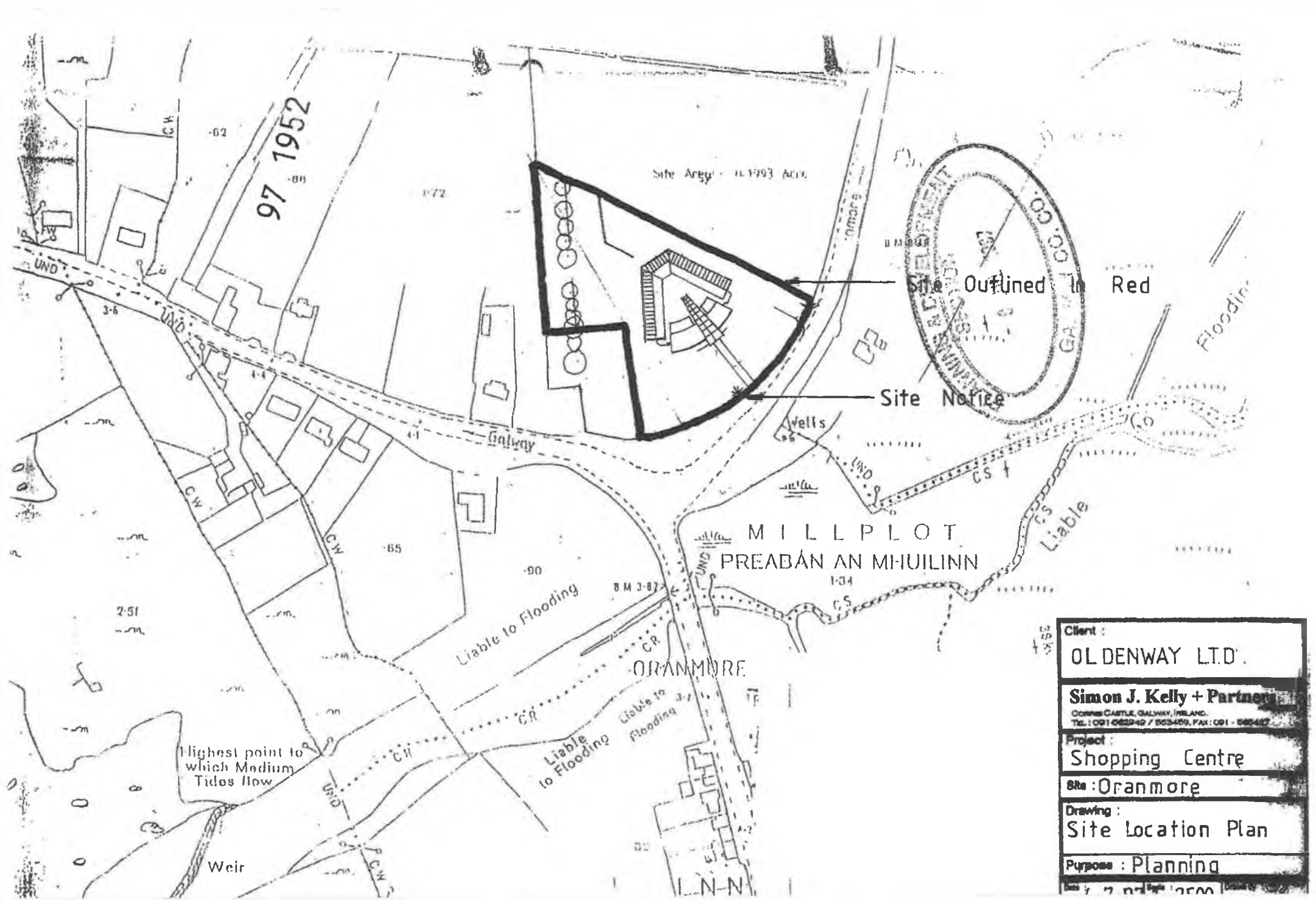
4. The developer shall pay a sum of money to the planning authority as a contribution towards expenditure that was and/or that is proposed to be incurred by the planning authority in respect of the provision of works which have facilitated the proposed development. The amount of the contribution and the arrangements for payment shall be as agreed between the developer and the planning authority or, in default of agreement, shall be determined by An Bord Pleanála.

In the case of expenditure that is proposed to be incurred, the requirement to pay this contribution is subject to the provisions of section 26(2)(h) of the Local Government (Planning and Development) Act, 1963 generally, and in particular, the specified period for the purposes of paragraph (h) shall be the period of seven years from the date of this order.

Reason: It is considered reasonable that the developer should contribute towards the expenditure that was and/or that is proposed to be incurred by the planning authority in respect of works facilitating the proposed development.

Member of An Bord Pleanála
duly authorised to authenticate
the seal of the Board.

Dated this 20th **day of** October. **1998.**


Site Outlined In Red
Site Notice
MILLPLOT
PREABÁN AN MHUILINN
ORANMORE
Liable to Flooding
Highest point to which Medium Tides flow
Weir
Galway
Wells
Client :
OLDENWAY LTD.
Simon J. Kelly + Partners
Project :
Shopping Centre
Site : Oranmore
Drawing :
Site Location Plan
Purpose : Planning

An Bord Pleanála

PLANNING AND DEVELOPMENT ACTS 2000 TO 2004

Galway County

Planning Register Reference Number: 03/5413

An Bord Pleanála Reference Number: PL 07.209434

APPEAL by Martin and Mary Conconnon, Kathleen Davis, Martin Byrne and Colin and Mary McDonagh care of Percy Podger and Associates of French Furze House, Kildare, County Kildare and by White Cedar Developments Limited care of A. P. McCarthy of Block 1, G.F.S.C., Moneenageisha Road, Galway and by others against the decision made on the 30th day of September, 2004 by Galway County Council to grant subject to conditions a permission to the said White Cedar Developments Limited in accordance with plans and particulars lodged with the said Council.

PROPOSED DEVELOPMENT: Town Centre mixed use development to include a shopping centre, creche, retail, commercial, hotel, bar, restaurant, office development (13,438 square metres), a museum (2,874 square metres), 310 residential units comprising 102 number townhouses, 83 number apartments and 25 number duplex units in 18 blocks, varying from two to three and four storey with penthouse level and basement or part basement with ancillary carparking, stores, plant and bin stores, a school (1,418 square metres), gallery with retail crafts studio's (1,264 square metres) single to two-storey in height. Change of use from residential to office of dwelling at Main Street/Kelly's Lane corner. Demolition and new two-storey extension at rear of McDonagh's Pub (a protected structure). Demolition, alterations and extension including change of use to 18 bedroom hotel and ancillary bar, restaurant and service areas at Oranmore House (a protected structure). Demolition of a dwellinghouse at Main Street. Ancillary civil engineering waterfront promenade, re-routing of existing drainage and road works with roundabout south of the bridge including all ancillary carparking, site and external works at Innplot townland and Oranmore Townland, Oranmore, County Galway (as revised by further notice received by the planning authority on the 5th day of May, 2004).

DECISION

GRANT permission for the above proposed development in accordance with the said plans and particulars based on the reasons and considerations under and subject to the conditions set out below.

REASONS AND CONSIDERATIONS

Having regard to the zoning objectives for the site, part of which is designated for village centre/commercial uses, and its location contiguous to the existing commercial centre of Oranmore, it is considered that, subject to compliance with conditions set out below, the proposed development would not seriously injure the amenities of the area or of property in the vicinity, would not adversely affect the candidate Special Area of Conservation or Special Protection Area, would not be prejudicial to public health and would be acceptable in terms of traffic safety and convenience. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area.

CONDITIONS

1. The development shall be carried out in accordance with the plans and particulars lodged with the application, as amended by the plans and particulars received by the planning authority on the 19th day of March, 2004, the 1st day of April, 2004, the 14th day of April, 2004, the 5th day of May, 2004 and the 14th day of June, 2004, except as may otherwise be required in order to comply with the following conditions.

   Reason: In the interest of clarity.

2. The development shall be carried out on a phased basis. The content, extent, and timing of each phase shall be agreed in writing with the planning authority prior to commencement of development. Phase 1 shall include the construction of the proposed roundabout at the main access to the north-east of the site. This access shall be used as a sole construction access to the site.

   Reason: In the interest of orderly development.

3. The proposed museum building indicated on the drawings submitted at application stage as plot number 1, shall be omitted from the proposed development. No development shall be carried out in this area.

   Reason: In the interest of visual amenity and to protect the habitat of the candidate Special Area of Conservation

4 The proposed additional development at plot number 16 adjacent to the new entrance and roundabout as indicated on drawing number P-003 received by the planning authority on the 19th day of March, 2004 shall be omitted.

   Reason: In the interest of clarity.

5. The development shall be revised as follows and drawings showing compliance with these revisions shall be submitted to the planning authority for written agreement prior to commencement of development. The development shall be carried out in accordance with the agreed revisions.

(a) Appropriate childcare facilities, in accordance with the Planning Guidelines on Childcare Facilities issued by the Department of the Environment and Local Government in June, 2001, shall be provided. These facilities shall be in operation before more than 75 residential units are occupied.

Reason: In the interest of orderly development and the amenities of the area.

(b) The development on plot number 3 (shopping centre) shall be re-designed so that the childcare facility is located away from the main vehicular access and overlooking the internal courtyard.

Reason: As proposed, the childcare facility would enjoy an unacceptably poor quality environment.

(c) The development on plot number 2 (Eisc and Cormorant) shall be re-designed so that the upper level carparking area behind the residential units is replaced by a landscaped courtyard, accessible to the residents only.

Reason: As proposed, the residents of these units would overlook a road on one side and a carpark on the other, which would present a poor quality environment.

(d) The development on plots numbers 6A and 6B shall be omitted. Any development in this area shall be subject of a further application for permission and shall provide for a scheme of smaller footprint in the eastern part of the plot, aligned to generally respect the boundaries of the candidate Special Area of Conservation, protect views of Oranmore Castle and provide for improved residential amenity (including separation between facing windows to dwellings).

Reason: To protect the amenity of the area and to provide for an acceptable level of residential amenity, including separation between windows to dwellings.

(e) The development on plot number 8A shall be modified by omission of residential units numbers 15 and 16.

Reason: These units are inappropriately located and would give rise to unacceptable overshadowing of the courtyard and of other adjacent units.

(f) The development on plot number 9 shall be modified by increasing the width of the first floor courtyard to the rear of retail units numbers 4 and 6 by four metres, by relocating northwards the southern wall and associated corridor at the rear of these units.

Reason: To improve the amenity of the residential units facing onto the courtyard.

(g) The development on plot number 10 (Castlequarter) shall be modified by omission of the two-storey westernmost range of building (containing gallery and café).

Reason: To protect the amenity of the area.

6. Prior to commencement of development, details of the coastal defences, amended in accordance with conditions numbers 3 and 5, and including materials and finishes, shall be submitted to the planning authority for written agreement. The development shall be carried out in conformity with the agreed details.

Reason: In the interest of proper planning and of amenity.

7. Prior to commencement of development, the developer shall submit detailed proposals in relation to all boundary treatments on site to the planning authority for agreement.

Reason: In the interest of residential amenity and privacy.

8. Prior to commencement of construction of the external walls, details of the materials, colours and textures of all the external finishes to the proposed development shall be submitted to the planning authority for agreement.

Reason: In the interest of orderly development and the visual amenities of the area.

9. Prior to commencement of development or any site preparation works, the developer shall carry out a programme of pre-development testing on site concentrating in particular on the Zone of Archaeological Potential of Monument GA095-110 (tower house) and GA095-111 (church and graveyard). The developer shall facilitate the planning authority in an archaeological appraisal of the site and in preserving and recording or otherwise protecting archaeological materials or features, which may exist within the site. In this regard, the developer shall

(a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development,

(b) employ a suitably qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works.

The assessment shall address the following issues

(i) the nature and location of archaeological material on the site, and

(ii) the impact of the proposed development on such archaeological material.

Prior to commencement of development, a report containing the results of the assessment shall be submitted to the planning authority. Arising from this assessment, the developer shall agree with the planning authority details regarding any further archaeological requirements (including, if necessary, archaeological excavation) prior to commencement of construction works.

In default of agreement on any of these requirements, the matter shall be determined by An Bord Pleanála.

Reason: In order to conserve the archaeological heritage of the site and to secure the preservation of any remains which may exist within the site.

10. Prior to commencement of development, and following consultation with the Department of the Environment, Heritage and Local Government, the developer shall submit a method statement to the planning authority for written agreement outlining the measures, which will be put in place to protect the graveyard wall from construction works on site. This method statement shall include measures that will ensure the long-term protection of the graveyard wall. The agreed measures shall be carried out in full.

Reason: To protect and preserve features of archaeological significance.

11. Prior to commencement of development and following consultation with the Parks and Wildlife Section of the Heritage Division of the Department of the Environment, Heritage and Local Government, the developer shall submit to the planning authority for written agreement details of best practice measures and mitigation measures to minimise impact on the candidate Special area of Conservation and Special Protection Areas within the site and abutting the boundaries of the site. The agreed measures shall be carried out in full.

Reason: In the interest of amenity and the preservation of natural heritage.

12. Public lighting shall be provided in accordance with a scheme, details of which shall be submitted to the planning authority for agreement prior to the commencement of development.

Reason: In the interest of amenity and public safety.

13. The internal road network serving the proposed development, including turning bays, junctions, parking areas, footpaths and kerbs shall be in accordance with the detailed requirements of the planning authority for such works. Detailed specifications for these elements, including base formation of the main access road, shall be submitted to the planning authority for written agreement prior to commencement of development.

Reason: In the interest of amenity and public safety.

14. All service cables associated with the proposed development (such as electrical, communal television, telephone and public lighting cables) shall be run underground within the site. In this regard, ducting shall be provided to facilitate the provision of broadband infrastructure within the proposed development.

Reason: In the interest of orderly development and the visual amenities of the area.

15. Water supply and drainage arrangements, including the disposal of surface water, shall comply with the requirements of the planning authority for such works and services. In particular, details of the proposed relocation of the existing public sewer on the site shall be submitted to the planning authority for written agreement prior to commencement of development.

Reason: In the interest of public health and to ensure a proper standard of development.

16. Prior to commencement of development, a construction management plan shall be submitted to the planning authority for written agreement.

Reason: In the interest of the proper planning and sustainable development of the area.

17. During the construction of the development, vehicle wheels shall be cleaned prior to exiting onto the public road so as to minimise material deposits on the public road. Details of the proposed wheel wash facility, which shall incorporate underbody power washing, shall be agreed with the planning authority prior to commencement of development.

Reason: In the interest of orderly development.

18. Prior to commencement of development, the developer shall submit, and obtain the written agreement of the planning authority to, a plan containing details for the management of waste (and, in particular, recyclable materials) with the development, including the provision of facilities for the storage, separation and collection of waste and in particular, recyclable materials and for the ongoing operation of these facilities.

Reason: To provide for the appropriate management of waste and in particular recyclable materials in the interest of protecting the environment.

19. Prior to commencement of development, the developer shall submit a full programme of traffic calming measures including details of any boundary set-backs in order to facilitate future traffic.

Reason: In the interest of traffic and pedestrian safety.

20. The site shall be landscaped in accordance with the scheme submitted to the planning authority with the application and as additional information. Details of treatment of specific areas, including the roadside embankment along the main access road, sizes and species of planting, and of the hard landscaping materials (including samples) and coastal walk shall be submitted to the planning authority for written agreement, prior to commencement of development. The development shall be carried out in accordance with the agreed details.

Reason: In the interest of visual amenity.

21. Prior to commencement of development, a management scheme providing adequate measures relating to the future maintenance of open spaces, roads, carparks and communal areas in a satisfactory manner shall be submitted to the planning authority for agreement.

Reason: To ensure the adequate future maintenance of this private development in the interest of residential amenity.

22. Development described in Classes 1, 3 or 7 of Part 1 of Schedule 2 to the Planning and Development Regulations, 2001 shall not be carried out within the curtilage of the proposed dwellinghouses without a prior grant of planning permission.

Reason: In the interest of amenity.

23. Within eight weeks of the date of this order, the developer shall enter into an agreement with the planning authority under Section 96 of the Planning and Development Act, 2000 (as amended) in relation to the provision of social and affordable housing, in accordance with the requirements of the planning authority's housing strategy, unless, before the expiry of that period, the said developer shall have applied for and been granted an Exemption Certificate under Section 97 of the Planning and Development Act, 2000.

Reason: To comply with the requirements of Part V of the Planning and Development Act, 2000 (as amended).

24. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or other security to secure the provision and satisfactory completion and maintenance until taken in charge by the planning authority of roads, footpaths, watermains, drains, public open space and other services required in connection with the development, coupled with an agreement empowering the planning authority to apply such security or part thereof to the satisfactory completion or maintenance of any part of the development. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be determined by An Bord Pleanála.

Reason: To ensure the satisfactory completion of the development.

25. The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to the Board to determine the proper application of the terms of the Scheme.

Reason: It is a requirement of the Planning and Development Act 2000 that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act be applied to the permission.

Member of An Bord Pleanála
duly authorised to authenticate
the seal of the Board.

Dated this day of 2005.

An Bord Pleanála

Inspector's Report

PL 07.209434

Development

Description:	Town Centre mixed use development comprising of retail space, 310 residential units, office space, crèche, hotel, school, museum and ancillary uses, including works to protected structures.
Address:	Innplot and Oranmore Townlands, Oranmore, County Galway.

Planning Application

Planning Authority:	Galway County Council
Planning Authority Reg. Ref.:	03/5413
Applicant:	White Cedar Developments Limited.
Type of Application:	Permission
Planning Authority Decision:	Grant

Planning Appeal

Appellant(s):	1. White Cedar Developments 2. M. & M. Concannon, K. Davis, M. Byrne and C. & M. McDonagh 3. J. Hayes 4. V. Finn
Type of Appeal:	3rd Party -v- Grant and 1st Party -v- Conditions
Observers:	1. Oranmore Residents Association
Date of Site Inspection:	22/01/2005
Inspector:	Paul Caprani.

INTRODUCTION

PL 07.209434 relates to 3 no. third party appeals against the decision of Galway County Council to issue notification to grant planning permission for a mixed use town centre development including retail, residential and office and community uses. The decision was also the subject of a first party appeal against four specific conditions 3 of which relates to reductions sought in the overall size and scale of the proposal while one condition specifically relates to a financial contribution. An Environmental Impact Statement has been submitted with the application.

SITE LOCATION AND DESCRIPTION

The 8.369 hectare (20.67 acre) site is located on predominantly vacant lands to the immediate west of Main Street, Oranmore. The site encompasses lands from the rear buildings fronting onto the western side of Main Street to the seashore of Oranmore Bay. The Millplot River and an inter-tidal area of Oranmore Bay bound the site to the north. Castle Road, a small narrow road leading to Oranmore Castle, a historically important 15th century structure which was refurbished in the 20th century runs along the southern boundary of the site. The site itself is for the most part vacant and incorporates a gradual slope towards the shoreline. The topography falls from c.6 metres Ordnance Datum in the eastern part of the site to c.2 metres Ordnance Datum in the western part of the site. According to the EIS, the site accommodates a variety of habitats including a salt marsh area along the western and northern perimeter of the site adjacent to the shoreline and river. This area roughly corresponds with the cSAC and SPA (2068 – Galway Bay Complex, see Drawing P3). The main central area of the site accommodates calcareous grassland. A large rectangular field adjacent to the Castle Road accommodates a playing pitch and this is classed as amenity grassland. The south-eastern corner of the site to the rear of the existing buildings accommodates a small area of grassy meadow. The lands are currently used for grazing purposes.

The site incorporates a number of buildings fronting onto Main Street including McDonagh's public house and Oranmore House, both of which are protected structures. An old church and graveyard, which includes an old stone boundary wall, are located to the rear of the main street adjacent to the south-eastern boundary of the site. Oranmore Castle is located on a prominent position adjacent to the shoreline to the south-west of the site.

The bridge over Millpot River is located at the north-eastern boundary of the site. A floodplain is located on the north bank of the river beyond which, the old Oranmore/Galway Road is located. A recently constructed shopping development is located on land further north-east of the site.

The site is therefore centrally located within the village of Oranmore and its development will result in a significant expansion of the main commercial/retail area of the village. Oranmore Main Street accommodates buildings predominantly one and two-storeys in height.

PROPOSED DEVELOPMENT

Planning permission is sought for a mixed-use development on site. The development is set out in a series of blocks, which enclose urban spaces. Blocks range in height from one to four-storey. The four-storey elements are predominantly located in a central part of the site and front onto a new square, Market Square. The building height reduces down to two-storey around the perimeter of the site. The proposed uses include retail, office, hotel, crèche, shopping centre, restaurants, a museum and 310 residential units which was reduced to 297 units on foot of further information submitted. The land uses are set out in 15 separate plots and each plot is briefly described below.

Plot 1 "The Museum" Plot 1 is located in the north-western part of the site. It accommodates the proposed museum. The museum is a two-storey building of contemporary design, which is to accommodate exhibition areas, a restaurant, shop and ancillary uses on two floors. Basement car parking is to be provided. The gross floor area of the building is 2,874 square metres. The building is to rise to a maximum height of 18.3 metres.

Plot 2 "Éisc Cormarant" is located to the north of the site adjacent to the river and is to accommodate 40 residential units in a series of three-storey blocks fronting onto the main access road and river beyond.

Plot 3 "Shopping Centre" This plot accommodates a four-storey shopping centre overbasement car parking. The shopping centre is located to the immediate north-west of the main square, Market Square. Four retail units and a crèche are to be located at ground floor level. 14 residential units are to be provided around a central decking area at first and second floor level. Office space is to be provided in the four-storey element along the south elevation at first, second and third floor. The building is to rise to a maximum height of just over 21 metres.

Plot 4 "Mallard and Teal" This plot is located between the proposed shopping centre and the Main Street. A number of blocks are proposed and front onto the Main Street to the east and also onto the proposed main internal access road – 'Bothar na Riasca'. A number of existing buildings fronting onto the Main Street and Kelly's Lane are to be maintained and incorporated into the development. The frontage onto Kelly's Lane and Main Street accommodate retail and commercial use at ground floor level. Residential units front on to the proposed Brown's Lane and Bothar na Riasca. A total of 48 residential units are proposed in Plot 4. The blocks range from two to four-storeys in height. The four-storey element is located on the southern elevation of Mallard Block, fronting onto Market Square.

Plot 5 "Square East" Plot 5 is located to the immediate south of Kelly's Lane and comprises of buildings fronting onto Market Square and Market Lane. The buildings accommodate retail units at ground floor level with residential units overhead. The buildings fronting onto Market Lane are two-storeys in height. The buildings fronting onto Market Square are three-storeys in height.

Plot 6 "Clipear, Climeen" is located in the western portion of the site. It comprises of two blocks of buildings set out around courtyards. Underground car parking is to be provided at basement level. Retail units are to be provided at ground floor level with residential units overhead at first and second floor level. A total of 45 units are to be provided in total.

Plot 7 "Iskatch, comprises of a C-shaped block enclosing a west facing courtyard. 32 residential units are to be provided on three levels overbasement car park.

Plot 8 "Suipin Ruhlin Tobaraur" Plot 8 comprises of 49 residential units set out in blocks three to four-storeys in height.

Plot 9 "Gobadan" Plot 9 is centrally located within the site directly south of the shopping centre and accommodates retail units at ground and first floor level. Office and residential development are also provided for at first floor level. Second and third floor levels are exclusively for residential use.

Plot 10 "Castle Quarter" is located in the south-western corner of the site. It comprises of one and two-storey buildings with small retail units at ground floor level and some studios and galleries overhead.

Plot 11 "Gaelscoil" is located in the southernmost portion of the site. It is a single-storey structure accommodating 8 classrooms and ancillary storage area.

Plot 12 "Inn Plot Terrace" is located to the immediate north-east of the Gaelscoil and accommodates 20 residential units on three levels over a large basement car park.

Plot 13 "Father Gill House" comprises of four-storey block on the southern side of Market Square accommodating retail at ground floor overbasement car parking with 15 residential units including penthouses overhead.

Plot 14 accommodates the existing Oranmore House fronting onto the Main Street. This existing protected structure dating from the late 18th century is to be converted into an 18 bedroom hotel. Small scale internal alterations are to take place within the buildings to accommodate the hotel use. The stable buildings to the rear are to be converted and extended into a two-storey bedroom wing.

Plot 15 "McDonagh's Bar" is located to the immediate north of the Oranmore House and is separated from Oranmore House by Market Lane. This building is likewise a protected structure and dates to the 1840s. Existing unsympathetic extensions to the rear of the building are to be removed and a new two-storey extension including basement storage and toilets are to be accommodated to the rear of the buildings.

Traffic Management and Circulation

The main access to the site is to be provided at the north-eastern corner of the site and crosses over the candidate Special Area of Conservation. A roundabout will facilitate the access onto the Main Street from the site. This main road runs to the north-west of the development adjacent to Plot 2 before meandering to the centre of the development separating Plot 9 from Plot 8 and providing access to the Castle Quarter and Gaelscoil

in the southern portion of the site. Smaller roads are to branch off the main road and these penetrate through to the main square to the east. Access is also provided to the site from Oranmore main Street via a series of lanes and roads. These include Market Lane, Bothar na Raisca and Kelly's Lane, the latter provides pedestrian access from the main Market Square to the Main Street. These smaller routes are to provide delivery access routes to the various retail and commercial outlets. The proposal makes provision for 895 spaces, the majority of which are to be provided in the form of underground car parks underneath the various blocks.

Infrastructure

The proposed development is to be served by public mains water supply which has recently been upgraded. All surface water generated on the site will be collected in surface water sewers which will be divided into two sub-catchments with outfalls into the river to the north and a bay to the west. The development will be served by public sewage infrastructure.

Landscaping

A Landscaping Masterplan is indicated on Drawing 03-038-01 submitted to the planning authority on 16/9/2003. More detailed layouts of the Plan are contained on 9 separate drawings (03-038-2 to 03-038-10). The Board are also referred to the 'digital dimension CD' which is submitted by the applicant in his response to the grounds of appeal which give an indication of external finishes and building heights etc.

Environmental Impact Statement

An EIS was submitted with the application and the main points contained therein are summarised below.

Chapter 1of the EIS the site with the methodology employed in preparing the structure of the EIS and provides notes on the study team and its contributors.

Section 2 outlines possible alternatives but notes in relation to alternative locations that lands to the east, north and south are partly developed and do not offer the same development potential in the appeal site. There are no alternative sites on this scale in Oranmore which is zoned for town centre use and which can be integrated with the town centre to the same extent. The do nothing scenario would also exacerbate the dormitory role of Oranmore as a commuter town for Galway City.

Chapter 3 outlines the planning policy context relating to the proposed development. Reference is made to the policies contained in the;

- National Development Plan,
- National Plan for Sustainability.
- The National Spatial Strategy
- The Border, Midland and Western Regional Development Strategy 2000-2006
- The Galway County Development Plan
- The Oranmore Development Plan 2001 and
- The Oranmore Village Centre Draft Area Plan.

The EIS argues that the proposed development complies with many of the policies and provisions contained in the above documents. It is also acknowledged that the development proposal will require a material contravention of the Oranmore Development Plan 2001 in relation to the zoning objectives for part of the site.

Chapter 4 outlines the description of the proposed project. This is outlined above in the report. Chapter 4 also notes that water supply to the Oranmore region has recently been upgraded and the water demands resulting from the proposed development is not expected to impact significantly or negatively on the water infrastructure of the area. Surface water generated will be discharged to the sea and the stream at the northern boundary of the site. Petrol interceptors will be provided at car parks consisting of more than 20 or more spaces to remove any hydrocarbons. The site will be served by a public sewage system which will connect into the main public sewer in Galway City.

Chapter 5 of the EIS outlines the potential impact and mitigation measures the proposed development briefly outlined below.

In relation to human beings the EIS outlines the recent increase in population expansion for the Oranmore area. The population increased from 1,576 persons in 1991 to 2,385 in 2002. Growth in the Oranmore is significantly higher in percentage terms than national and regional growth for the same period. In terms of population the proposal will have a moderate positive impact on the future population of Oranmore as it will attract residential and employment growth within the town and this complies with the county development strategy. The cumulative impact of the additional traffic generated on the capacity of the road system will be slight to moderately negative. The proposal will also strengthen the urban consolidation and maximise the site's location at the head of Galway Bay, which will a have a significant positive impact on future urban methodology of the town. In terms of tourism and amenity it is noted that the proposal will result in the loss of one playing pitch. The impact therefore is considered to be moderate and negative. The provision of additional urban amenity space together with the increase in community and recreational facilities which includes a children's museum etc. will contribute to the town's attractions and this is deemed to be positive. The retail element of the proposal will establish the future vitality and viability of Oranmore and is therefore likely to have a significant and positive impact on the town.

Section 5.3 of the EIS specifically relates to flora and fauna. The area was visited in April and September 2003. The main habitats found on the site included moderately exposed rocky shore, lower and upper salt marsh, calcareous grassland, amenity grassland and dry grassy verges. These are indicated on Map 5.3.1 of the EIS.

The mammal fauna on the site is small because of the lack of cover and suitable habitat. Otters may be expected to feed along the shore from time to time although there was no evidence of their presence during the site visits. The river is too small to provide for fresh water fish of a suitable size. The tree cover along the south-eastern boundary is likely to provide feeding habitat for a few bats. However it would be extremely limited. The terrestrial parts of the site are used by a few birds however the adjacent marine sections would hold a significant number of shore birds particularly in

winter. Studies show that Oranmore Bay is relatively important for little grebe, wigeon, teal, golden plover, lapwing, curlew and green shank.

The esterline inlet and soft shorelines incorporate a good habitat diversity and a good range of species. In general the habitats are typical of Galway Bay and there are no species of significant rarity or interest.

In relation to bird fauna the Oranmore Bay area is considered the richest in the whole of Galway Bay so that portion adjacent to the development site seems to carry important numbers of teal, wigeon, lapwing and green shank only.

Potential adverse impacts result from the construction of buildings and paving of surfaces as well as bringing additional people to the area.

The proposed impacts during the construction phase will result from noise and some rock excavation. Human presence along the shoreline during construction will limit the use of the immediate vicinity by feeding shore birds. During the operational phase the main impact will occur on the salt marsh at the north-eastern corner which will be encrossed by the embankment and road. Culverts are included beneath this road. The flooding by high tides will continue to support characteristic communities. All shore birds are sensitive to disturbance however they quickly become used to traffic and other noise and feed in many industrialised estuaries. Reference is made to the bull island in this regard.

Construction of the coastal buildings and walkways will cover some important habitats but the additional disturbances deemed to be small. This is due to the fact that there is at least 150 hectares of other inter-tidal habitat in the bay. The impact on shoreline birds will not be significant in the long-term. The impact on local fauna will be negative and permanent but since very few invertebrates use the site its impact must be regarded as slight. The removal of grazing animals on the remaining part of the salt marsh will be positive and permanent and this will allow more diverse fauna to develop in that area.

The mitigation measures to offset any potential impacts are set out in Section 5.3.4.

Slight changes will occur in the feeding patterns of the shore birds wintering in Oranmore Bay in that they will spend less time in the immediate vicinity of the town. No decline in bird populations is expected within the SPA.

Section 5.4 relates to geology and soils. Bedrock of the area including the site consists of Upper Carboniferous limestone. There are a number of rock outcrops visible on the site. The underlying bedrock is located at the depth of 0.5 to 2 metres. Soils encountered above the bedrock consist of dark brown topsoils, silty clays dotted with cobbles and boulders of various sizes. The proposed development will have a slight negative impact on existing geology. Construction of the buildings and basements will necessitate excavation of rock. Excavated material will be reused on site. Topsoil excavated will be retained for landscaping purposes.

Section 5.5 of the EIS relates to surface hydrogeology. It is stated that the proposed total hard area including roofs, paving, roads and footpaths amounts to 5.4 hectares. The study site does not have any surface drainage, ditches or streams except for the Millplot (Oranmore) Stream that passes along the north-west boundary of the site. Areas of the site below 3 metres O.D. Malin will regularly flood as a result of high astronomical tides. Details of the monthly precipitation rates for the Galway area are contained in t he EIS. The EIS also outlines the design high tide level, wave climate, freshwater flow regime and flood flows likely to occur on site. It is suggested that the combined flood flows in the channel downstream of the Oranmore Bridge will be in the order of 10 to 15 cumecs. This is well within the capacity of the river channel. It is proposed to pipe directly the storm run-off to Oranmore Bay via two outfalls. An additional outfall is to be provided at the stream channel. The receiving capacity of the stream channel at coastal areas is well capable of accepting additional surface water flows from the development without causing flooding to surrounding areas. The impact on surface water will be slight to imperceptible. Potential contaminants from the surface water are not deemed significant as the estuarine waters are not ecologically sensitive in the vicinity of the outfall pipes. To safeguard against any accidental spillages during the operational phase of the development an oil/grit interceptor should be located up stream of all storm outfalls.

To ensure no changes in the hydrogeological regime the northern entrance road should be adequately culverted to allow the low-lying section to continue to ebb and flood with the spring tides.

Finally the section 5.5 outlines mitigation measures to control soil run-off adversely impacting on receiving waters. Any spillages on site should be immediately contained and contaminated soil should be removed for suitable disposal. Washdown water from aggregate heaps and dust control can be directed and contained in a settlement area before being discharged to any watercourses.

Section 5.6 deals with the issues of groundwater hydrogeology. The section outlines the bedrock and quaternary geology of the site. The site overlays a regionally important bedrock limestone aquifer The groundwater flows in a south-westerly direction to preferential pass ways towards Oranmore Bay. It is stated that the water table level is likely to be within 1 to 2 metres of the mean sea level. The aquifer is classified as extremely vulnerable. The impact of the proposed development on groundwater is deemed to be negligible. There is no significant potential for the contamination of groundwater on the site during its operational phase except for damage or the installation of a faulty sewer pipe fitting. There are no proposed abstractions or direct discharges to groundwater.

Section 5.7 relates to air climate. The only gaseous emissions expected during the construction are those from internal combustion engines and the impact is deemed to be slight. In relation to noise it is stated that construction noise will occur for a limited period only. The proposed development will generate noise emissions, which are likely to be slight but negative. The main source of noise is likely to be attributed to traffic circulation.

Section 5.8 relates to landscape and visual impact.The EIS notes that the site is of a high scenic quality with a combination of landscape features, rocky shoreline and a river estuary. The most prominent historic feature is Oranmore Castle which sits on the seashore. The EIS analysis views from the road network in the vicinity of the site, and on roads to the south and west of the site. The most significant impacts could be adjacent to the site along the R339 (Old Oranmore to Galway Road).

The impact from the built environment will generally have a moderate negative impact on its surrounding by virtue of the scale of the development. The impact however is reduced in the context of the existing built environment of Oranmore Town. The site has the capacity to absorb the development with minimum adverse impacts.

The impact of the new development is reduced by the close proximity to the existing village, the retention and conservation of the linear park along the northern edge of the site, the planting of new trees, and the retention of mature trees immediately to the south-east of the site. The landscape plan allows for an envelope around the historic castle to the south-west of the site. Other mitigation measures are outlined on Page 101 of the EIS. The proposed mitigation measures are achieved mainly through the design of the proposed scheme together with strategic planting or appropriate locations.

Section 5.9 relates to archaeological and cultural/built heritage. The chapter notes that there are a number of recorded monuments in close proximity to the proposed development. These include Oranmore Castle (GA095:110). The castle is described as a well built oblong structure which can be dated from the 15th century by its architectural details. It may have been built on a site of an earlier fortress, which could have been incorporated into the fabric of the building. In 1947 Lady Lesley purchased Oranmore Castle and had it reroofed. Between 1950 and 1960 her daughter built a two-storey wing to the south-east of the castle. Other important archaeological features in the vicinity of the site include the church and graveyard to the immediate south of the site (GA095-111), a church 140 metres south-east of the site dating from 1803 (GA095-114), a holy well to the immediate north-east of the site (GA095-081), the old site of a mill (GA095-082).

It is noted that some archaeological excavation took place as part of the recently constructed Oranmore Sewage Scheme. Findings during this excavation are set out in the EIS. A field inspection was undertaken on 25th August 2003. The survey concluded that there are no visible or recorded archaeological remains within the boundary of the proposed development. It is acknowledged that the lands surrounding the castle and the old church and graveyard would have a higher potential to reveal unrecorded features subsurface as this area became the focus for all manner of activities throughout the long lifetime of the castle.

The developer shall agree to be advised by Dúchas with regard to the appropriate mitigation in the event of discovery of archaeological material during monitoring. Section 5.9.5 of the EIS relates to cultural heritage in relation to architecture. This part of the report sets out how to deal with the impact of the proposals on the architectural heritage and in particular the impact of the proposal on the protected structures which form part of the planning application namely Oranmore House and McDonagh's thatched pub. The report also assesses the impact on the structure known as Kelly's

House. This does not appear to be protected structure but is deemed to have sufficient architectural merit to require investigation.

Oranmore House (c.1790), McDonagh's thatched house (c.1800) and Kelly's House (c.1820) are described in detail in the report.

It is proposed to convert Oranmore House into a hotel and retaining the existing buildings with the exception of a single-storey extension to the north and parts of the rear extension. A two-storey bedroom block is proposed for the western part of the curtilage and the existing stable building is to be converted into an administrative building. Little work is proposed for the house itself.

In relation to McDonagh's thatched public house it is proposed to retain this building as such. The 20th century additions to the rear of the building are to be demolished and replaced by a new two-storey structure with a single-storey link to the existing building. It is proposed to retain Kelly's House and use it as a residence. Any stone work which is to be removed is to be reused within the site.

In terms of likely impacts it is considered that the proposed conversion of Oranmore House to a hotel use would have a neutral moderate impact. In relation to McDonagh's thatched house it is noted that substantial work is required for the thatched roof. The impact varies from slight in relation to repairs to be carried out to significant where renewal is required. However the impact should be seen as positive as a do nothing scenario would result in destruction of the roof. The proposal to conserve and refurbish Kelly's House is considered to be a significant positive impact. Its reversal to residential use will ensure the ongoing survival of the building. The removal of enclosures and walls etc, may have a moderate to significant impact on the boundaries. The impacts on Oranmore Castle relates to the visual and setting of the structure as it is located outside the boundary of the application site. Other mitigation measures are set out in Section 5.9.5.5 of the EIS. (Page 136).

Section 5.10 relates to roads and traffic. The section outlines the description of the project and the existing road network serving the site. Traffic counts were undertaken on Tuesday 12th August 2003 and details of the traffic counts are set out in Appendix B (5.10 of the EIS). It was observed during the p.m. peak count that a substantial number of vehicles were using the roads through Oranmore as a rat run to avoid congestions at the roundabouts on the N6 By-pass. Based on the TRICS traffic generation database, it is estimated that the a.m. peak generation for the total development (8 a.m. to 9 p.m.) will amount to 357 vehicles arriving to the site while departure during the same period would amount to 373 vehicles. The traffic flows in and out of the development for the p.m. peak are 518 and 510 respectively. The trip distribution suggests that the majority of trips would be split between Galway City via the R339 coast road (29%) and to south Oranmore via the N18 (38%).

Section 5.10.7 relates to junction assessment. Together with the general forecasted growth in traffic for the town, it is suggested that in the year 2017, with the development, the junction on the Old Sligo Road will operate near capacity. This is therefore likely to have a significant negative impact on the junction capacity especially during evening peak. With the addition of the development traffic levels at the junction of the Old Dublin Road will operate with a 14% spare capacity. This is

therefore likely to have a moderate negative impact on the junction capacity during evening peak. Likewise in relation to the Castle Road junction, it is forecasted that with the development in the year 2017, this junction will operate with a 4% spare capacity. The proposed new roundabout at the north-eastern corner of the site will operate at 13% spare capacity in the year 2022. The increase in traffic noise resulting from the proposed development may be perceptible during peak hours this impact is rated as slight and negative.

Although the capacity of some of the existing junctions is, at or above capacity for the target year of 2017 it is not proposed to upgrade these junctions. Under the current National Development Plan an outer by-pass should be in operation before 2017. This will improve the capacity of the existing by-pass thus reducing the need for traffic to rat run through the town. In relation to construction traffic it is proposed to construct the roundabout at the outset and this being used for the majority of construction vehicles for the remainder of the construction period. As the development will be carried out in phases it is unlikely that the proposal will have a significant adverse impact on the surrounding road network during construction works. In conclusion it is stated that the removal of the rat run traffic which significantly contributes to congestion at these junctions at present will increase the capacity of the existing junctions in the vicinity of the site thereby enabling the existing road network to accommodate the proposed increases in traffic.

PLANNING AUTHORITY'S DECISION

Initial Application

The application was lodged with the planning authority on 16th September 2003. A large number of objections from local residences and local associations have been submitted in relation to the application. The contents of these letters have been read and noted.

Initial Reports

- A report from the Irish Aviation Authority states it has no observation to make in relation to the proposal.

- A report from the Western Regional Fisheries Board dated 20th October 2003 stated that the Fisheries Board has no objection to the above application provided appropriate conditions are stipulated in order to protect the water quality during site development construction and operational phases.

- A report from the Western Health Board dated 20th October 2003 states that it has no objections regarding the EIS submitted but that details, plans and drawings of the development must be received by the Western Health Board particularly drawings in relation to the shopping centre, crèche, hotel and restaurant areas.

- A report from the Department of the Environment, Heritage and Local Government express a number of concerns regarding certain aspects of the EIS including:

- The impact of the proposal on the Galway Bay Complex SAC particularly the impact of construction on the salt marsh area.

- The cumulative impacts on the SAC as a result of ongoing development in the Oranmore area and the inner bay should also be investigated.

- The EIS does not properly consider the impacts on the surface water outfalls on the water quality of coastal areas or on the stream.

- All areas to be infilled should be clearly shown on site maps and plans. No indication is given of the shoreline defences for the proposed development.

- The EIS should be revised to cover all aspects of the proposed development from construction to operation.

- The flora and fauna section of the EIS does not describe the river that is included as part of the development along the northern boundary.

A report from the Engineering Section dated 4/11/03 requested further information in relation to:

- Measures to be taken to protect the regional important karst aquifer.

- A Waste Management Plan for the construction phase and a Waste Management Plan for the operational phase.

- A report from the Architectural Conservation Officer required further details in relation to the proposed alterations to the protected structures which are to be altered as a result of the proposed development. It is also suggested that the proposed development will affect the character of the setting of Oranmore Castle.

- A report from the Architects Department considers the overall architectural quality to be high particularly with the creation of urban spaces. However concerns are expressed over the three to four-storey elements of the development. It is argued that the collective massing effect on top of the existing topography would adversely affect the character for the village.

- The Water Services Report requested additional information be submitted prior to the application being determined.

- A written report from the Roads Department suggest that the EIS does not forecast the cumulative traffic flows resulting from the additional zoned land in the Oranmore area. It also suggested that inadequate car parking has been provided. Concerns were also expressed in relation to sight distances at the Castle Lane exit point. Changes to the width of the access road are also recommended, as are changes to the roundabout design. Further details of car parking including basement car parking are also required.

- A report from the Department of Communications, Marine and Natural Resources states that in accordance with the Foreshore Acts a foreshore licence or lease must be obtained from the Minister of Communications, Marine and Natural Resources in relation to any works on the state owned foreshore.

- A further report from the Department of Environment, Heritage and Local Government dated 23rd December 2003 notes that the site is adjacent to areas of archaeological constraint, and the heritage and planning division agrees with the finding in the EIS that a programme of archaeological of pre-development testing should be carried out. It is also recommended that a geophysical survey should be carried out in the vicinity of the recorded monuments in a manner to be agreed with the heritage and planning division.

Additional Information Request: 10th November 2003.

On 10th November 2003 Galway County Council requested additional information from the applicant on 42 separate issues. Further information was requested in relation to:

- Maps in relation to the cSAC and SPA
- Details of legal interest
- Open space provision
- Photographic Survey
- Reduction in the scale and density
- Retail Impact Statement
- Heritage and Archaeological Issues
- Nature Conservation Issues
- Waste Management Issues
- Water and Drainage Issues
- Roads and Traffic Issues
- Supplementary EIS information

Response to Further Information Request

Further information was submitted on behalf of the applicant by A. P. McCarthy, Planning Consultants Limited. The points contained in the further information are briefly outlined below.

SAC/NHA Site Boundary

A revised site layout plan (Drg. No. P-2A) is set out in Appendix I. The revised site layout plan indicates the SAC/NHA boundary, the mean high water mark and the annual maximum tide level.

Legal Interest

Details of the legal standing to carry out works proposed for areas below the high water mark are set out in Appendix II of the submission. This includes a letter from Keane Solicitors, which confirms that the proposed development is carried out completely within the confines of the title of the applicant White Cedar Developments Limited. Title documents are submitted in this regard.

Open Space Provision
Open space provision associated with the development has been reviewed in consultation with the planning authority and is indicated in the drawings submitted in Appendix I.

Photomontages
In accordance with Point 4 and 5 of the request for additional information, the applicant has submitted four photographs indicating the proposed development when viewed from Oranmore Castle.

Scale and Density
In relation to Point 6 of the request for additional information, it is argued that the scale and density of development as well as the recreational open space has been revised in consultation with the planning authority and the revised site plans are set out in Appendix I.

Retail Impact Assessment
In relation to Point 7 the applicant has submitted a Retail Impact Statement in Appendix 4. The contents of this Retail Impact Statement have been read and noted. The total retail provision inclusive of storage space is 7,021 square metres. In retail terms the defining issues in relation to Oranmore are that (a) Galway City is so large that Oranmore poses no retail threat, (b) the nearest significant urban centres are a considerable distance from Oranmore. They include Tuam, Athenry, Loughrea and Gort. And Lastly the hinterland around Oranmore is densely populated. Oranmore's growth in population and housing provision has not been matched by the commensurate development of retail activities. Section 9 of the Retail Impact Statement provides a profile of the existing retail and service provision in the town. It is also stated that the development fully complies with the sequential test as set out in the Retail Guidelines. The Retail Impact Statement concludes that retail provision at present is inadequate for current need and additional retail provision is required to offset the shortfall. The proposed development will consolidate the pattern of small retail units in the Oranmore area. The proposal will help reverse the existing retail leakage to Galway City. The proposed retail development is in the most central point of Oranmore and the proposal meets all the criteria set out in both the General Policy Directive and the Galway County Development Plan. Both the gravity model and theoretical estimation model indicates that there would be a substantial shortfall in the required retail provision in 2006.

Amenity Impacts
Point 8 of the additional information suggests that the likely impacts on residential amenity resulting from the construction and operational phases of the proposal have not been taken into account in the EIS. The response states that mitigation measures would be put in place to reduce noise, dust and traffic uses during the construction period. Phasing arrangements are indicated in the response.

Material Contravention
Point 9 of the request for additional information notes that the proposed development would materially contravene the provisions of the Development Plan and the applicant is requested to comment on this matter. The applicant in response contends that the

contravention would be in the interest of the proper planning for the town of Oranmore.

Impact on Environmental Designations

Point 10 requires the applicant to comment and consult with the Department of the Environment, Heritage and Local Government in relation to the impact of the proposal on the SPA. It is stated that some disturbances will be caused by the construction phase of the development but there will be little amount of disturbance once the development is complete and people are confined to regular areas. The overall impact is considered to be slight as the feeding area for birds is large.

Point 11 requires the applicant to submit additional details as to how the applicant proposes to construct the development with minimal intervention to the salt marsh. It is proposed to limit the impact on the salt marsh by confining the construction activities to a defined fenced off area the boundaries of which are indicated on Drg. CP08. The works to be carried out within this area including mitigation measures are set out in the response. It is suggested that the construction of this road will have short-term negative impacts.

Item No. 12 of the request for additional information relates to bin storage areas and storage loading and unloading areas for the retail units and this issue has been addressed in The Waste Management Plan submitted as Appendix 6.

Heritage and Archaeological Issues

Heritage and archaeological issues were raised in Points 13 to 20 and all these issues have been addressed in the heritage and archaeological report submitted in Appendix 5 of the submission. In relation to the protected structures it was acknowledged that further alterations may be required in order to comply with Part M and Part B of the Building Regulations. This may materially affect the character of Oranmore House and could require a further planning application. The internal partitions to be removed from the half landing and stairs of Oranmore House are of 1980s construction. Detailed specifications of the materials to be used in the extensions to the protected structure are indicated on the revised drawings submitted. The requirements for scheduling the conservation and consolidation of the thatched roof maybe conditioned as part of any grant of planning permission. The relationship of the proposed development to nearby protected structures is indicated on the contextual sections and perspectives incorporated on the revised drawings.

A conditioned survey of Oranmore Castle is not feasible as it is not within the site or within the applicant's ownership. The impact of the proposed development on the old brewery is imperceptible. Agreement will be reached in consultation with the Heritage Office in the context of an overall plan for museums in the county context.

Impact on Salt Marsh

In response to Point 21 the area of the site covered by salt marsh is described and amounts to 4.84 hectares on the north coast and 1.48 hectares on the west coast. The building adjacent to the roundabout (Plot 16) will require approximately 1.4 hectares of the habitat and the museum requirement (Plot 1) will also require approximately 1 hectare. Any damage sections of salt marsh will be regraded using topsoil.

Aquifer Protection
In response to Point 23 a method statement for the protection of the aquifer during construction is outlined.

Services
In response to Items 26 to 32 details of service layout in relation to manholes and interceptors are set out on Drgs. CP01 and CP01B and CP09.

Sightlines
In relation to Item 33 which relates to sight lines, an additional traffic survey was carried out, the details of which are attached to Appendix 7. It shows that the 85% percentile speed is 25 mph and the splay dimensions proposed are for a road with a 25 mph design speed. Site visibility splays are indicated on Drg. CP07.

Devaluation of cSAC and SPA
Regarding Item 34 it is stated as mentioned above the impacts of this and other projects in the Oranmore area will be local only and will not lead to a significant devaluation of the cSAC or SPA.

Surface Water Disposal
Item 35 relates to surface run-off, it is that the Oranmore Stream is not a salmonid stream. It is noted that the stream is slightly polluted currently. The submission goes on to outline mitigation measures in relation to accidental spillages using UK guidelines for typical pollutant build up on surface areas. The submission demonstrates that routine storm run-off from the proposed development will have a slight long-term negative impact on receiving water quality and this would be reduced to imperceptible when dilution by tidal mixing takes place combined with petrol interceptor mitigation measures.

Flooding and Coastal Defence
The amount of land to be infilled to reduce flooding is indicated on Drg. P-02A.
In relation to coastal defence measures it is stated that the sea wall and rock armour are to be provided in this regard and these are shown on Drg. CP04.

Project Description
Item 38 of the additional information request related to a detailed description of the project from which the likely impacts of the environment can be established. A detailed description of the project is given in Appendix 8 of the submission.

Ecological Report on Intertidal Area
In response to Item No. 39 further details in relation to the ecology section of the EIS is contained in a further report attached to Appendix 9. In relation to Item No. 40 it is stated that a survey of the inter-tidal area has now been completed and this is contained in the aquifer report attached as Appendix 9.

Water Quality
Item 41 relates to supplementary information contained on water quality. Water quality sampling was carried out on three locations on the 21st January 2004. Details of the chemical quality of the water are set out in Table 5. The chemical quality results indicated relatively unpolluted water at all three sites.

In response to Item No. 42 it is stated that during the construction phase all surface water run-off from the site will be passed through settlement ponds.

Further Reports Prepared on Foot of Additional Information Submitted

- A report from the Water Services Section dated 05/04/05 2004 stated that there was no objection to the proposal subject to conditions.

- A further letter was submitted by H.G.L. O'Connor & Company (22/04/2004) on behalf of the applicants indicating measures which would be taken to ensure the protection of the graveyard wall from construction activities.

- A handwritten report from the Roads Department dated 01/05/04 states that on foot of numerous meetings with the applicant the Roads Department are generally satisfied with the proposed development subject to certain conditions.

- A further memorandum dated 3/5/2004 from the Heritage Officer requires a number of conditions in relation to archaeology and the protection of the graveyard wall. It is suggested however that the applicant has not fully addressed all heritage issues. Further details are required in relation to the shoreline development adjacent to the cSAC boundary. Likewise further information is required in relation to the museum building.

- A letter from Dominic Delaney & Associates, Archaeological Consultants, dated 15/04/05 notes that the structural integrity of the graveyard wall may be potentially compromised by the construction of the proposed development. This matter has been brought to the attention of the applicant's consulting engineers and a structural engineer has been appointed to examine the potential impact. A further report was submitted dealing with this issue on 28th April 2004.

- An internal memorandum of the 5th May 2004 to the planning authority from Christina O'Sullivan (graduate environmental scientist) notes that the Waste Management Plan for the construction phase of the development contains no specific details on the amount of waste that will be produced and the proposed destination of the waste. It is also suggested that during the ongoing operation of the development a condition should be included requiring the developer to provide for segregated collection of waste.

Further letters of objection were submitted on foot of the additional information submitted.

Planning Authority's Request for Clarification of Additional Information

The planning authority wrote to the applicants on 13th May 2004 requesting clarification of additional information on nine issues.

Items 1 to 5 require additional information in relation to the full impact of the proposed development on the SAC, SPA and general marine environment.
Item 6 requires further public notices.
Item 7 requires changes to the overall design scheme.
Item 8 will require the removal of the proposed museum on the grounds that it will interfere with views of Oranmore Castle.
Item 9 argues that the proposed development and the interference with the SAC area within the site has not been adequately addressed by the developers.

Submission of Clarification of Additional Information on behalf of the Applicant

Further information was submitted on 14th June 2004.

Further Information on cSAC and SPA
A more accurate habitat classification was carried out and the loss of salt marsh habitat will be reduced from 2.4 hectares to 1.2 hectares. Additional maps were submitted indicating the habitat losses. Also enclosed is a detailed response prepared by Kelvin & O'Sullivan Associates, which details habitat survey results. It states that consultations have taken place with the DOEHLG and Birdwatch Ireland. Details of the phasing of the construction of the development have also been discussed with Department of Environment Representatives. The report prepared by Kelvin & O'Sullivan Associates refers to impacts on the marine environment.

Plot 16
It is proposed to omit the additionally proposed building at the bridge so as to avoid the inclusion of an element not previously indicated on the site layout plans. This building can be part of a separate application at a future date.

Design Changes
In relation to open space while it is acknowledged that not all the units strictly comply with the open space requirements, on balance the proposed units are more appropriate from an urban context. Revised plans are submitted for Blocks 5 and 6 indicating additional areas of open space. It is not proposed to change the height of the buildings along the Main Street.

Museum Building
It is further stated that the site selected for the museum is a fulcrum to the urban design. The site allows for a bookend to the promenade frontage as a balance opposite the castle.

Finally it is stated that the amended documentation enclosed takes into account the detailed concerns of the Department of the Environment representatives to mitigate against impacts as far as possible.

Further Reports on foot of the Clarification of Additional Information submitted to the Planning Authority

- A report from the DOEHLG dated 10th May 2004 requested additional information be submitted.

- The planning report dated 29/9/2004 noted the various submissions made by objectors and agencies in relation to the proposed development. It is also stated that the elected members passed a material contravention in relation to the proposal on 27/9/2004. It is noted that the proposed development falls within an SAC area, however on foot of the information submitted on behalf of the applicant, the planning authority is generally satisfied with the proposed mitigation measures to minimise impacts. It is noted that the applicant has consulted directly with the Department of the Environment, Heritage and Local Government on some of these issues. Other aspects of the proposal are generally deemed to be suitable. It was therefore recommended that planning permission be granted for the proposed development.

In its decision dated 30th September 2004 Galway County Council issued notification to grant planning permission for the proposed development subject to 31 conditions.

Condition No. 3 requires that not more than 250 residential units shall be provided in the overall development.

Condition No. 5 requires that those elements of the proposed development which are four-storeys in height, particularly Plot 3 (shopping centre) shall be reduced to three-storey. The maximum height of any building above ground level shall not exceed 12.5 metres.

Condition No. 6 requires that the proposed museum building shall be omitted from the overall development as currently proposed. The developer shall make provisions for the provision of a community/amenity/recreational facility of a similar floor area elsewhere in the overall development to be agreed with the planning authority prior to the commencement of development. The area on which the museum was originally proposed shall be developed and landscaped as additional amenity area, details of which are to be agreed with the planning authority prior to the commencement of development.

Condition No. 31 requires that the developer pay a contribution of €2,126,000 to the planning authority in accordance with the provisions of Section 48 of the Planning and Development Act 2000.

GROUNDS OF APPEAL

The decision of Galway County Council to issue notification to grant planning permission was appealed by three third parties two of which are represented by Percy Podger & Associates and one was submitted by Peter Sweetman and Associates. The grounds submitted in all three third party appeals are outlined together below.

- The proposal is not in accordance with the proper planning and sustainable development of the area but merely seeks to maximise the development potential of the lands. This SAC, SPA and NHA together with Oranmore Castle are major tourist attractions for Oranmore and these attractions will be lost as a result of the proposal.

- The wording of the conditions leaves a large amount of issues to be determined for the planning authority and the developer.

- The mitigation measures proposed in the EIS are deemed to be inadequate.

- The castle will be adversely affected by the proposal. It is suggested that building in and around Oranmore Castle will result in "killing the goose that laid the golden egg".

- It is suggested that many of the conditions attached to the grant of planning permission are deemed to be inappropriate in that they exclude public participation and this is not in accordance with the requirements of the EIA Directive.

- The proposal will result in severe traffic congestion.

- Part of the area on which it is proposed to build is subject to regular flooding.

- Condition No. 12 requires the applicant to consult with the Parks and Wildlife Section of the Heritage Division of the Department of the Environment regarding the cSAC and SPA. This is contrary to EU law as it is a requirement to the EIA and Habitats Directive that the planning authority in making a decision must have relevant facts before them. The condition indicates that no proper assessment has taken place. Reference is also made to the reasoned opinion of the EU Commission dated 6/8/2001 in that post-consent monitoring should not constitute a substitute for the provision of all and adequate information as part of the EIA process.

- The proposed description of the development is inadequate and it is not clear how many residential units have been granted planning permission.

- The file has not been made available for public inspection.

- The Board are requested to ensure that the planning authority pay costs to the applicant's agents who had to repeatedly travel to Galway in order to study the file where information in relation to the application was not set out on file in accordance with Section 7 of the Planning and Development Act 2000.

- The material contravention procedure is invalid as one of the councillors proposing the material contravention has a conflict of interest in the scheme. It is stated that the councillor is a future occupier of one of the dwellings owned by the applicant.

- The proposed dwelling will damage the SPA and cSAC and such developments are only permissible for imperative reasons overriding the public interest.It is argued that there is no imperative reason to grant planning permission in this instance.

- The EIS does not have a true description of the site, design and size of the project.

- The development requires a Foreshore Licence and there is no evidence to suggest that such a licence is forthcoming from the DOE.

- No need has been established for the proposed development.

- It is clear from the information contained on file that the Department of Environment, Heritage and Local Government have clear concerns in relation to the proposal.

- The cumulative impacts of the proposal have not been adequately assessed.

The third party appeals also contain a number of appendices and these include:

- A letter of objection by Kathleen McDonagh complaining about flooding in the area of the site.

- A report by M. J. Design Consulting Engineers contained in one of the grounds of appeal objecting to the proposed development on grounds relating to

  - Restricted sight lines,
  - Inadequate open space,
  - The removal of salt marsh,
  - Impact on residential amenity during the construction and operational phases,
  - The need to reduce the height of the buildings so as to be compatible with existing buildings in the area,
  - Over-intensification of use on site,
  - Traffic congestion which will amount to an additional 700 to 1,000 cars per hour on the surrounding road network,
  - Deficiency in car parking spaces,
  - Noise pollution for surrounding residences,
  - Devaluation of property on grounds of overlooking and loss of light,
  - Adverse impact on visual amenity,
  - The proposal to infill the bay will prevent flooding thus resulting in a major ecological impact,
  - A letter submitted by Mary Spelman objecting to the proposal on grounds of flooding is also attached to the submission.

The submission also contains details of the planning application and various correspondence between the planning authority and the applicant as well as details of

the reasoned opinion by the Secretariat General regarding complaints received by the Commission concerning Ireland's implementation of the EIA Directive 97/11/EEC. Numerous photographs are also attached to the submission indicating flood levels. UK Government Guidelines in relation to flood risk are also attached.

GROUNDS OF FIRST PARTY APPEAL

The grounds of first party appeal specifically relate to four conditions. The grounds of appeal have been submitted by A. P. McCarthy, Planning Consultants Limited on behalf of the applicant and are briefly outlined below.

Condition No. 3 requires that not more than 250 residential units be provided within the overall development. The reason for this according to the decision is to ensure compliance with the requirements of the County Development Plan strategy. The reason for this condition is purely to comply with household numbers contained in the settlement strategy. It is suggested that the arbitrary removal of a significant proportion of development as required by Condition No. 3 will detract from the coherence of the overall proposal. It is suggested therefore that the 297 units as proposed on foot of the additional information submitted should be allowed. In the event that planning permission is granted it is unlikely that the development will be completed before 2010. The new County Development Plan will almost certainly provide for future household growth in Oranmore and the proposed development by the time of its completion is unlikely to exceed the Council's Settlement Strategy.

Condition No. 5 requires that those elements of the proposed development which are four-storey in height particularly Block 3 (shopping centre) shall be reduced to three-storey. The maximum height of any building above ground level at public elevation shall not exceed 12.5 metres or as otherwise agreed in writing with the planning authority prior to the commencement of development. The applicant is somewhat unclear as to the precise requirements/implications of this condition. The existing buildings at their public elevation are three-storeys with a four-storey setback. As a result at public interfaces the buildings read as three-storeys. The condition does not specify where the level of 12.5 metres is to be taken from and consequently it is assumed that it refers to the finished floor level at ground level. The four-storey element contained within the development is centrally located and will therefore have no undue visual impact from existing streets or Oranmore Castle as the entire development is stepped down to two-storeys in height around the perimeters. In urban design terms a variety of height is desirable in order to add interest and visual variety. It is therefore suggested that this condition should be omitted.

Condition No. 6 requires the omission of the museum building from the overall development. The inclusion of a museum building in this development arose from an approach to the applicants at pre-planning stage. On further extensive subsequent consultations detailed plans were prepared for the museum building although no formal agreement was entered into between the applicants and the promoters of the children's museum. The museum building formed an integral part of the overall development providing a bookend to the public promenade area. It is suggested that the museum site is an ideal site for a civic/cultural building such as a museum. The applicants have made it clear that while they have no objection in principle to the planning authority

deferring a grant of planning permission on this specific museum building they wish to retain the principle of providing such a building on site.

Condition No. 6 also requires the applicant to make provision for community / amenity / recreational facilities available elsewhere within the overall development. It is argued that significant amounts of community facilities are already apparent. These include the Gaelscoil, the Castle Quarter, the seafront promenade and the Market Square as well as substantial open space. The Castle Quarter (Plot 10) is not considered a commercial but rather a craft/cultural element. Preliminary construction costs for the overall development indicated that the social community element of the proposal amounts to approximately 17% of the overall preliminary budget.

Condition No. 31 requires the developer to pay €2,126,000 as a financial contribution under the provisions of Section 48 of the Planning and Development Act 2000. It is acknowledged that this contribution is based on an adopted contribution scheme. However it is suggested that the contribution is extremely onerous having regard to the outdoor community/cultural/educational/recreational and amenity space being provided. There are also significant infrastructural costs associated with the development including the relocation of the major public sewer and the provision of a link road, which will benefit the entire village from a circulation and access point of view. The financial contribution makes it extremely onerous and raises the issue of viability of the overall development from a financial viewpoint. There is considerable precedent whereby a portion of the development contribution is offset against the provision of additional public/recreational/community facilities and it is suggested that such an arrangement could be employed with the current scheme.

A number of appendices are attached to the submission.

Appendix 1 provides a detailed breakdown of the proposed development in terms of gross floor area prior to and after the revised scheme submitted on foot of the further information request.

Appendix 2 contains a grant of planning permission issued by Galway County Council

Appendix 3 contains a preliminary breakdown of construction costs for the overall development.

OBSERVATIONS

The Oranmore Community Development Association Limited submitted one observation. The submission from the Oranmore Community Development Association wish to offer the support for the above town centre development. While the Community Development Association originally had concerns, these concerns have been allayed as clarification has been given on a number of issues. Furthermore a number of conditions attached to the planning permission considerably improve the overall design and integrity of the scheme by reducing its scale and intensity. Oranmore has experienced phenomenal housing growth since 2001 with the rezoning of some 472 acres of agricultural land. Oranmore now hosts a population excess of 5,000 persons. While the village is emerging as a town, its infrastructure in terms of

traffic, commerce and amenity is still very much based on the original village structure. The observers are keen to ensure that the emerging town of Oranmore is developed in a fully integrated manner and does not develop as a dormitory town relying on neighbouring Galway City to meets its infrastructure and service needs. The proposal is an integral part of achieving this objective.

It is also suggested that a number of conditions attached to the planning authority decision require greater clarification and in this regard particular reference is made to Condition No. 6. It is suggested that Condition No. 6 can only be achieved by the deletion of either the grant of Gaelscoil or some other element to make provision of a facility in excess of 30,000 square feet. Condition No. 6 would appear to be a contradiction in terms in that, if complied with, some of the other conditions specified in the remainder of the grant of planning permission cannot be fully met or complied with. It is therefore requested that Condition No. 6 be revised as follows:

> "The developer shall make a financial contribution of an equivalent amount to which it would be incurred under Condition No. 6. The financial contribution to be for the provision of a youth and recreational centre on nearby lands in the village centre owned by Galway County Council and leased to the Oranmore Community Development Association".

A proposed map is attached indicating where this youth and recreation centre could be located.

APPEAL RESPONSES

First Party Response to the Grounds of Third Party Appeal

P. McCarthy, Planning Consultants Limited submitted the following first party response to the third party appeals. The response by A. P. McCarthy, Consultants Limited outline the site location and description, the Development Plan provisions as they relate to the site, a description of the proposed development and details of the chronology of the planning application before specifically dealing with the grounds of appeal.

It is acknowledged that a small portion of the development as originally proposed did contravene the zoning objectives of the Development Plan. However this matter was overcome when Galway County Council unanimously passed material contravention of the Oranmore Development Plan. It is argued that the other requirements of the Development Plan were all fully complied with in the proposed development. While not all of the units may strictly comply with open space requirement it is considered that flexibility could be employed having regard to the urban nature of the development.

In overall design terms the proposal constitutes a cohesive and appropriate extension to the village core of Oranmore. Visual representations of how the proposed development would blend in with the existing village are indicated on the photomontages contained in Appendix 1 and 2. Overall the development will result in a vibrant and thriving town centre.

In relation to the impact on the cSAC, Section 5.3 of the EIS describes the impact on flora and fauna. Additional ecological information was submitted on foot of a request from the planning authority and the latter ecological report dealt with the likely impact of the proposed development on the designated site and consultations took place with the Wildlife Service and Department of the Environment, Heritage and Local Government. It is therefore argued that a competent and significant ecological assessment was carried out on the proposal.

While it is noted that the appellants have raised concerns regarding the nature of the conditions which require agreement between the developers and the planning authority, without the benefit of public participation, this is considered to be standard practice and on foot of the information submitted with the planning application and subsequent information submitted as part of the processing of the application it is contended that the planning authority had all the relevant information on file at the time of decision. The material contravention procedure was initiated when the planning authority were satisfied that all outstanding issues had been dealt with. All requirements of the Planning and Development Regulations were adhered to during the material contravention process.

In relation to flooding it is contended that this issue was adequately dealt with in the EIS and a subsequent report (see Appendix 7 of response) was prepared by a hydrologist which indicates that the finishing floor levels of the proposed buildings will be 4.5 metres O.D. which represents a 200 year high tide level plus a freeboard of 500 millimetres. In addition defences of 5 metres O.D. are recommended along the more westerly exposed section of the site. The report concludes that the proposed loss of tidal flood storage will not result in any measurable displacement of tidal waters to the surrounding local flood prone lands or adjoining properties.

In relation to the impact of the proposed development on the castle, it is argued that the north and west elevations of the castle address the bay. Furthermore the recent construction of the school in the vicinity of the site has greatly altered the context in which the castle is viewed. The framing and maintenance of significant views to the castle is fundamental to the urban design strategy utilised in preparing the plans for the proposed development. The proposal has been designed in order to ensure that both views to and from the castle area maintained while facilitating the necessary expansion of the village of Oranmore. It is concluded therefore that the proposal will not adversely affect the character and setting of the castle.

In relation to traffic congestion, the Environmental Impact Statement carried out a detailed study of forecast traffic levels for the year 2017 (estimated completion date plus 10 years after the proposed development). The analysis demonstrates that the existing road infrastructure has the capacity to handle the anticipated traffic generated by the development. Improvements in public transport will serve to reduce the impacts of the development and release further capacity in the village. The proposed access points have been designed in accordance with relevant standards and having regard to traffic speeds within the village (85% of traffic travels at 25 mph or slower would indicate that sight lines are appropriate in both directions). Problems in relation to traffic have been appropriately addressed through numerous meetings with the Road Design Section of Galway County Council.

While it is acknowledged that there is a shortfall in the provision of car parking and this shortfall amounts to 265 spaces it is suggested that having regard to the mixed use nature of the proposal that there will be considerable overlap and dual/multi usage of spaces, peak demands for all elements will not coincide this will result in a more efficient use of available spaces.

The EIS was prepared in accordance with the requirements of all relevant statutory instruments. The EIS was augmented with further additional information submitted to the planning authority on foot of a request in November 2003. Furthermore numerous meetings were held with the National Parks and Wildlife Service (NPWS) and the regional manager of the DOEHLG with particular regard to the cSAC and the SPA. It is argued that the area of cSAC, SPA and salt marsh that will be affected by the footprint of the development is relatively small. The issue of compensation for the loss of habitat was also discussed during the consultation exercise but no agreement could be made at the time. Condition No. 12 of the planning authority decision requires consultation and liaison to allow for an agreement to be reached in relation to the compensation of loss of habitat. The matter of compensation is an ongoing issue that in the event of a favourable consideration from the Board this issue will be agreed with NPWS. It is argued that an adequate assessment has been carried out. Condition No. 12 has been attached to a grant of planning permission to ensure that all mitigation measures agreed upon are put in place and maintained.

In relation to the recent opinion of the European Commission it is again argued that a full and comprehensive EIA and associated documentation has been submitted to the planning authority prior to the decision being issued.

In relation to overlooking and particularly having regard to the elements along Bothar na Riasca (along the northern boundary of the site) it is argued that the separation distance between the proposed development and existing properties is more than adequate when an urban context is taken into account. It should also be noted that the majority of the site is currently zoned for town centre uses. Adequate landscaping and screening can be provided if it is considered that overlooking is an issue.

Having regard to the impact on tourism it is considered that the proposed development will have a significant beneficial impact on the local tourist industry. The proposal will provide additional tourist accommodation and recreational amenities.

In relation to noise pollution, it is stated that the EIS in Section 5.7.3.2 has detailed the impact of the proposal and the relative mitigation measures which would be put in place during the construction phase. The construction of the development will be carried out in phases and as such only a portion of the site would be under construction at any one time. This will limit the level of nuisance/noise experienced.

In relation to the need of the proposed development both the Galway County Development Plan and the Oranmore Development Plan have clear concise policies and objectives to facilitate the expansion of Oranmore. The proposal fully complies with these policies. The provision of a village centre development will ensure that Oranmore does not become a more dormer satellite town for the city of Galway. The proposal also provides much-needed amenities for the village.

The applicant acknowledges that a Foreshore Licence is required and all relevant approvals and licences shall be applied for.

In relation to cumulative impact it is acknowledged that other applications including an application for 134 dwellings and one crèche is currently before the County Council. Notwithstanding this, it is considered that extensive consultations have taken place with relevant authorities and that all requirements of these authorities have been adhered to throughout the application process. Statutory bodies have been kept informed of issues arising and every effort has been made to minimise the potential adverse impact on the environment. The assessment of this application was not carried out in isolation and was viewed in the context of the overall development strategy for Oranmore.

Finally in relation to archaeology/heritage the Environmental Impact Statement and additional information submitted in support of the application have dealt with archaeological issues in a comprehensive and detailed manner. It is respectively suggested that the proposed development will not have a negative impact on the archaeology of the area.

Eight appendices are attached to the appeal response.

FURTHER SUBMISSIONS

A letter was received from the Board from Maureen & Oliver Foley which states that an objection lodged with Galway County Council regarding a completely different development was inadvertently submitted to An Bord Pleanála as part of one of the third party appeals. The inclusion of this objection implies that Maureen & Oliver Foley are objecting to the White Cedar Development Project in Oranmore. Maureen & Oliver Foley wish to state that they are not objecting to the development in question.

A further submission by Mr. Podger wish to state that he fully supports the grounds of appeal submitted by the other parties. An article is attached which indicates that the EIS has not fully assessed the cumulative effects of the proposed development.

A further submission by Percy Podger & Associates argues that the proposed development will destroy the setting and context of Oranmore Castle and it is considered that the developer's appeal should be disregarded.

DEVELOPMENT PLAN PROVISION

The site is governed by the policies and provisions contained in the Oranmore Development Plan 2001.

The site is governed by three separate land use zonings under the Oranmore Development Plan 2001. The eastern portion of the site to the rear of the existing buildings fronting onto Main Street is zoned village centre/commercial. A rectangular area located in a southern part of the site fronting onto Castle Road is zoned for

amenity and civic recreational purposes. The western portion of the site adjacent to the bay and a northern part of the site contiguous to the Oranmore River is zoned amenity/ environment.

The elected members passed a material contravention of the plan on 27/9/2004. Details of the material contravention were submitted to An Bord Pleanala on the 21/02/05.

Section 2.4 of the Development Plan outlines the Oranmore Development Strategy. The Plan ensures that the future growth and development of Oranmore considers the existing village centre. In particular the commercial vitality of the centre will need to maintained and reinforced. It is also the intention to protect the residential character of the village so as to ensure a living centre.

Section 3.3 of the Development Plan outlines the existing land use pattern for the village. It notes that there is a notable lack of office space in the village, which indicates that most people tend to travel to Galway City to avail of services. There are few infill opportunities along the Main Street. Many of the backland sites in the village centre are suitable for commercial development however accessibility is a problem.

Section 3.3.4 outlines the public/institutional lands in the village and refers to the site in question. It states that the future use and development of these lands will have a significant influence on the future character of the village.

Section 4.1.1 of the Development Plan outlines the proposed Natural Heritage Areas as they relate to the site. The designation of an NHA will not prevent any landowner from developing the lands in question. However it is EU policy that any developments undertaken are compatible with the protection of the environment. The wetlands in question, it is noted in the Development Plan, have a number of important characteristics including offering excellent wildlife habitat to a range of species.

The design population for Oranmore is 5,000. The Plan therefore aims to accommodate an additional 2,119 persons or approximately 675 households. The Plan states that any retail units should ideally be located within the existing village core thereby reinforcing the existing commercial viability of the village.

Section 5.3 of the Development Plan relates to the designation of a commercial core. It states that given the population forecast for Oranmore and its catchment area together with the potential demand for future commercial uses it is felt that some additional land close to the village core will need to be zoned for commercial use. Factors consider in the future zoning of commercial lands include the reinforcing and maintenance of the existing village structure and its townscape, maintaining and complementing the existing businesses and retail outlets, accessibility and parking provision. The common owned lands lying between the bay and Main Street and north of Castle Road are centrally located and therefore a desirable option which merits consideration for commercial expansion. It is desirable to retain the football pitch in this area however. Part of this site is delineated as a proposed Natural Heritage Area and is liable for flooding. Because the site extends along the bay and the shoreline, which is being identified as an important visual and recreational amenity to the

inhabitants of Oranmore, it is important to retain much of the site for this purpose. The remainder of the site is deemed suitable for commercial development.

PLANNING ASSESSMENT

Issues Raised in the Third Party Appeal

Contravention of Zoning

The grounds of appeal argue that the proposed development contravenes the zoning provisions designated for the site in the Oranmore Development Plan 2001. The elected representatives passed a material contravention procedure on the 27/9/2004 (see planner's report dated 29/9/2004 (Page 3) and information received by the Board on the 21/02/05). The proposed development therefore has addressed any material contravention matters in this regard.

Over-development of the Site

It is argued that the proposed development constitutes overdevelopment of the site. The Development Plan sets out a plot ratio standard of 1.25 for development in the town centre. The plot ratio in this instance amounts of 0.55, less than half that permitted under the standards set out in the Development Plan. Furthermore the Development Plan states that the local authority may use its discretion where it is considered appropriate in the interest of the proper planning and sustainable development of the area to allow variations in plot ratio. The proposed development in this instance seeks to provide an urban extension to the existing village. I consider that the planning authority have appropriately exercised its discretion in relation to applying strict development control standards and these are referred to in more detail further on in the report. While the proposed development accommodates buildings of up to four-storeys in height and may not comply with various standards set out in the Development Plan in relation to separation distances, overlooking, private open space provision etc, such exception should be permitted in my opinion to ensure that suitable urban quality is achieved in the design approach. I consider that the development proposed employs a suitable and strong urban form with the incorporation of squares and perimeter blocks with strong urban edges. An 'urban' as opposed to 'suburban' extension may result in some blocks contravening various standards set out in the Development Plan. However it is my view that the urban design objectives to create an appropriate urban town centre extension should override any perceived contravention of standards in relation to height and density and site coverage or plot ratio. Finally I do not consider that any perceived overdevelopment will adversely impact on the residential amenity or otherwise for the town.

Impact of the Proposal on cSAC and SPA

Most of the development work will take place outside the environmentally sensitive areas which are designated as cSAC/SPA. It would appear from Drg. P003 and Drg. P12 (submitted to the planning authority on 2/6/2004) that only Plot 1 and parts of Plots 6 and 10 will encroach upon the SAC boundary. In the case of the SPA boundary only Plot 1 will intersect with the boundary. According to the information submitted in

the clarification of additional information (14th June 2004) only 1.16 hectares of the cSAC and 0.14 hectares of the SPA will be impacted upon by the footprints of the proposed buildings. Furthermore it is clear from the drawings that if Plot 1 (museum building) were to be omitted, as required by a planning authority condition, the direct impact on the ecologically sensitive area would be greatly diminished.

What is also clear is that the area of land to be affected by the proposed development is miniscule in terms of the total area designated as SAC and SPA. This designation covers the whole Galway Bay complex.

Furthermore I consider that the applicant has undertaken a reasonable amount of investigation into the impact of the proposed development on this ecologically sensitive area. In addition the applicant has employed appropriate mitigation measures to ensure that the impact will be kept to a minimum. The greatest impact is likely to occur during the construction phase and any impact during this phase is described as being of a temporary and negative nature particularly on the salt marsh. The temporary nature of the impact is unlikely, according to the information submitted, to cause a permanent loss of habitat. Construction work on the coastal boardwalk will not take place during the winter months and this will minimise any disturbance to birds.

As proposed, the development would result in a loss of approximately 1 hectare of salt marsh. A possible mitigation measure as outlined by the applicant would be the replacement of the habitat in the vicinity of the site. I suggest however that if the museum building were to be removed altogether from this location the impact on the salt marsh would be greatly reduced.

In terms of the impact of the proposal on the bird population, it is suggested that wading birds can become habituated to human presence and may still be able to use areas of mud flats near to the development after the construction is completed. Furthermore there are other alternative sites in the vicinity for feeding and breeding.

In conclusion therefore while the proposed development will have an adverse impact on the areas of salt marsh, the impact could be substantially reduced with the removal of the museum building. In addition I am satisfied that the applicant has suggested appropriate mitigation measures during the construction phases to reduce the impact of the proposed development on the SPA and cSAC. I therefore do not consider that the proposed development should be refused on the grounds of the potential impact of the proposed development on the environmentally sensitive areas designated SPA and SAC.

Impact on Oranmore Castle

Oranmore Castle is located to the south-west of the site and is accessed via Castle Road. The historic importance of the castle is well documented on file. The castle is located on a prominent site along the coast. The castle is highly visible especially from vantage points along the Old Dublin – Galway Road and to the north of the bridge. Views in the vicinity of this area are depicted on the information submitted to An Bord Pleanála on 4/2/2005 (see Photomontage 8). The castle provides an important visual landmark for the village of Oranmore. Views of the castle are very apparent from vantage points to the north of the site. The undeveloped lands in the foreground

accentuate the relative isolation of the castle. This adds significantly to the scenic quality of the castle.

Having regard to the current setting of the castle any development on the townland of Innplot will detract, to some extent, from the panoramic views of the castle currently enjoyed from vantage points to the north of the site. It is apparent from photographs taking during the site inspection and the photographs submitted with the application that recent developments on the southern side of Castle Road has already encroached upon and adversely impacted on the scenic isolation of the castle when viewed from the north. The proposed development will undoubtedly impact on these significant views of the castle. However the Board should have regard to the fact that the lands in question are zoned for development and it is therefore the objective of the planning authority to allow for the development of the lands in the question. Furthermore the lands having regard to their central location within the town and immediately adjacent to Main Street are ideally suited for any commercial expansion to the village in question. I consider such an expansion to be necessary having regard to recent developments of a residential nature in the vicinity of the village and the likelihood of the continuation of this residential expansion. It is important that the commercial base of the town is expanded to ensure that the village of Oranmore is not transformed into a residential dormitory town associated with Galway City.

It is my opinion that the western perimeter blocks with the exception of the museum building create a good urban edge to the development. It is clear from view 8 of the photomontage referred to above, that views of the castle are apparent from vantage points just north of the bridge. It is from this point in the vicinity of the bridge and from subsequent vantage points further west that the visual envelope of the urban extension proposed will terminate and that views of the castle come into view.

It is my opinion that the location of the museum building does not complement or facilitate views of the castle from the Old Oranmore – Galway Road. The museum building is the only building to be located on the western side of "Siul na Mara". The vantage points chosen in the photomontages are quite selective. They depict the castle as the terminating vista along Suil na Mara. If one was to view the castle from vantage points further west along the Old Oranmore – Galway Road the museum building would interfere and screen views of the Castle. While I consider the contemporary design of the museum building to be of a high quality, such contemporary design in my opinion would detract from the historic setting of the castle. The more traditional designs associated with the buildings in the main part of the development are of a more appropriate scale and design in the overall context of the castle setting. I therefore consider that the view of the castle in the context of the overall development would benefit to a greater extent if the museum building were to be omitted.

Strong visual references to the castle have been incorporated within the layout of the proposed development. The vista along Riarc an Cashlain is terminated with views of the castle. The overall design and layout of the proposal has particular regard to the setting of Oranmore Castle and this aspect of the layout and design of the development is most welcome.

The Requirement for the Proposed Development

It is argued in the grounds of the third party appeal that the requirement for the development has not been established. It would appear that the need for the development has been established on a number of levels. The zoning provisions contained in the Development Plan supported by the material contravention procedure adopted by Galway County Council acknowledges the need for additional town centre uses. This fact is referred to in Section 5.3 of the Development Plan where it is stated "given the population forecast for the Oranmore area and its catchment area together with the potential demand for future commercial uses, as identified in Section 4.2.2 of the Plan it is felt that some additional land close to the village core will need to be zoned for commercial use".

Furthermore the population projections indicate in Section 4.2.1 together with the estimated potential development land, which amounts to an acreage of 400 acres, would indicate that there is significant potential for expansion of both the village and the town centre.

The Retail Impact Assessment submitted by the applicant in response to the additional information request likewise suggests that an expansion of the commercial core would be commensurate with the proposed expansion of the town. The site in question is fully in accordance with the sequential test.

As already referred to above, without such commercial expansion of the village centre, Oranmore would become a commuter village completely dependent on Galway City for services and employment. Such a scenario would not be in the interest of the settlement strategy for the county.

Impact on Flooding

It would appear from the information contained on file that the site in question, particularly the coastal area is subject to periodic flooding. This is illustrated in the photographs submitted in the appeal on behalf of M. & N. Concannon and Others. However I find it difficult to believe that the floodwaters reach the level indicated in the photographs contained in Appendix 5(1). Such levels would have resulted in the complete inundation of Oranmore village and surrounding lands. The proposal will require infilling of the site in question. This will result in the displacement of floodwaters along the coastal areas. I refer the Board to the report prepared by Anthony Cawley, of Hydro Environmental Limited. (Appendix 7: Applicant's response to grounds of appeal). The report acknowledges that tidal surges occurred along the coastline. References are particularly made to two occurrences in 1995 and 1997. It is perhaps these flood events that are depicted in the photographs submitted in the grounds of appeal. It is from the above flooding events, which gave rise to flood levels of 3.49 metres, O.D. and 3.48 metres O.D. respectively. It is from these figures that a 200 year return period flood level of 3.98 O.D. is estimated. The lowest proposed finished floor level is 4.5 metres O.D. – 0.5 metres above the 200 year high tide levels.

It is also estimated that the proposed infilling will result in the loss of approximately 28,000 cubic metres of flood storage area. These volumes in the context of the overall tidal volume of Oranmore Bay are miniscule. The report goes on to argue that the

removal to infilling will not materially affect the height that the high tide eventually reaches. The report concludes therefore that the proposed development will not in any way encroach on the functional floodplain. I generally concur with the conclusions reached in the above report. The volume of flood storage loss would be negligible in the context of the overall water volumes in Oranmore Bay. The proposal may result in a slight increasing in the tidal egress along the river channel of the Millpot River during times of flood. However it would appear that the floodplain, and the volumetric storage area associated with the river channel, will be more than capable of accommodating this slight increase.

Traffic

Traffic issues are also an important consideration in determining the application. The cumulative effect of traffic on the road network of Oranmore Village resulting from the proposal in conjunction with other developments recently constructed or planned should be considered. Oranmore has experienced rapid expansion in recent years and this has resulted in some traffic congestion especially along the Main Street. The Board will also note that there are a number of other applications in the town centre which are currently under appeal (PL07.210065 – 51 apartments and 16 retail units and PL07.209215 – 78 apartments. Both sites are located on the eastern side of the Main Street).

The proposed development currently before the Board should be seen in a positive light in terms of encouraging and promoting sustainable transportation modes. The mixed-use nature of the development allows for retail, residential and employment activities to be located in close proximity. This will reduce the relative demand for travel. In addition the central location of the development will also reduce the demand for car-based travel.

The provision of 895 car parking spaces is approximately 250 less than the Development Plan requirement. The potential for dual usage of spaces at different times of the day is welcomed and indicates a more sustainable approach to car parking provision.

In terms of traffic congestion I note that the main congestion point within the town centre occurs on the main street south of the existing Dublin Road junction. The main access/egress point from the development is at the north-east of the site in the vicinity of the Old Galway – Sligo Road junction. The trip assignment analysis set out in Appendix B – 5.10 in the EIS indicates that a large amount of traffic (c.75%) from the development travels northwards and not southwards from the main junction. Likewise traffic exiting from the Castle Road junction will also travel southwards (c.70%) towards the Limerick – Gort Road. A substantial amount of traffic therefore will avoid the critical area of congestion along the main street. It is also suggested in the EIS that the traffic volumes along Oranmore Main Street will decrease from the reduction in rat- running through Oranmore Village with the construction of the new N6.

With the exception of Oranmore Main Street, it is my opinion that the road network surrounding Oranmore, including the N6 has the capacity to accommodate significant increases in traffic.

In terms of site visibility, concerns have been expressed particularly in relation to the Castle Road junction. The applicant argues that the 85 percentile speed limit along this section of the road is 25 mph (40 kmph) and therefore sight lines are adequate having regard to the speed of the traffic concerned. A report from the Roads Department dated 1/5/2004 expresses agreement with the proposal from a roads perspective and that the applicants have "by and large" complied with the requirements of the Road Department. Any outstanding concerns expressed by the Roads Department have in my view been addressed in Conditions Nos. 27 & 28 of the grant of planning permission which require additional traffic calming measures and that the front wall of the school be set back on the Castle Road to accommodate future traffic. In conclusion therefore I do not consider that the proposed development should be refused on traffic grounds.

Impact on Tourism

It is difficult to assess the impact of the proposed development on tourism. The proposed development will not involve the demolition or closure of any tourist attraction. I have already noted above that the proposed development will impact on views of Oranmore Castle and the setting and the context of the castle will be to some extent compromised by the proposed development. On the other hand however the proposal includes land uses such as retail outlets, restaurants, craft workshops, and a hotel and possibly a museum which will assist the tourist base for the town.

Impacts on Archaeology and Heritage

The impact of the proposal on Oranmore Castle has already been set out in this assessment. Issues in relation to archaeology and heritage were addressed in Section 5.9 of the EIS. A letter from the Department of the Environment, Heritage and Local Government states that it agrees with the findings of the EIS but having regard to the areas of archaeological constraint (GA095-110 and GA095-111), archaeological monitoring should take place across the entire site if the development were to proceed. Any concerns in this regard have been assessed in Conditions Nos. 9, 10 and 11 of the planning authority's grant of planning permission and it is suggested that the Board can likewise address these issues by way of condition.

Adequacy of EIS

It is argued that the EIS is inadequate and does not comply with the EIA Directive and statutory regulations. I consider that the EIS statutory complies with the legal requirements as set out in Article 25 of the Second Schedule of S.I.93 of 1999 and Article 94 of Schedule 6 of the Planning and Development Regulations 2001 in relation to the information to be contained in the EIS. The information contained in the EIS has been supported by supplementary details by way of additional information and clarification of additional information. I consider that there is enough information contained on file to enable the Board to adequately assess the impact of the proposed development on the receiving environment.

Particular reference is made to Condition No. 12 of the notification to grant planning permission issued by the planning authority where consultation is required with the Parks and Wildlife Service with regard to best practice measures and mitigation

measures in order to minimise any damage to the cSAC and SPA. The applicant in response to the grounds of appeal suggests that any agreement with the Parks and Wildlife Service specifically relates to compensatory measures which are to be finalised on foot of any loss of habitat. It is also stated that the planning authority and Parks and Wildlife Service are in possession of all the relevant facts regarding the potential impact.

I concur with the above conclusion and note that the Parks and Wildlife Service of the Department of the Environment, Heritage and Local Government have been notified and have made comments in relation to the application and have not subsequently raised any objection at appeal stage. I do not consider that Condition No. 12 renders the EIA process invalid. It is my opinion that all relevant information has been provided as required under Article 3.4.1 of the reasoned opinion of the European Commission (dated 6/8/2001 and referred to in the grounds of one of the third party appeals). It is also my opinion having regard to the information contained on file that the competent authorities had all the facts before them in arriving at the decision. The impact of the proposed development in relation to the cSAC and SPA has been ascertained and the main requirement now subsequently is to agree on compensatory measures for any loss of habitat.

Number of Conditions Imposed

Concerns are also expressed in relation to the number of conditions, which have been imposed in relation to the proposed development. The nature of the conditions requires that certain aspects of the development be agreed between the planning authority and the applicant. The majority of the conditions are standard conditions and do not require fundamental or profound changes in the proposed development. Most of the issues to be agreed between the parties are minor in nature. Conditions, which require fundamental changes in the design, are the subject of a first party appeal and these are addressed separately below.

Private Open Space Requirements

It is acknowledged that parts of the development do not meet the private open space requirements as set down in the Development Plan. The Board will note my comments in relation to the arguments put forward regarding the overdevelopment of the site, in that I consider the proposal is successful in creating an urban extension to the existing Main Street. The proposal incorporates a variety of architectural styles with appropriate urban edges, fine quality streetscapes and buildings of an appropriate mass and height typical and conducive to an urban scale which befits Oranmore Village. Any shortfall in open space standards is compensated in my opinion in the quality of the design. A reduction in the density and mass of the bocks proposed in order to comply with open space standards would in my view result in a significant diminution in the urban design quality of the overall scheme.

Noise Pollution

It is evident that increased noise levels will result from the construction activities to be carried out on site and to a lesser extent from day to day activities carried out during the operational phase. The phasing of the development during the construction period should reduce the impact of noise on the surrounding areas. Ambient noise levels currently associated with the village will increase during the operational phase however these levels will be consistent with typical village/town centre activities having regard to the land uses proposed. There are no particular land uses, which would result in excessive noise generation that would adversely impact on the surrounding amenity to a material extent on an ongoing basis.

Overlooking

There will be insignificant levels of overlooking between the proposed development and the existing residential units in the vicinity of the site. The existing buildings fronting onto Main Street are almost exclusively non-residential in nature. It is however possible that the upper floors of some of the buildings could be in residential use or could revert to residential use at a future stage. Having regard to the separation distances between the existing and proposed buildings together with the non-residential nature of the buildings in the vicinity of the site, I do not consider that the proposed development will give rise to any amenity problems for existing dwellings in relation to overlooking.

Overlooking may be an issue in relation to the juxtaposition of the proposed blocks within the scheme. The separation distances between many of the blocks are less than the stipulated distances contained in the Oranmore Development Plan and the Residential Density Guidelines for Planning Authorities. A separation distance of 35 metres is suggested for buildings in excess of two storeys in height. However such a strict and slavish obedience to the above separation distance would in my view have an adverse impact on the urban design quality of the scheme as already mentioned in my assessment. The imposition of such separation distances would adversely impact on the sense of space and sense of enclosure, which I deem to be a major positive aspect of the proposal.

Cumulative Effects

In assessing the proposed development I have referred to the cumulative effects of other development in the vicinity. Any planning application in Oranmore should be assessed in the context of land zoned for the town in the current Development Plan. The proposed development has not been assessed in isolation and the cumulative effects have been taken into consideration particularly in relation to traffic.

Relocation of the Sports Ground

The observation submitted by the Oranmore Community Development Association requires that an additional financial contribution be levied on the applicant for the provision of a youth and recreation centre off site. To this end a specific site is also suggested. In response to this I consider that the Board may be acting beyond its remit

in imposing such a condition. There is no evidence to suggest that it is the policy of the planning authority to develop the suggested site for a youth and recreation centre. Issues in relation to an additional financial contribution for such a recreational and amenity purposes are addressed in more detail in relation to the grounds of the first party appeal.

Other Issues

It has been argued that the planning file has not been made available for public inspection during the course of the application. The Board cannot verify whether or not this is the case and therefore the Board cannot decide the issue of costs.

In relation to a Foreshore Licence, the applicant has indicated that this issue will be addressed on foot of any grant of planning permission.

The issue of whether or not there was any conflict of interest concerning a Councillors role in the material contravention procedure is not an issue which An Bord Pleanála can determine.

GROUNDS OF FIRST PARTY APPEAL

Condition No. 3

Condition No. 3 requires that the proposed residential element be restricted to 250 units so as to comply with the County Development Plan Strategy 2003 – 2009.

The estimated household allocation for 2003 – 2009 is 500 units for the town of Oranmore, according to the development plan strategy. This figure appears to be derived from the Galway Transportation and Planning Study. Based on the above study it is estimated that the population of Oranmore will increase to 4,800 during the life of the Plan (2003 – 2009). The Oranmore Development Plan however forecasts a target population of 5,000 for the end of the development period of 2006. There are slight discrepancies in the target population and the timeframe for which this target population will be achieved.

The allocation of 500 units for Oranmore appears to be a rather arbitrary figure having regard to the zoning provisions contained in the Development Plan. Furthermore the rationale for allocating half of the total number of units to the development before the Board is likewise not apparent from the information contained on file. Having regard to the residential zoning provisions contained in the Oranmore Plan, it is highly likely that considerably more than 500 units will be provided within the life of the Plan. I am therefore not convinced that the number of residential units should be reduced purely to comply with the settlement strategy for the village of Oranmore or the county in general.

More importantly perhaps is that any reduction in the quantum of development would adversely impact on the overall design and scale of the scheme, which I consider to be very appropriate for a town centre extension. Any reduction in the height of the blocks could adversely impact on the urban scale of the proposal. If the Board do consider it

appropriate to reduce to the number of residential units, I would recommend that a particular block/blocks be omitted from the scheme as opposed to reducing the height of the blocks proposed.

Condition No. 5

Condition No. 5 requires that those elements of the scheme which are four-storeys in height particularly Plot 3 (shopping centre) shall be reduced to three-storeys in height. The maximum height of any building above ground level at public elevation should not exceed 12 metres in height.

I would also recommend that An Bord Pleanála consider omitting the above condition. The variety of building height is an important architectural/urban element of the scheme. The four-storey elements are centred about Market Square, the main public focal point of the scheme. I consider it appropriate that building heights be graduated upwards towards this focal point. Furthermore Market Square is a relatively large space (0.16 hectares) and appropriate building heights are necessary to ensure a proper sense of enclosure within the space. The reduction as suggested by the planning authority would in my view create a stagnant uniformity at parapet level which would detract from the variety of building height and would also detract from the sense of enclosure around the urban space. The ridge levels of most of the buildings fronting onto the square rise to between 14 and 15 metres. A reduction of the building height to 12.5 metres at the public elevation would create a less satisfactory space for the reasons set out above.

In this regard I refer the Board to the animated CD submitted by the applicant in response to the grounds of appeal. I consider the "virtual walk through" depicted on the CD shows that there is an appropriate relationship between the building height and the dimensions of the urban square an roads leading off it. I therefore conclude that the buildings heights of the proposed development should remain as proposed.

Condition No. 6

Condition No. 6 requires the omission of the museum building (Plot 1). As already outlined in my report in relation to grounds of the third party appeal I consider that this condition should be retained. While I acknowledge that the building is of a high architectural quality I consider the proposal would benefit from its absence in terms of retaining a significant area of ecologically sensitive habitat and also ensuring that views of Oranmore Castle would be retained to a greater extent.

The second part of the condition requires that the developer shall make provision for a community/amenity/recreational facility of a similar floor area elsewhere in the overall development. My concern in relation to this is that such a condition could have a profound impact on the layout of the proposal and issues in relation to the design and location of any such facility would be the subject of the sole agreement between the applicant and the planning authority. The relocation of the museum or any other community/amenity/recreational facility could have implications for issues such as traffic circulation, residential amenity parking provision etc, and as such, I consider the proposal should be the subject of a separate planning application which would allow third party involvement.

I recommend that the museum be omitted from the proposal and that the developer be required to pay a special contribution in lieu of the omission under Section 48(2)(c) for additional community/amenity/recreational facilities.

Condition No. 31

Condition No. 31 requires a financial contribution of €2,126,000. The applicant acknowledges that this contribution is based on the Development Contribution Scheme adopted by Galway County Council. It is suggested however that the amount of the contribution is extremely onerous having regard to the amenities provided and the infrastructure needed to service the site.

I consider that the Board has no option but to apply the terms of the scheme as adopted by the planning authority in accordance with Section 48(ii)(a). This section states that subject to paragraph (c), the basis for the determination of a contribution under subsection (i) shall be set out in the Development Contribution Scheme under this section. The planning authority have applied the adopted contribution scheme in accordance with the quantum of development to be provided. This is acknowledged by the applicant in the grounds of appeal and I do not consider that An Bord Pleanála is in a position to vary the financial contribution in this regard. The contribution scheme as adopted by the planning authority on 27/2/2004 should apply.

RECOMMENDATION

Arising from my assessment above I consider the proposed development to be in accordance with the proper planning and sustainable development of the area and therefore recommend that planning permission be granted. In relation to the grounds of the first party appeal I recommend that Conditions Nos. 3 and 5 as stipulated by the planning authority be omitted and Condition No. 31 be retained. In relation to Condition No. 6 I recommend that the museum building be omitted from the proposed development and an additional special financial contribution be levied on the applicant on foot of this omission.

DECISION

Grant planning permission for the proposed development in accordance with the plans and particulars submitted based on the reasons and considerations set out below.

REASONS AND CONSIDERATIONS

Having regard to the zoning objective for the site which is designated for village centre/commercial uses and the location of the proposal contiguous to the existing commercial centre of Oranmore it is considered that, subject to compliance with conditions set out below the proposed development would not seriously injure the amenities of the area or of property in the vicinity, would not seriously impact on the candidate Special Area of Conservation or Special Protection Area, would not be prejudicial to public health and would be acceptable in terms of traffic safety and convenience. The proposed development would therefore be in accordance with the proper planning and sustainable development of the area.

CONDITIONS

1. The development shall be carried out in accordance with the plans and particulars lodged with the application as amended by the drawings received by the planning authority on the 19th day of March, 2004, on 1st April 2004, on 14th April 2004, on 5th of May, and on 14th June except as may otherwise be required in order to comply with the following conditions.

   Reason: In the interest of clarity

2. The development shall be carried out on a phased basis. The content, extent, and timing of each phase shall be agreed in writing with the planning authority prior to the commencement of development. Phase 1 shall include the construction of the proposed roundabout at the main access to the north-east of the site. This access shall be used as a sole construction access to the site.

   Reason: In the interest of orderly development.

3. Within eight weeks of the date of this order, the developer shall enter into an agreement with the planning authority under Section 96 of the Planning and Development Act, 2000 (as amended) in relation to the provision of social and affordable housing, in accordance with the requirements of the planning authority's housing strategy, unless, before the expiry of that period, the said developer shall have applied for and been granted an Exemption Certificate under Section 97 of the Planning and Development Act, 2000.

   Reason: To comply with the requirements of Part V of the Planning and Development Act, 2000 (as amended).

4. The proposed museum building indicated on the drawings submitted, as Plot 1 shall be omitted from the proposed development.

Reason: In the interest of visual amenity and to protect the habitat of the candidate Special Area of Conservation

5. The proposed additional development at Plot No. 16 adjacent to the new entrance and roundabout as indicated on Drg. P-003 received by the planning authority on 19/3/2004 shall be omitted.

Reason: In the interest of clarity.

6. Prior to the commencement of development on site, the developer shall submit detailed proposals in relation to all boundary treatments on site.

Reason: In the interest of residential amenity and privacy.

7. Prior to the commencement of development or any site preparation works the developer shall carry out a programme of pre-development testing on site concentrating in particular on the Zone of Archaeological Potential of Monument GA095-110 (tower house) and GA095-111 (church and graveyard). The developer shall facilitate the planning authority in an archaeological appraisal of the site and in preserving and recording or otherwise protecting archaeological materials or features, which may exist within the site. In this regard, the developer shall

(a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development,

(b) employ a suitably qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works.

The assessment shall address the following issues

(i) the nature and location of archaeological material on the site, and

(ii) the impact of the proposed development on such archaeological material.

Prior to the commencement of development, a report containing the results of the assessment shall be submitted to the planning authority. Arising from this assessment, the developer shall agree with the planning authority details regarding any further archaeological requirements (including, if necessary, archaeological excavation) prior to commencement of construction works.

In default of agreement on any of these requirements, the matter shall be determined by An Bord Pleanála.

Reason: In order to conserve the archaeological heritage of the site and to secure the preservation of any remains which may exist within the site.

8. Prior to the commencement of development, the developer shall submit a method statement to the planning authority and to the Department of Environment, Heritage and Local Government for written agreement outlining the measures, which will be put in place to protect the graveyard wall from construction works on site. This method statement must include measures that will ensure the long-term protection of the graveyard wall.

Reason: To protect and preserve features of archaeological significance.

9. Prior to the commencement of development on site the developer shall submit to the planning authority details of an agreement reached with the Parks and Wildlife Section of the Heritage Division of the Department, Heritage and Local Government with regard to best practice measures and mitigation measures to be utilised on site to minimise any damage to the cSAC and SPA areas within the site abutting the boundaries of the development site.

Reason: In the interest of amenity and the preservation of natural heritage.

10. All vehicles/machinery associated with construction works shall be contained within the site and adequate parking/storage shall be made for same. Details of which shall be agreed with the planning authority prior to the commencement of development.

Reason: In the interest of traffic safety and orderly development.

11. Vehicle wheels shall be cleaned prior to exiting onto the public road so as to minimise material deposits on the public road. Details of the proposed wheel wash facility, which shall incorporate underbody power washing, shall be agreed with the planning authority prior to the commencement of development.

Reason: In the interest of orderly development.

12. Public lighting shall be provided in accordance with a scheme, details of which shall be submitted to the planning authority for agreement prior to the commencement of development.

Reason: In the interest of amenity and public safety.

13. The internal road network serving the proposed development, including turning bays, junctions, parking areas, footpaths and kerbs shall be in accordance with the detailed requirements of the planning authority for such works.

Reason: In the interest of amenity and public safety.

14. All service cables associated with the proposed development (such as electrical, communal television, telephone and public lighting cables) shall be run underground within the site.

Reason: In the interest of orderly development and the visual amenities of the area.

15. Water supply and drainage arrangements, including the disposal of surface water, shall comply with the requirements of the planning authority for such works and services.

Reason: In the interest of public health and to ensure a proper standard of development.

16. Prior to the commencement of development a construction management plan shall be submitted to the planning authority for written agreement.

Reason: In the interest of the proper planning and sustainable development of the area.

17. Prior to the commencement of development the developer shall submit and obtain the written agreement of the planning authority to, a plan containing details for the management of waste (and, in particular, recyclable materials) with the development, including the provision of facilities for the storage, separation and collection of waste and in particular, recyclable materials and for the ongoing operation of these facilities.

Reason: To provide for the appropriate management of waste and in particular recyclable materials in the interest of protecting the environment.

18. Prior to the commencement of development the developer shall agree a full programme of traffic calming measures including details of any boundary set-backs in order to facilitate future traffic.

Reason: In the interest of traffic and pedestrian safety.

20. Prior to commencement of development, a landscaping scheme shall be submitted to the planning authority for agreement. This scheme shall include details of all existing trees and hedgerows on the site, specifying those proposed for retention, together with measures for their protection during the period in which the development is carried out. The site shall be landscaped in accordance with the agreed scheme, which shall also include a timescale for implementation.

Reason: In the interest of visual amenity.

21. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or other security to secure the provision and satisfactory completion and maintenance until taken in charge by the planning authority of roads, footpaths, watermains, drains, public open space and other services required in connection with the development, coupled with an agreement empowering the planning authority to apply such security or part thereof to the satisfactory completion or maintenance of any part of the development. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be determined by An Bord Pleanála.

Reason: To ensure the satisfactory completion of the development.

22. The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to the Board to determine the proper application of the terms of the Scheme.

Reason: It is a requirement of the Planning and Development Act 2000 that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act be applied to the permission.

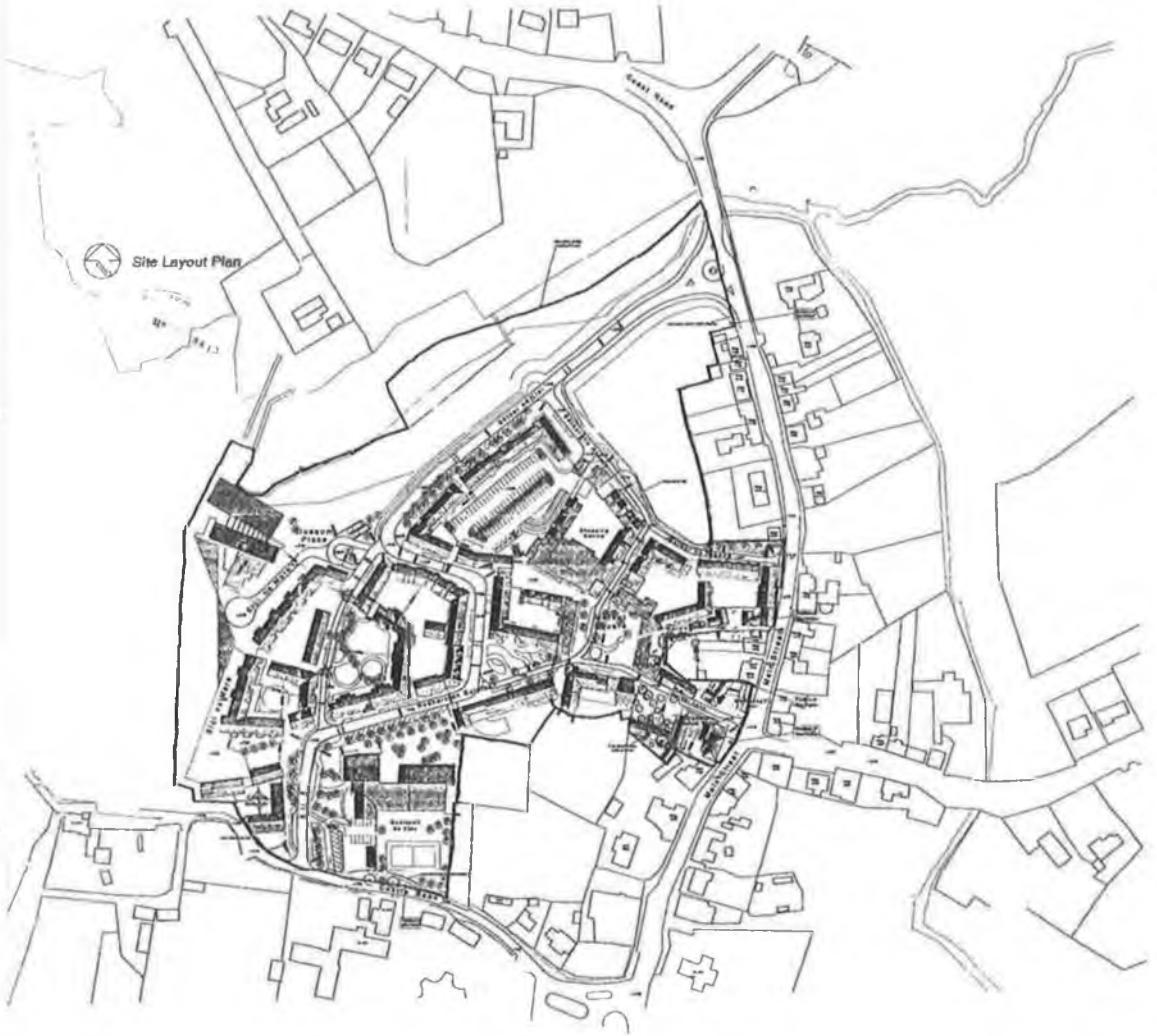
23. The developer shall pay a sum to be agreed with the planning authority (updated at the time of payment in accordance with changes in the Wholesale Price Index – Building and Construction (Capital Goods) published by the Central Statistics Office, as a special contribution under Section 48(2)(c) of the Planning and Development Act in respect of additional recreational/amenity/community facilities to serve the development. This contribution should be paid prior to the commencement of development or in such phased payments as may be agreed by the planning authority and the developer. Payment is subject to the provisions of Section 48(12) of the Planning and Development Act 2000.

Reason: It is considered reasonable that the developer shall contribute towards the specific exceptional costs which are not covered in the Development Contribution Scheme and will benefit the proposed development.

Paul Caprani
Inspectorate

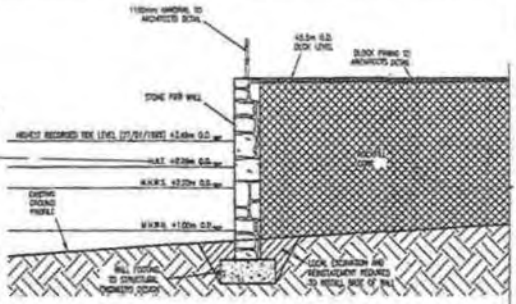
February, 2005.

sg

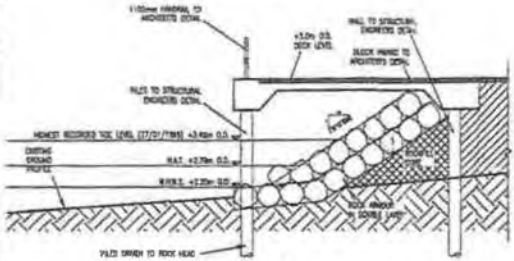


Masterplan

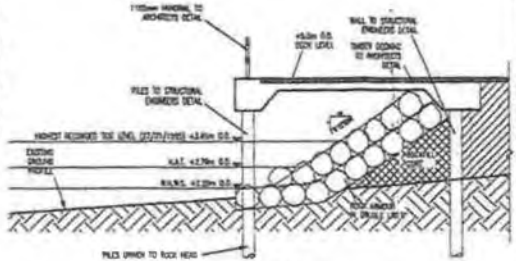
SEAN DOCKRY & ASSOCIATES



SECTION A-A
TYPICAL SECTION THROUGH PIER WALL (+5)



SECTION B-B
TYPICAL SECTION THROUGH ANCHORED PILE WALL AT CONCRETE RETAINING WALL



SECTION C-C
TYPICAL SECTION THROUGH ANCHORED PILE WALL AT TIMBER RETAINING WALL

WATERFORD DEVELOPMENTS LTD.

PATRICIAN CLOCHAN, DUNMORE

LAYOUT PLANS AND DETAILS OF COASTAL PROTECTION

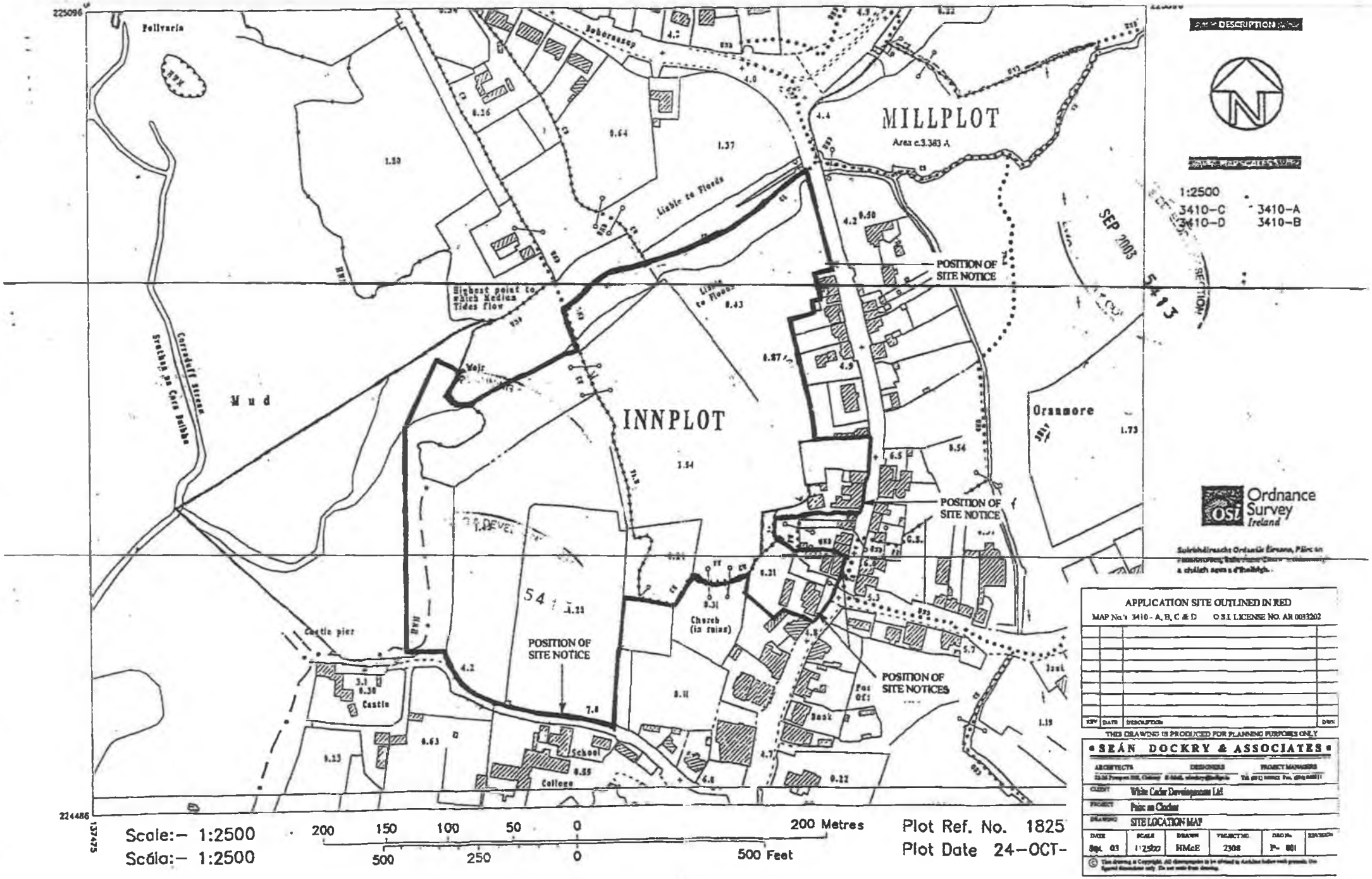
PLANNING

97051

CP-04

S. HYDE

oconnor
Consulting Civil & Structural Engineers
M.C. O'Connor + Company


225096
224486
137475
Pollvaria
Boheranagp
MILLPLOT
Area c.3.383 A
1.39
1.37
Liable to Floods
Highest point to which Median Tides flow
Liable to Floods
POSITION OF SITE NOTICE
SEP 2003
5413
Weir
Mud
Corradoff Stream
Srahbeg an Cora Buibhe
INNPLOT
Ornamore
1.73
POSITION OF SITE NOTICE
Church (in ruins)
Castle pier
POSITION OF SITE NOTICE
POSITION OF SITE NOTICES
Castle
School
College
Bank
Post Off
Scale:- 1:2500
Scála:- 1:2500
200 150 100 50 0 200 Metres
500 250 0 500 Feet
Plot Ref. No. 1825
Plot Date 24-OCT-
DESCRIPTION
MAP SCALES
1:2500
3410-C 3410-A
3410-D 3410-B
Ordnance Survey Ireland
APPLICATION SITE OUTLINED IN RED
MAP No's 3410 - A, B, C & D O.S.I. LICENSE NO. AR 0033202
REV DATE DESCRIPTION DWN
THIS DRAWING IS PRODUCED FOR PLANNING PURPOSES ONLY
SEÁN DOCKRY & ASSOCIATES
ARCHITECTS DESIGNERS PROJECT MANAGERS
CLIENT White Cedar Developments Ltd.
PROJECT Point on Clochar
DRAWING SITE LOCATION MAP
DATE Sept. 03
SCALE 1:2500
DRAWN HMcE
PROJECTNO. 2308
DRG No. P- 001
REVISION

Masterplan

SEAN DOCKRY & ASSOCIATES

An Bord Pleanála

PLANNING AND DEVELOPMENT ACTS 2000 TO 2009

Galway County

Planning Register Reference Number: 09/1936

An Bord Pleanála Reference Number: PL 07.235842

APPEAL by An Taisce of Tailor's Hall, Back Lane, Dublin against the decision made on the 14th day of December, 2009 by Galway County Council to grant subject to conditions a permission to White Cedar Developments care of Associated Design of Main Street, Oranmore, County Galway in accordance with plans and particulars lodged with the said Council.

PROPOSED DEVELOPMENT: Alterations and amendments to Plot 11 forming part of mixed use development previously granted permission under planning register reference number 03/5413. These alterations and amendments include the provision of a single storey discount food store comprising 1,672 square metres gross floor area, an Electricity Supply Board substation 25 square metres and a single storey childcare facility 344 square metres, revised roads layout and associated car parking at surface level. The development includes all associated site works and services in the Townland of Oranmore, County Galway.

DECISION

GRANT permission for the above proposed development in accordance with the said plans and particulars based on the reasons and considerations under and subject to the conditions set out below.

MATTERS CONSIDERED

In making its decision, the Board had regard to those matters to which, by virtue of the Planning and Development Acts and Regulations made thereunder, it was required to have regard. Such matters included any submissions and observations received by it in accordance with statutory provisions.

REASONS AND CONSIDERATIONS

Having regard to the provisions of the current Galway County Development Plan, the Oranmore Local Area Plan 2006-2012 and the permitted use of the adjoining site to the north as a town centre mixed use development, it is considered that, subject to compliance with the conditions set out below, the proposed development would be an appropriate form of development at this location, would not seriously injure the amenities of the area or of property in the vicinity and would be acceptable in terms of traffic safety and convenience. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area.

CONDITIONS

1. The development shall be carried out and completed in accordance with the plans and particulars lodged with the application as amended by the further plans and particulars submitted on the 16th day of November and the 18th day of November, 2009, except as may otherwise be required in order to comply with the following conditions. Where such conditions require details to be agreed with the planning authority, the developer shall agree such details in writing with the planning authority prior to commencement of development and the development shall be carried out and completed in accordance with the agreed particulars.

   Reason: In the interest of clarity.

2. Notwithstanding the exempted development provisions of the Planning and Development Regulations, 2001, and any statutory provision amending or replacing them, the use of the proposed development shall be restricted to a discount retail unit and a crèche (as specified in the lodged documentation), unless otherwise authorised by a prior grant of planning permission.

   Reason: In order to prevent an adverse impact on the viability and vitality of the area.

3. Details including samples of the materials, colours and textures of all the external finishes to the proposed buildings shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

   Reason: In the interest of the visual amenities of the area.

4. 99 number car parking spaces shall be provided within the site to serve the discount foodstore. The layout of these spaces together with details of the parking layout for the proposed crèche shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

   Reason: To ensure that adequate off-street parking provision is available to serve the proposed development.

5. The internal road network serving the proposed development, including turning bays, junctions, parking areas, footpaths and kerbs shall comply with the detailed standards of the planning authority for such road works.

Reason: In the interests of amenity and of traffic and pedestrian safety.

6. Site development and building works shall be carried out only between the hours of 0800 to 1900 Monday to Friday inclusive, between 0800 to 1400 on Saturday and not at all on Sundays and public holidays. Deviation from these times will only be allowed in exceptional circumstances where prior written approval has been received from the planning authority.

Reason: In order to safeguard the amenities of property in the vicinity.

7. No additional development shall take place above roof parapet level, including lift motor enclosures, air handling equipment, storage tanks, ducts or other external plant, telecommunication aerials, antennas or equipment, unless authorised by a further grant of planning permission.

Reason: To protect the residential amenities of property in the vicinity and the visual amenities of the area.

8. A comprehensive boundary treatment and landscaping scheme shall be submitted to and agreed in writing with the planning authority, prior to the commencement of development. This scheme shall include the following:-

(a) details of all proposed hard surface finishes, including samples of proposed paving slabs/materials for footpaths, kerbing and road surfaces within the development,

(b) proposed locations of trees and other landscape planting in the development, including details of proposed species and settings,

(c) details of proposed street furniture, including bollards, lighting fixtures and seating, and

(d) details of proposed boundary treatments at the perimeter of the site, including heights, materials and finishes.

The boundary treatment and landscaping shall be carried out in accordance with the agreed scheme.

Reason: In the interest of visual amenity.

9. Comprehensive details of the proposed public lighting system to serve the development shall be submitted to and agreed in writing with the planning authority prior to the commencement of development. The agreed lighting system shall be designed to minimize light pollution and shall be fully implemented and operational before the proposed development is made available for occupation.

Reason: In the interest of public safety and visual amenity.

10. No advertisement or advertisement structure, the exhibition or erection of which would otherwise constitute exempted development under the Planning and Development Regulations 2001, or any statutory provision amending or replacing them, shall be displayed or erected on the building/within the curtilage of the site unless authorised by a further grant of planning permission.

Reason: In the interest of visual amenity.

11. Prior to the commencement of development or any site preparation works, the developer shall carry out a programme of pre-development testing on the site concentrating in particular on the Zone of Archaeological Potential of Monument GA095-110 (Tower house) and GA095-111 (church and graveyard. The developer shall facilitate the archaeological appraisal of the site and shall provide for the preservation, recording and protection of archaeological materials or features which may exist within the site. In this regard, the developer shall:

(a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development, and

(b) employ a suitably-qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works.

The assessment shall address the following issues:

(i) the nature and location of archaeological material on the site, and

(ii) the impact of the proposed development on such archaeological material.

A report, containing the results of the assessment, shall be submitted to the planning authority and, arising from this assessment, the developer shall agree in writing with the planning authority details regarding any further archaeological requirements (including, if necessary, archaeological excavation) prior to commencement of construction works. In default of agreement on any of these requirements, the matter shall be referred to An Bord Pleanála for determination.

Reason: In order to conserve the archaeological heritage of the area and to secure the preservation (in-situ or by record) and protection of any archaeological remains that may exist within the site.

12. Prior to the commencement of development and following consultation with the Department of the Environment, Heritage and Local Government, the developer shall submit a method statement to the planning authority for written agreement outlining the measures which will be put in place to protect the graveyard wall from construction works on site. This method statement shall include measures that will ensure the long term protection of the graveyard wall. The agreed measures shall be carried out in full. No site works (including landscaping works) shall take place in the vicinity of the graveyard wall in the absence of a suitably qualified archaeologist.

Reason: To protect and preserve features of archaeological significance.

13. Prior to commencement of development on the site and following consultation with the Parks and Wildlife Section of the Heritage division of the Department of the Environment, Heritage and Local Government, the developer shall submit to the planning authority for written agreement details of best practice measures and mitigation measures to minimise impact on the candidate Special Area of Conservation and Special Protection Area abutting the site. The agreed measures shall be carried out in full.

Reason: In the interest of amenity and the preservation of natural heritage.

14. The developer shall submit details of the construction management plan to the planning authority for written agreement prior to commencement of development. These details shall address the following matters:

    (a) No access for construction traffic shall be permitted to Castle Road.

    (b) Weights, loads and volume of construction traffic.

    (c) Details of proposed traffic controls upon entering and exiting the site including proposals for preventing parking on the internal access road.

    (d) Proposals for wheel washing facilities and street cleaning.

    (e) Details of road signage during construction phase.

(f) Details of persons responsible for on-site traffic management during construction.

Reason: In the interest of traffic safety and the amenity of adjoining property.

15. Water supply and drainage arrangements, including the disposal of surface water, shall comply with the requirements of the planning authority for such works and services.

Reason: In the interest of public health and to ensure a proper standard of development.

16. All service cables associated with the proposed development (such as electrical, communal television, telephone and public lighting cables) shall be run underground within the site.

Reason: In the interest of orderly development and the visual amenities of the area.

17. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or other security to secure the provision and satisfactory completion and maintenance until taken in charge by the local authority of roads, footpaths, watermains, drains, public open space and other services required in connection with the development, coupled with an agreement empowering the local authority to apply such security or part thereof to the satisfactory completion or maintenance of any part of the development. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.

Reason: To ensure the satisfactory completion and maintenance of the development until taken in charge.

18. The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000. The contribution shall be paid prior to the commencement of development or in such phased payments as the planning authority may facilitate and shall be subject to any applicable indexation provisions of the Scheme at the time of payment. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to the Board to determine the proper application of the terms of the Scheme.

Reason: It is a requirement of the Planning and Development Act 2000 that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act be applied to the permission.

Member of An Bord Pleanála
duly authorised to authenticate
the seal of the Board.

Dated this day of 2010.

An Bord Pleanála

Inspector's Report

Appeal Reference No:	**PL 07.235842**
Development:	Alteration to Plot 11 forming part of mixed used development previously granted permission under 03/5413 to provide foodstore, crèche, ESB substation, revised road layouts and surface carparking at Innplot, Oranmore, Co. Galway
Planning Application	
Planning Authority:	Galway County Council
Planning Authority Reg. Ref.:	09/1936
Applicant:	White Cedar Developments Ltd.
Type of Application:	Planning permission
Planning Authority Decision:	Grant permission with conditions
Planning Appeal	
Appellant(s):	An Taisce
Type of Appeal:	Third party against grant
Observers:	Oranmore Community Development Association
Date of Site Inspection:	28th April 2010
Inspector:	Mary Kennelly

SITE LOCATION AND DESCRIPTION

The site is situated in the central area of the village of Oranmore, which is located to the east of Galway City. It forms part of a larger mixed use development site (known as Pairc an Clochar or Oranmore Town Centre Development), which extends from Main Street westwards to the shoreline of Oranmore Bay, (an inlet of Galway Bay), northwards to the Millplot River and intertidal inlet of Oranmore Bay and southwards to Castle Road. These areas support a variety of habitats (including some Annex 1 listed) and form part of the Galway Bay cSAC and Inner Galway SPA, which are located along the northern and western perimeter of the Pairc an Clochar site. The appeal site relates to Plot 11 of the mixed used parent permission (PL07.209430, PA 03/5413), which is located at the southern end of the site, adjacent to Castle Road. It is currently accessed by means of Castle Road to the south but will also be accessed from the road network permitted as part of the parent permission to the north. Castle Road is a narrow road leading to the 15th Century Oranmore Castle, (recorded monument) which is situated in a prominent location at the end of the road by the sea. The site is bounded to the east by a slam open space area adjacent to the entrance to a hotel and to the north-east by an old church (in ruins) and graveyard, including a stone boundary wall which adjoins the appeal site. There is an established school complex and convent on the southern side of Castle Road.

The area of the overall site is given as 1.0228ha. It corresponds to the site of the proposed Gaelscoil (permitted by 209430). It is currently laid out as a playing pitch and is bounded to the immediate north and west by Phase 1 construction works for the Oranmore Town Centre development. There is a rough track alongside the eastern and southern boundaries which appears to be used as a haul route for the construction works. The boundaries of the appeal site are defined by mainly by stone walls. The site of the Oranmore town centre to the immediate west was, at the time of my site inspection, covered with a stockpile of building rubble and overburden from the construction site.

PLANNING HISTORY

PL07.209430 Permission **granted** for mixed use development on large site to west of Main Street (parent permission, PA Ref 03/5413). Development comprised shopping centre retail (5,122m²), Supermarket (4,503m²), offices (3,403.9m²), 18 bedroom hotel, medical centre (624m²), crèche (344m²), bar and restaurant (1147.6m²), and 197 residential units. (Note museum required to be omitted by condition of permission and number of residential units reduced from 310) The development was arranged in blocks radiating out from a central square and a 4-storey shopping centre. The height of the blocks were also reduced to 1 or 2 storeys towards the

perimeter. Development included approx. 15 'plots'. Plot 11 related to a single storey Gaelscoil (8 classrooms); Plot 10 (immediately to west) is 'Castle Quarter', which consisted of 1 and 2 storey buildings with small retail units at GF with studios/galleries at FF; Plot 12 (immediately to north) 'Inn Plot Terrace' contained 20 residential units. Access to mixed use development for NE corner via a roundabout, which would run to NW and then meander south towards centre, and would provide access to Gaelscoil site and Castle Quarter. Development also included amenity coastal walk (part of Oranmore-Bearna walkway).

08/3651 Permission **refused** for Discount foodstore, substation and basement car park on 11/12/08. Three reasons for refusals, the first related to the absence of an alternative site for the (permitted) Gaelscoil which would be displaced by the proposed development. The second reason related to risks to the adjoining graveyard (Recorded Monument) from the proposed underground car park, together with other cultural and heritage considerations at this location, and the concept of need for a community facility on this section of site being contrary to rationale for site. Full details of this decision were requested from the P.A. but have not been supplied.

PL07.233379 Permission **refused** on site further to south, (on southern side of school complex), for residential development of 56 houses and 7 apartments, including site for gaelscoil, football pitch and amenity coastal walk (PA ref. 08/2739). 3 no. reasons for refusal included material contravention of zoning (recreational amenity) and development on buffer zone separating site from Natura 2000 sites, injury to visual amenities and impact on designated sites by reason of threat to groundwaters and hydrological regime of site.

Several permissions have been granted for modifications to the parent permission 209430.

Ref. 05/0203 Permission granted in Jan 2005 for mixed use development within site.

Ref. 08/2271 Permission granted in July 2008 for alterations to Plot 13 (Fr. Gill House) comprising redesign and increase in floor area, omission of 2 apartments.

Ref 08/3467 Permission granted in Nov 2008 for alterations to Plot 12 included redesign of building, extra floorspace, omission of 2 residential units and basement carpark access ramp.

Ref. 09/2124 Grant of extension of duration permission until 2015

PROPOSED DEVELOPMENT

The proposed development seeks to construct a single storey discount food store (Aldi), a crèche and an ESB substation. The proposal comprises the following specific elements:

- Site layout - The proposed buildings are located towards the southern end of the site with access gained from the south-eastern corner via a proposed internal access road (alongside eastern boundary) and from the north-eastern corner via the internal road network of the town centre development. The proposed surface car park wraps around the northern and western sides of the foodstore, with the crèche at the southern end. There is a proposed landscaping strip along the southern and eastern boundaries. The access to the foodstore carpark is at the NE corner of the site. The northern access road follows the perimeter of the site to the south-western corner where there is a turnaround serving the crèche (drop off and 3 no. parking spaces);
- The proposed foodstore is single storey, net floorspace of 1125m² and has a natural stone finish. It is set back from the southern boundary by approx. 5.7m;
- The proposed crèche is single storey (floor area of 344m²) and has painted render and stone walls with some cedar boarding and a zinc seam roof;
- The proposed car park has 99 surface parking spaces;
- Pedestrian links to the crèche are provided from Castle road.

The application was accompanied by the following documents:

Retail Impact Statement;
Ecological Information and Article 6(3) Screening Statement;
Report on Water and Drainage Services;
Flood Risk statement
Archaeological Assessment Report
Errata to Traffic Impact Assessment

PLANNING AUTHORITY DECISION

Local Authority Reports
The Area Planner's report (24/11/09) considered that the proposed development was appropriate in terms of design and orientation as it provided for views of the castle and that it overcame the previous reasons for refusal. The revised layout and replacement of the underground car park with a surface car park were considered to be an improvement as it would keep traffic away from the school complex and resolve the issue of integrity with the graveyard wall. The inclusion of a crèche was also welcomed and it was noted that documentation submitted had indicated that provision had been made for a school on

alternative grounds. It was noted that a letter of support had been submitted by the Oranmore Community Development Association and that a letter of objection had been submitted by an Taisce. The Area Planner strongly refuted the objections form An Taisce regarding car based development and anti-urban development and considered that the proposed development was in fact quite the opposite as the food store was to be located in the centre of the village.

Unsolicited additional information was submitted on 16th and 18th November 2009 which consisted of documentation regarding the alternative site for the Gaelscoil and a set of perspective drawings for the proposed food store.

There are no reports from the Roads or Sanitary Services sections of the planning authority.

Planning Authority Decision
The planning authority decided to grant planning permission subject to 16 conditions. These were mainly of a standard nature. Condition 2 required the developer to facilitate the planning authority in preserving/recording/protecting archaeological materials or features which may exist within the site. Condition 11 restricted the use of the proposed buildings to that stated in the submitted documentation. Condition 14 required the payment of a development contribution of €134,240. Condition 15 specified that the hours of operation of the retail unit and crèche be agreed with the P.A. prior to occupation. Condition 16 required the submission of the details of the parking arrangements for the crèche to be submitted for agreement prior to operation of the facility.

GROUNDS OF APPEAL

The third party appeal was submitted by An Taisce. The previous history of the site was referred to at the outset, namely the permission for the mixed use development of the town centre site (03/5413) and the refusal of a similar permission for a food store (08/3631). The **grounds of appeal** may be summarised as follows:

1. *Lack of condition re securing school use on another site*– planning permission granted under 03/5413 included a school on this site. The effect of the decision by the P.A. is to change the use of this approved site from school to commercial. However no conditions have been attached requiring the identification of a site or for the provision of school on another site. Neither is there any parallel planning application for a school on another site. The Draft Memorandum of Agreement between the developer and the P.A. (re the alternative school site) has not been signed. The proposed sale of lands for the alternative school site seems to be

dependent upon permission being granted for the current proposal for the food store, but no parallel conditions have been attached to the P.A. decision for the food store. The suitability of the alternative site vis-à-vis traffic safety, a mobility management plan, safety of cyclists and appropriateness of road infrastructure has not been addressed.

2. *Deficient provision of road infrastructure-* evaluation of the capacity and traffic management associated with the existing and permitted development in Oranmore is required before granting any further permissions. The construction traffic from the Tesco development in the village is already causing serious problems on the main street. This development was to have an exit onto Main Street and a roundabout was to be constructed to facilitate traffic from both the Tesco development and the permitted town centre development. The information submitted with the current application is deficient, particularly in respect of the timing and phasing of the delivery of the infrastructure. This information is required given that the current proposal would generate additional traffic.
3. *Failure to address Smarter Travel policy requirements* – The proposal does not address the requirements of the "Smarter Travel" to reduce car use and dependence within and around urban villages, to promote walking and cycling and public transport and to provide mobility management plans. This means that commercial parking availability should be curtailed and should be subject to a charge structure, with revenue funding sustainable transport measures. This means that the P.A. parking standards are not applicable and the number of spaces proposed in this case is not justified. Conditions should provide for an appropriate charge structure, linked to an overall parking and tariff for Oranmore.
4. *Failure to address flood risks*– The permission granted under 03/1543 did not properly address flood risk and climate change. Models used on sea level rise up to now need to be revised. Climate modelling based on historic rainfall and flood data is now out of date. The recent flooding events of November 2009 needs to be factored into the flood risk assessment as well as the appropriate floor levels. The site is in close proximity to Galway Bay which is exposed to high tides and high wind conditions, while higher rainfall levels need to be factored in to drainage calculations.

OBSERVATIONS

Observations have been submitted by the Oranmore Community Development Association Ltd. on 11th February, 2010. Enclosures included a map showing the location of the proposed alternative site for the Gaelscoil and a letter from the Principal of Gaelscoil de hIde. The main points made may be summarised as follows:

1. *School site* – the alternative site is owned by Galway co. co. apart from 0.98 acres, which is owned by White Cedar Developments (applicant for current application). There is an agreement between the parties that this site would be purchased by the local authority and is subject to the normal legal process. This site is currently leased by OCDA and Calasanctus College and it has been agreed that these leases will be relinquished in favour of the Gael Scoil. It is considered to be a suitable site located in the vicinity of several other schools and playing fields and its proposed development is supported by the OPW, Galway co. co. and the Board of Management of the Gael Scoil. OCDA tried to clarify matters by providing An Taisce with a copy of the Draft Memorandum of Agreement for the sale of the lands and took members of An Taisce on a tour of the site and of the site of the existing temporary Gael Scoil.
2. *Site of current appeal* – this site is zoned town centre mixed use and a school is normally permitted. However, it is claimed that the Dept. of Education has rejected the permitted plans for an 8 classroom school (Gael Scoil) and is seeking the provision of a 16 classroom school instead.
3. *Deficient Road infrastructure* – the current application is supported by a TIA (20/9/09) which amends the previous TIA of 4/12/08. The roundabout was part of the pp (03/5413) which required its design and layout to be agreed with the P.A., which has not yet been achieved. The NPWS has also stated that as it is close to a cSAC, no construction is permitted during the breeding season (i.e. until after April). Many of the recommendations in the TIA are outside the control of the applicant (e.g. upgrading of junctions of Main Street with old Sligo road, old Dublin Road and Castle Road. However, TIA indicates that these junctions will operate within capacity in 2024 (design year). The TIA also includes many cycle and pedestrian friendly proposals.
4. *Proposal in accordance with Smarter Travel policy* – as the site is in the centre of Oranmore. The DoT Smarter Travel policy also acknowledges that encouraging alternatives to the private car are dependent upon the availability of public transport.
5. *Flood risk* – The proposal was accompanied by an updated hydrological study which took climate change factors into account and proposed a FFL of 5m compared with predicted 200 year level of 3.98m OD Malin). It is claimed that the proposed development FFLs are 6.8m OD and it is pointed out that the basement car park has been omitted.

Planning authority response to grounds of appeal

The planning authority responded to the grounds of appeal on 16th February, 2010.

1. Alternative school site – A copy of the Director of Services response to this issue dated 12/2/10 is appended. This states... It is stated that notwithstanding the response of the DoS, the securing of a school site cannot be made an objective of this application and this application must be and has been assessed on its own merits.
2. Deficiency in road infrastructure – This issue has been comprehensively addressed in the TIA. The traffic arrangements permitted under 03/5413 are still relevant.
3. DoT Smarter Travel policy – refutes allegation that anti-urban development as located in centre of Oranmore in close proximity to existing retail development and crèche is close to existing schools which will minimise car journeys. The LAP requires commercial development to provide car parking.

First party response to grounds of appeal

McCarthy Keville O'Sullivan responded to the grounds of appeal on behalf of the first party responded on 17th February 2010. This was in the form of a rebuttal of the grounds of appeal. The main points may be summarised as follows:

- The site of the current appeal is not the most appropriate site for the Gaelscoil due to its size and proximity to the commercial retail core. The site is restricted in terms of its ability to expand in the future and to develop additional amenities. However, the developer owns lands to the south which adjoin lands owned by the County Council. This land has been identified as the most suitable site for the Gael scoil and has the support of the local community and the planning authority.
- It is stated that the principle of an agreement has been reached between White Cedar Developments and Galway Co. Co. re the sale of the necessary lands and all relevant documents are currently with the council for agreement. It is claimed that the Council has effectively accepted the suitability of these lands by issuing a notification of decision to grant permission, (08/2739), although it is accepted that this was subsequently refused by the Board (PL07.2333379). It is submitted that the refusal related largely to the unsuitability of the site to residential development.
- The submitted TIA takes into account permitted development and development under construction and concludes that the proposed road network can accommodate the proposed development. It was pointed out that the current proposal provides for an entrance from Castle Road which is further to the east (away from the castle) and provides for a pedestrian priority environment on Castle Road.
- The proposed development sits comfortably within the overall strategy for Smarter Travel as it will enhance and improve the facilities available within Oranmore Town Centre as a single destination centre and will minimise the need for longer journeys

to Galway City. It also includes a wide range of pedestrian and cycle facilities which will help the P.A. to achieve the overall aims of encouraging such activities.

- The P.A. had issued a Further Information request in respect of 08/3651 in relation to flood risk of tidal surges and proposals to mitigate/prevent flooding and surges. Arising from this, a consultant Hydrologist has provided a detailed report in respect of both 08/3651 and the current application which addresses these issues. As a result, the proposed FFL for the foodstore has been set at 6.8m O.D. Malin which provides a 1.8m freeboard above the recommended design flood level. In addition, there is no basement parking and the recent flood events in November 2009 did not result in the appeal site being flooded.

Each of the submissions from the first party, the planning authority and the Oranmore Community Development Association were circulated to all the parties, but only one response was received, which was from Oranmore Community Development Association on 25th February 2010.

Further response from OCDA to P.A. submission

There were no new issues raised.

DEVELOPMENT PLAN

The statutory plan for the area is the Galway County Development Plan 2009-2015. Oranmore is identified as a satellite town and a local service hub within the Metropolitan Gateway Area and is on the first tier of the settlement strategy. The site is located within the GTPS. It is in an area designated as Landscape Sensitivity Class 3, (where Class 1 is the least sensitive and Class 5 is the most sensitive). The site is located close to the Galway Bay Complex cSAC and Inner Galway Bay cSPA and pNHA. The site is located in an area designated as a Regionally Important, conduit karst aquifer, where development potential is limited. Policy HP 28 states that it is the policy of the County to *"Support the consolidation and appropriate development of the urban areas, towns and villages of the County as attractive living environments with a range of services, facilities and employment opportunities appropriate to its size, role and potential."* An increase of 6,150 residential units is forecast for the County wide area, with 900 of these units forecast for Oranmore.

Oranmore Local Area Plan 2006-2012

The site is located within the development boundary as shown on Map 1 (copy attached to this report) and is zoned Town Centre-Mixed Development. The zoning objective is to enhance the town centre through the promotion of appropriate infill development and

expansion of the centre having regard to the town vernacular, location and heritage. The relevant policies in relation to the Town Centre zone are as follows:

- ❖ Encourage development of town centre in a manner that is sympathetic to the character of its surroundings including the development of backlands and obsolete/brownfield lands;
- ❖ Support the role of the town centre as the principal commercial area;
- ❖ Facilitate and encourage appropriate provision of retail facilities that service local needs and to ensure that these facilities are properly located in terms of accessibility and traffic safety as well as being in keeping with the character and scale of the area;
- ❖ Maintain and enhance Oranmore's function as a satellite town for Galway City as well as encouraging an increasing degree of self sufficiency;
- ❖ Ensure that new commercial and retail development complements the existing town centre in terms of commercial viability and continued prosperity.

The Objectives include the following:

TC4 Expand the town centre through the creation of new streets connecting Castle Street with Main Street in a sensitive manner.

Section 2.14 identifies as need for a new school to replace the temporary school Gaelscoil de hIde. Policy 3.14.3 states "Co-operate with the relevant bodies in the provision of new and adequate facilities for Gaelscoil de hIde." Section 5.4.2 states that shopping centres will be encouraged primarily to locate within the town centre (mixed development) zone.

ASSESSMENT

The main issues arising from this appeal are considered to be as follows:

- Does the proposed development comply with the policy framework for the area?
- Is the roads infrastructure provision adequate?
- Has the proposed development adequately addressed the Smarter Travel policy of the Dept. of Transport?
- Has the issue of flood risk been adequately addressed?
- Review of conclusions of Screening Assessment for Appropriate Assessment
- Review of Archaeological Assessment.

Does the proposed development comply with the policy framework for the area?

Proposed retail food store

The site is located within the town centre zone, wherein retail development is not only permissible but is encouraged. It is considered that the development of the site as a foodstore would comply with many of the policies and fulfil several of the objectives contained in the County Development Plan and in the Local Area Plan for the town centre. It would help to support the role of the town centre as the principal commercial area, would help to main the role of the town as a satellite town for Galway as well as encourage a degree of self-sufficiency and would complement the town centre in terms of commercial viability and continued prosperity. It would also provide a retail facility that would service local needs and is located in a very accessible location where traffic safety has been taken into account in the layout and design.

The Retail Impact Assessment submitted with the application supports this and it is stated that the recent growth of housing in the town has increased the demand for local retail services, that the present provision for retail shopping in Oranmore is insufficient to meet current demand and that an upgrading and improvement of retail provision within Oranmore is desirable to increase the attractiveness of the centre and provide variety to local consumers. It is predicted that there will be a shortfall in retail space by 2013. The location would also accord with the advice contained in the Retail Planning Guidelines 2005 as it is in the centre of town, is accessible to a local housing and is very accessible by a variety of modes of transport and supports the continuing role of the town centre as a preferred location for retail development by providing a discount food store, which increases the range of retail services in the town. The Retail Impact Assessment also concluded that the core issues of size (1,125sq.m net) and impact on the existing retail environment are in accordance with the Retail Guidelines and with the Retail Strategy for Galway City and County 2002 and the Draft Galway County Retail Strategy. It is concluded in the RIA that as the increase in the available and surplus expenditure within the catchment area will exceed the turnover of the proposed development by 2013, there will be no immediate or long term impact on the trading patterns of the existing and permitted facilities within the area.

Proposed creche

A crèche is also a permitted development within the Town Centre Zone and is located adjacent to the existing schools complex to the south, which would facilitate multiple drop off and ease of accessibility. Its proximity to the town centre development (under construction) and the accessibility to local housing developments also supports the siting of the crèche at this location as it is likely to generate more pedestrian traffic and multi-purpose car journeys.

Alternative site for school

The proposed development would displace the permitted school, which was part of a comprehensive and large scale mixed use development of a substantial area of ground behind the main street. This development, (PL07.209434) which consisted of retail, residential, offices, hotel, restaurants, when completed, will constitute a considerable portion of the new town centre core area. It is considered that the replacement of the school use with a food store and crèche would not undermine the LAP objectives for the development of these lands and would not seriously conflict with the overall development as granted under PL07.209434. These uses are considered to be appropriate to the zoning and in particular to this location where the food store would abut the existing retail core and new development under construction and the crèche would be adjacent to the existing adjacent educational uses, and in addition, they would be highly accessible to all modes of transport.

The Local Area Plan (2.14) states the following about the existing Gaelscoil:

> *Gaelscoil de hIDE currently has 168 pupils and is at capacity. The school premises are rented and there is a need for a new school, hall and recreational facilities. Classes currently use the Community Pitch on the Dublin Road at allotted times throughout the week for physical education. The safety of pupils and teachers as they walk the 0.5km to the pitch along the busy Dublin road on poor and non-existent footpaths is a major concern. Traffic problems are an issue due to the school's location on the narrow Bog Road linking the Dublin Road to the Eastern approach road. There are no car parking facilities, therefore, with 60% of attending pupils living outside the Oranmore area, and buses from Ballinderreen and Athenry, traffic at school opening and closing times is a major problem. To combat this, the School Authorities encourage parking outside the school on one side of the road only.*

Thus there is a clear and identified need for a new school. However, it is noted from the submissions that the appeal site is considered to be inadequately sized and that the Dept. of Education is not in favour of an 8 classroom school in this location, but is seeking a 16 classroom school on an alternative site. The Board should note that there is nothing in the submissions with the application and appeal that indicates that this statement has been corroborated by the Dept. of Education. However, it is clear from the various submissions that there is an identified alternative site, which is partly within the control of the applicant and partly in the control of the planning authority, and that there is broad agreement amongst these two parties, the local community group (OCDA) and the Gaelscoil itself, that this alternative site should be pursued. It is also clear that whilst this site is not readily available at present and does not have the benefit of planning permission, it is accessible to the town centre and is adjacent to the established schools complex to the south.

However, it should be noted that the site identified as being a suitable alternative is zoned *Recreational Amenity*, where Education is *not permitted.* It also forms part of a larger site which was recently refused permission by the Board for a mixed use development including a school (PL07.233379). Thus there are a number of unresolved issues which mean that it would be impractical and unreasonable to attach a condition requiring the applicant to cede the land or to reserve land for the provision of a school. As the Gael Scoil already exists in Oranmore, the proposed development would not result in the loss of the school itself, but would delay the provision of a site for a new premises. However, given that there are a number of difficulties with the appeal site as such, in terms of satisfying the identified needs for a replacement school premises, it is considered that there is insufficient justification to refuse permission on these grounds, particularly in light of the zoning of the site for town centre use and the nature of the proposed development which accords with the zoning objectives.

Is the roads infrastructure provision adequate?

A revised Traffic Impact Assessment (dated 4th December 2008) was submitted with the planning application which incorporated the changes made to the original development on which the original Traffic Impact Assessment was made. The revised TIA assessed the impact of the proposed development on the existing road network, calculated the expected volume of traffic that would be generated by the proposed development and assessed the impact that this development would have on the operational capacity of the road network in the vicinity of the site. The junctions that were assessed were

- Proposed upgrade of Main Street/Old Sligo Road to a roundabout junction
- Proposed upgrade of Main Street/Old Dublin Road to a priority junction
- Proposed upgrade of Main Street/Castle Road junction to a mini roundabout.
- Proposed site access roundabout
- Proposed site access priority junction.

The TIA identifies a number of traffic congestion points at present such as right turning traffic into Castle Road and right turning traffic into Old Dublin Road from Main Street both of which block traffic on Main Street. It is also noted that a number of road projects proposed in the environs of the site are expected to reduce rat running (in the order of 80-90%) through Oranmore. These include the N18 Oranmore to Gort, N6 Galway to East Ballinasloe and the Galway City Outer Bypass and it was assumed that these would be in place and operational prior to commencement of the proposed development. It was also assumed that the junction upgrades included in the previous planning permission for the

town centre development would be carried out prior to the operation of the current proposed development.

The junction analysis, which used a variety of computer programs (PICADY, ARCADY and OSCADY) to analyse the impact of the proposed development on the existing junctions for the year of opening (2009) and the Design Year (2024) was carried out for the am and pm peak periods. It was concluded that two of the three existing junctions (once upgraded) would operate below capacity for the design year of 2024, but that the Old Dublin Road priority junction would be above capacity. It was recommended that this junction be upgraded by the installation of a signalised junction and that thereafter, it would operate below capacity in the design year. Other junctions analysed were the proposed site access roundabout and the proposed access from Main street. These were both found to operate below capacity in the design year also. A link capacity assessment was also carried out and this found that each of the link roads would have spare capacity in the design year.

It is noted that the "With Development Scenario" included the parent permission (209434) and a number of other significant permissions in the area including 07/2865 and PL07.210590. On the basis of the above it is clear that the capacity and traffic management associated with the existing, the committed and the proposed development has been adequately evaluated.

In terms of the timing and phasing of the roads infrastructure, I note that Condition 2 of the parent permission (209434) required the development to be carried out on a phased basis, and that the *"content, timing and extent of each phase shall be agreed in writing with the planning authority prior to the commencement of development."*

This condition also stipulated that

> *"Phase 1 shall include the construction of the proposed roundabout at the main access to the north-east of the site. This access shall be used as the sole construction access to the site"*

I noted from my site inspection that construction traffic is using the main access point at the north–eastern end of the site. However, the roundabout has not yet been constructed. The first party's response to this part of the grounds of appeal stated "construction of Phase 1 of this permission is currently underway and is being carried out under the terms of that permission [and subsequent amendments under 07/2865]". No details of the latter permission have been forwarded to the Board. However, I note from the Ecological report (Screening Assessment for Appropriate Assessment) that the design and layout of the permitted roundabout was to be agreed with the P.A following consultation with the NPWS. It is further advised that there is a time constraint in that as it is close to a cSAC,

no construction is permitted during the wintering wildfowl breeding season (i.e. until after April). It is anticipated that these works will be carried out between May and August.

The Ecological Report also identified which elements of the parent permission constitute Phase1 and which constitute Phase 2. A Qualitative Risk Assessment and Risk Management Plan have been carried out following extensive consultation with the NPWS, and these are included in the Ecological Report. The planning authority's roads section has not expressed any concern about the lack of progress on the construction of the roundabout or any other element of the proposed development. As the issue of phasing of the infrastructure has been addressed in the parent permission by means of condition, which has been followed by extensive consultation with the PA and the NPWS and given the lack of concern from the planning authority, it is considered that the matter has been adequately addressed. Any remaining matters can be addressed by means of appropriately worded conditions on any planning permission.

On a related matter, I noted at the time of my inspection that the eastern end of Castle Road was quite congested at the school collection time, but that the congestion cleared quite quickly thereafter. Cars were parked on both sides of the road and there was considerable congestion with traffic turning into and out of Castle road. In addition, pupils of school were walking towards the Main Street. In addition, there are a number of small shops on the northern stretch of Castle Road (between the hotel and Main St.), which have emerged since the previous parent permission was assessed by the Board. It is considered, therefore, that construction traffic associated with the proposed foodstore and crèche should be required to use the access point from the north-east of the town centre development (in accordance with the parent permission) and should not be permitted to use Castle Road.

Has the Smarter Travel Policy been adequately addressed?

The Dept of Transport's *Smarter Travel A Sustainable Travel Future* Policy (published in February 2009), recognises the vital importance of continued investment in transport to ensure an efficient economy and continued social development. It also encourages the use of more sustainable travel modes such as cycling, walking and public transport. It is envisaged that the policy will be delivered through 49 actions, which are grouped into 4 broad categories. These are the reduction in the distance travelled by focussing population growth in areas of employment; the improvement of the availability of alternatives to the private car; improvements in fuel efficiency and actions to strengthen institutional arrangements. The proposed development proposes to locate a retail food store and a crèche in the town centre adjacent to an existing schools complex to the south and a large town centre mixed use development (under construction) to the north. It is in a highly

accessible location to housing, other retail and commercial development, town centre activities and facilities, the site of any future public transport (which is outside the remit of the applicant) and to existing schools and recreational facilities. In light of this, it is considered that the proposed development is in accordance with this policy and I do not agree that the proposal fails to address the requirements of the policy.

The appellant also believes that commercial parking should be curtailed and subject to a charge structure. It is noted that a total of 1012 parking spaces have been provided for the overall town centre development in a mix of basement, surface and road side parking bays. It is stated that this represents a shortfall of 100 spaces when compared with the Local Plan requirement, but was justified on the basis of the likelihood of multi-purpose trips. Given that there is currently no public transport available in Oranmore, apart from a bus route to Galway City, I do not see the need to curtail parking associated with a foodstore. The issue of charging is, in any case, a matter for the local authority.

Is the flood risk assessment adequate?

The issue of flood risk was addressed in the parent permission (209434) both in the EIS and in a subsequent report by a Hydrologist. This examined the impact of the tides, fluvial flows and wave climate combined and in isolation. The report had acknowledged that tidal surges occurred along the coastline and that the proposal would require infilling of the site in question, which could result in some displacement of floodwaters. This flood risk assessment had recommended a 200 year high tide level which corresponded to a FFL of 4.5m together with a design flood level of 5m O.D. Malin. The recommended flood risk mitigation for the entire development was to set minimum FFLs above the design flood level of 5m and to provide a sea wall and rock armouring wave climate protection along the exposed sea shore. The assessment had concluded that the proposed loss of tidal flood storage would not result in any measurable displacement of tidal waters to surrounding local flood prone lands or adjacent properties.

It is noted that the Inspector had brought to the Board's attention that the main flood events referred to in the Hydrologist's report (2003) were in 1995 and 1997 which had given rise to flood levels of 3.49m OD and 3.48m OD, respectively. It was from these figures that the 200 year return period flood level was obtained (3.98m OD). It was also pointed out that the proposed infilling would result in the loss of 28,000 cubic metres of flood storage area, but it had been considered that this would not materially affect the height that the high tide eventually reaches. It was concluded that "the volume of flood storage loss would be miniscule in the context of the overall water volumes in Oranmore Bay" and that "the flood plain and the volumetric storage associated with the river channel would be more than capable of accommodating the slight increase."

The appellant casts doubt on the previous assessment on the basis that models used on sea level rises up to now need to be revised to take account of climate change and the recent flooding events of November 2009. However, the first party has responded by pointing out that the site of the current application was assessed by a hydrologist in response to a FI request from the P.A. on the previously refused planning application (08/3651) in April 2009. It is stated that this later assessment had been "*updated to include the more recent data for the OPW gauge 29015 which extends the annual maximum flood series to 25 years*".

The first party response continues:

> "The predicted 200 year flood elevation is 3.80m OD Malin having a statistical standard error of 0.18m giving an upper 66% confidence interval of 3.98m O.D. Malin, therefore allowing for climate change and wave climate effects, a combined design flood level of 5m OD Malin is desirable and remains unchanged from the previous recommendation. The minimum FFL and road level within Pairc Na Clochar development is above 5.5m Malin ensuring adequate freeboard to minimise flood risk. In relation to the discount foodstore, the proposed FFL is set at 6.8m OD Malin, which provides a 1.8m freeboard above the recommended design flood level."

It is further pointed out that the current proposal does not include any basement parking and that the site of the appeal was not flooded during the November 2009 flood event.

It is considered that on the basis of the original flood risk assessment, combined with the more recent flood risk assessments relating to the site of appeal (which takes account of more recent information), together with the proposed mitigation measures of further increases in the FFLS, the proposed development has been designed to minimise the risk of flooding. In addition, there is no evidence that the appeal site itself is prone to flooding. It is considered therefore that this matter has been adequately addressed in accordance with the requirements of "The Planning system and Flood Risk Assessment Guidelines 2009."

Review of Screening Assessment for Appropriate Assessment

The site is located approx. 25m from Galway Bay cSAC and approx. 35m from Inner Galway Bay SPA and as such, a screening assessment regarding whether the proposed development should be subject to an Appropriate assessment under the EU Habitats Directive (Article 6(3)) is required. The application was accompanied by a report on the ecological information and Article 6(3) screening, which was similar to the report submitted on 8/3651, which had received a positive response from the DoEHLG. The EU

Habitats Directive, Article 6(3) Screening Assessment was included to address Policy HL31 and DM Std. 37 of the Galway County Development Plan. Condition 9 of PL07.209434 had required consultation with the NPWS and the submission of written agreement details of best practice measures and mitigation measures to minimise impact on the cSAC/SPA within and abutting the site and the agreed measures to be carried out in full. It is stated that the current application forms part of Phase 2 and that the Risk Assessment Management Plan has been submitted to the NPWS for approval.

It was concluded that the proposed development would not significantly affect the Natura 2000 sites for the following reasons:

- None of the qualifying interests of the cSAC/SPA are affected;
- The distances of 25m and 35m respectively from the cSAC and the SPA
- Best environmental practice to be employed as described in the Phase 2 Risk Management Plan.

It was therefore concluded that there was a Finding Of No Significant Effect (FONSE) based on the information submitted in the screening assessment and the measures set out in the Risk Management Plan. This serves as a "Screening Assessment" and precludes the requirement to carry out a full Article 6(3) appropriate Assessment.

Review of Archaeological Assessment

An Archaeological Assessment was carried out in October 2009 including a desk top study and field work. The site is bounded to the east by a stone wall enclosing a church and graveyard (RMP GA 95:110). This consists of two churches (one medieval) and associated graveyards, both churches in ruins. The site is bounded to the west by Oranmore Bay and to the south west lies Oranmore Castle (RPM GA 95:111). This consists of a tower house dating from 16th Century (and site of former structure), set on the shoreline and includes a quay and private jetty. The area is of high archaeological potential as evidenced by a number of finds and features recorded during previous archaeological fieldwork carried out during Oranmore Sewerage Scheme 1995-99 and more recent excavation exposing a possible Bronze Age Ring Ditch. Further sites in the area include middens, stone features, pits, cists and associated Bronze Age lithics.

The Archaeological Assessment recommended that a programme of archaeological testing be carried out by and Archaeologist prior to development or construction works, with provision for full recording and excavation of any archaeological features or deposits which may be exposed. In particular, mitigation measures are suggested to avoid any negative impact on the church and graveyard, due to the potential of interference with

human remains. These included alerting contractors to the extent of the RPM and requiring any works in the vicinity of the graveyard wall (including landscaping) to be monitored by a suitably qualified archaeologist.

Conclusion and recommendation

Having regard to the provisions of the development plan, the local area plan and the overall policy framework for the area, and the town centre development which is currently under construction, it is considered that the proposed development would result in the provision of retail and creche facilities which is likely to assist in the achievement of the objectives of the development plan. The proposed development, subject to appropriately worded conditions, would not seriously injure the amenities of the area and would be acceptable in terms of traffic safety. It is recommended therefore that planning permission be granted for the reasons and considerations here under.

REASONS AND CONSIDERATIONS

Having regard to the provisions of the current Galway County Development Plan 2009-2015, the Oranmore Local Area Plan 2006-2012 and the permitted use of the adjoining site to the north as a town centre mixed use development, it is considered that, subject to compliance with the conditions set out below, the proposed development would be an appropriate form of development at this location, would not seriously injure the amenities of the area or of property in the vicinity and would be acceptable in terms of traffic safety and convenience. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area.

CONDITIONS

1. The development shall be carried out and completed in accordance with the plans and particulars lodged with the application as amended by the further plans and particulars submitted the 18th day of November 2009, except as may otherwise be required in order to comply with the following conditions. Where such details require points of detail to be agreed with the planning authority, these matters shall be the subject of written agreement and shall be implemented in accordance with the agreed particulars.
   Reason: In the interest of clarity.

4. The total net retail sales area (as defined in Annex 1 of the Retail Planning Guidelines for Planning Authorities issued by the Department of the Environment, Heritage and Local Government in January 2005) of the supermarket shall not exceed 3,000 square metres .

   Reason: To comply with national policy, as set down in these Guidelines

5. Notwithstanding the exempted development provisions of the Planning and Development Regulations, 2001, and any statutory provision amending or replacing them, the use of the proposed development shall be restricted to a discount retail unit and a creche (as specified in the lodged documentation), unless otherwise authorised by a prior grant of planning permission.

   Reason: In order to prevent an adverse impact on the viability and vitality of the area.

6. Details including samples of the materials, colours and textures of all the external finishes to the proposed buildings shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

   Reason: In the interest of the visual amenities of the area.

7. 99 no. car parking spaces shall be provided within the site to serve the discount foodstore. The layout of these spaces together with details of the parking layout for the proposed crèche shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development.

   Reason: To ensure that adequate off-street parking provision is available to serve the proposed development.

8. The internal road network serving the proposed development [including turning bays, junctions, parking areas, footpaths and kerbs] shall comply with the detailed standards of the planning authority for such road works.

   Reason: In the interests of amenity and of traffic and pedestrian safety.

9. Site development and building works shall be carried out only between the hours of 08.00 to 19.00 Mondays to Fridays inclusive, between 08.00 to 14.00 on Saturdays and not at all on Sundays and public holidays. Deviation from these times will only be allowed in exceptional circumstances where prior written approval has been received from the planning authority.

   Reason: In order to safeguard the amenities of property in the vicinity

10. No additional development shall take place above roof parapet level, including lift motor enclosures, air handling equipment, storage tanks, ducts or other external

plant, telecommunication aerials, antennas or equipment, unless authorised by a further grant of planning permission.

Reason: To protect the residential amenities of property in the vicinity and the visual amenities of the area.

11. A comprehensive boundary treatment and landscaping scheme shall be submitted to and agreed in writing with the planning authority, prior to the commencement of development. This scheme shall include the following:-

    (a) details of all proposed hard surface finishes, including samples of proposed paving slabs/materials for footpaths, kerbing and road surfaces within the development;

    (b) proposed locations of trees and other landscape planting in the development, including details of proposed species and settings;

    (c) details of proposed street furniture, including bollards, lighting fixtures and seating;

    (d) details of proposed boundary treatments at the perimeter of the site, including heights, materials and finishes.

    The boundary treatment and landscaping shall be carried out in accordance with the agreed scheme.

    Reason: In the interest of visual amenity.

12. Comprehensive details of the proposed public lighting system to serve the development shall be submitted to and agreed in writing with the planning authority, prior to the commencement of development. The agreed lighting system shall be fully implemented and operational, before the proposed development is made available for occupation.

    Reason: In the interest of public safety and visual amenity

13. No advertisement or advertisement structure, the exhibition or erection of which would otherwise constitute exempted development under the Planning and Development Regulations 2001, or any statutory provision amending or replacing

them, shall be displayed or erected on the building/within the curtilage of the site unless authorised by a further grant of planning permission.

Reason: In the interest of visual amenity.

14. Prior to the commencement of development or any site preparation works, the developer shall carry out a programme of pre-development testing on the site concentrating in particular on the Zone of Archaeological Potential of Monument GA095-110 (Tower house) and GA095-111 (church and graveyard. The developer shall facilitate the archaeological appraisal of the site and shall provide for the preservation, recording and protection of archaeological materials or features which may exist within the site. In this regard, the developer shall:

(a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development, and

(b) employ a suitably-qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works.

The assessment shall address the following issues:

(i) the nature and location of archaeological material on the site, and

(ii) the impact of the proposed development on such archaeological material.

A report, containing the results of the assessment, shall be submitted to the planning authority and, arising from this assessment, the developer shall agree in writing with the planning authority details regarding any further archaeological requirements (including, if necessary, archaeological excavation) prior to commencement of construction works. In default of agreement on any of these requirements, the matter shall be referred to An Bord Pleanála for determination.

Reason: In order to conserve the archaeological heritage of the area and to secure the preservation (in-situ or by record) and protection of any archaeological remains that may exist within the site.

15. Prior to the commencement of development and following consultation with the Department of the Environment, Heritage and Local Government, the developer shall

submit a method statement to the planning authority for written agreement outlining the measures which will be put in place to protect the graveyard wall from construction works on site. This method statement shall include measures that will ensure the long term protection of the graveyard wall. The agreed measures shall be carried out in full. No site works (including landscaping works) shall take place in the vicinity of the graveyard wall in the absence of a suitably qualified archaeologist.

Reason: To protect and preserve features of archaeological significance.

16. Prior to commencement of development on the site and following consultation with the Parks and wildlife Section of the Heritage division of the Department of the environment, Heritage and Local Government, the developer shall submit to the planning authority for written agreement details of best practice measures and mitigation measures to minimise impact on the candidate Special Area of Conservation and Special Protection Area abutting the site. The agreed measures shall be carried out in full.

Reason: In the interest of amenity and the preservation of natural heritage.

17. The developer shall submit details of the construction management plan to the planning authority for written agreement prior to commencement of development. These details shall address the following matters:

    a) No access for construction traffic shall be permitted to Castle Road.
    b) Weights, loads and volume of construction traffic;
    c) Details of proposed traffic controls upon entering and exiting the site including proposals for preventing parking on the internal access road;
    d) Proposals for wheel washing facilities and street cleaning;
    e) Details of road signage during construction phase;
    f) Details of persons responsible for on-site traffic management during construction.

Reason: In the interest of traffic safety and the amenity of adjoining property.

18. Water supply and drainage arrangements, including the disposal of surface water, shall comply with the requirements of the planning authority for such works and services.

Reason: In the interest of public health and to ensure a proper standard of development.

19. All service cables associated with the proposed development (such as electrical, communal television, telephone and public lighting cables) shall be run underground within the site.

Reason: In the interest of orderly development and the visual amenities of the area.

20. Prior to commencement of development, the developer shall lodge with the planning authority a cash deposit, a bond of an insurance company, or other security to secure the provision and satisfactory completion and maintenance until taken in charge by the local authority of roads, footpaths, watermains, drains, public open space and other services required in connection with the development, coupled with an agreement empowering the local authority to apply such security or part thereof to the satisfactory completion or maintenance of any part of the development. The form and amount of the security shall be as agreed between the planning authority and the developer or, in default of agreement, shall be referred to An Bord Pleanála for determination.

Reason: To ensure the satisfactory completion and maintenance of the development until taken in charge.

21. The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000. The contribution shall be paid prior to the commencement of development or in such phased payments as the planning authority may facilitate and shall be subject to any applicable indexation provisions of the Scheme at the time of payment. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to the Board to determine the proper application of the terms of the Scheme.

Reason: It is a requirement of the Planning and Development Act 2000 that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act be applied to the permission.

Mary Kennelly
Senior Planning Inspector
18th May 2010

01 Building 10 Site Layout Key Plan

REVISIONS

- Granted Planning Permission
- Proposed Development
- Proposed Development as Part of this Application

THIS DRAWING IS FOR PLANNING APPLICATION PURPOSES ONLY. INFORMATION SHOWN, AGREES CURRENT PLANNING ACTS. THIS DRAWING IS NOT INTENDED TO DEMONSTRATE COMPLIANCE WITH THE CURRENT BUILDING REGULATIONS.

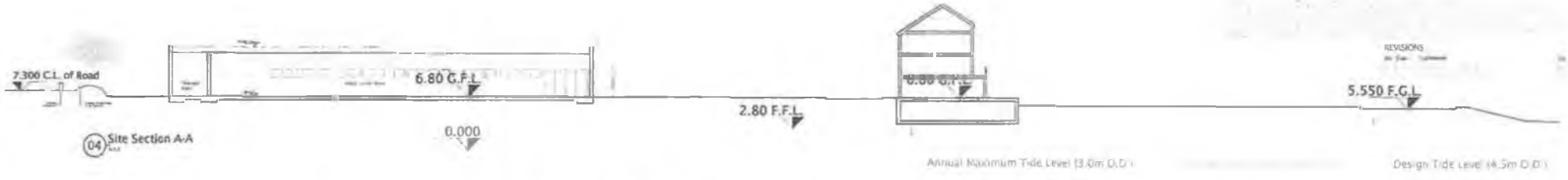
ALL DIMENSIONS TO COMPLY WITH THE RECOMMENDATIONS FOR SITE DEVELOPMENT WORKS FOR HOUSING AREAS 1998 – by An Foras Forbartha

3 04 Building 10 Site Layout Key Plan — 06017 310006 A

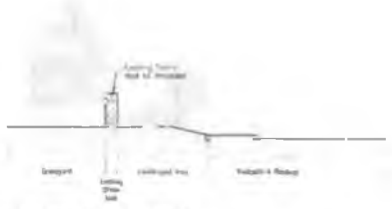
Project: Parc an Clocher
Client: White Cedar Developments Ltd — Dec 08 — Drawn by: RMC

Scale: 1:1000

Drawing Purpose: Planning Application



04 Site Section A-A



03 Building 10 Site Section 'B'

01 Building 10 Site Layout Plan

THIS DRAWING IS FOR PLANNING APPLICATION PURPOSES ONLY. INFORMATION SHOWN, ADDRESSES CURRENT PLANNING ACTS. THIS DRAWING IS NOT INTENDED TO DEMONSTRATE COMPLIANCE WITH THE CURRENT BUILDING REGULATIONS.

ALL DETAILS TO COMPLY WITH THE RECOMMENDATIONS FOR SITE DEVELOPMENT WORKS FOR HOUSING AREAS 1998 / by the Stationery Office.

3.04 Building 10 Site Layout Plan

Project No. 06017 Building No. 310002 Rev. B

Project: Páirc an Chlochair
Client: White Cedar Developments Ltd
Date: Dec 08
Drawn: BMC
Scale: 1:500
Drawing Purpose: Planning Application

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

30th January 2009

Our Ref.: DAU-2009-GA-GA-08/3779

County Secretary,
Galway County Council,
County Hall,
Prospect Hill,
Galway.

Re: Planning Application Reg. Ref. No. 08/3779 to construct 59 mixed size apartments/retail units, demolish existing out buildings with all associated site works at Garraun South by M. Finn.

A Chara,

We refer to the Council's notification in relation to the above-proposed development. Outlined below are the archaeological and nature conservation recommendations of the Department of the Environment, Heritage and Local Government. Outlined below are the archaeological recommendations of the Department of the Environment, Heritage and Local Government.

Due to the scale of the proposed development it is our recommendation that pre-development testing as described below should be carried out on site. A report of the testing should be submitted as Further Information. This will enable the Department of the Environment, Heritage and Local Government and the Planning Authority to formulate an informed archaeological recommendation before a planning decision is taken.

Archaeological Impact Assessment should be compiled as follows:

1. The applicant is required to engage the services of a suitably qualified archaeologist to carry out an archaeological assessment of the development site. No sub-surface work should be undertaken in the absence of the archaeologist without his/her express consent.
2. The archaeologist should carry out any relevant documentary research and inspect the site. Test trenches may be excavated at locations chosen by the archaeologist (licensed under the National Monuments Acts 1930-1994), having consulted the site drawings.
3. Having completed the work, the archaeologist should submit a written report to the Planning Authority and to the Department of the Environment, Heritage and Local Government in advance of the planning decision. Where archaeological material/features are shown to be present, preservation *in situ*, preservation by record (excavation) or monitoring may be required.
4. It should be borne in mind that, if significant archaeological remains are found, refusal might still be recommended, and/or further monitoring or excavation required. Our decision should be

made on this application until the Department of the Environment, Heritage and Local Government and the Planning Authority has had the opportunity to evaluate the Archaeological Assessment. The Department of the Environment, Heritage and Local Government will forward a recommendation based on the Archaeological Assessment to the Planning Authority.

Reason: To ensure the continued preservation (either in situ or by record) of places, caves, sites, features or other objects of archaeological interest.

From a nature conservation perspective, this department would like to make the following comments and observations.

Article 6(3) screening

1. The site of the proposed development encroaches Galway Bay Complex cSAC (site code 268), and is adjacent to Inner Galway Bay SPA (site code 4031), both of which are Natura 2000 sites.

2. The cSAC has been selected for the conservation of, among other things, the following EU Habitats Directive Annex I habitats and Annex II species:
   - Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
   - Mediterranean salt meadows (Juncetalia maritime) [1410]
   - Perennial vegetation of stony banks [1220]
   - Otter (*Lutra lutra*) [1355]

   The SPA is of international importance for birds, and for wintering wildfowl in particular. Intertidal areas and the shoreline provide important feeding and roosting habitat for birds.

3. On its own and in combination with other plans and projects in this area, construction and operation of the proposed development has the potential to have significant effects on a Natura 2000 site, and its conservation objectives[1], or the possibility of such effects cannot be excluded based on the information supplied to date. Accordingly, an EU Habitats Directive Article 6(3) appropriate assessment is required, and guidance from the Commission[2] should be followed in this regard.

4. As part of the appropriate assessment, an ecological impact assessment should be completed, and this should be informed by full project details, and any site information of relevance, including in relation to geology, soils, hydrology, and coastal processes/flood risks (including wave climate, tidal regime and storm surges, and taking sea level rise and climate change scenarios into account).

---

[1] In the absence of management plans for the sites, the conservation objectives are to maintain or restore the favourable conservation status of the Annex I habitats and Annex II species (and their habitats) for which the sites are listed.

[2] European Communities. 2000. *Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*
European Communities. 2002. *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*
European Communities. 2007. *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission*

Ecological impact assessment

5. A basic ecological impact assessment should include survey, description and evaluation of the following:
   - ✓ Habitats of the receiving environment, including a habitat map with the footprint of all parts of the development overlain. A standard scheme such as Fossitt[3] (2000) should be used for habitat nomenclature, except in the case of any EU Habitats Directive Annex I habitats which should be clearly mapped, described (in terms of vegetation communities and flora and fauna present) and evaluated;
   - ✓ Flora of the receiving environment, including any rare or protected plants;
   - ✓ Mammals that use the site or surrounding areas, with particular emphasis on rare, protected or annexed (Habitats Directive) species – see below;
   - ✓ Birds that use the site or surrounding areas, with particular emphasis on any rare[4] or Annex I (Birds Directive) species – see below;
   - ✓ Other terrestrial and aquatic fauna (e.g. invertebrates, fish), as appropriate, and with particular emphasis on rare, protected or annexed (Habitats Directive) species.

6. Bird surveys will be required to establish usage of the site and surrounds by birds, particularly in winter months, and to determine the likely significant direct, indirect and cumulative effects on the SPA. In this regard, the potential for cumulative effects are of concern, including as a result of the construction and operation of other residential, commercial and amenity developments along the coast in the wider Oranmore area. The assessment of impacts should include disturbance from amenity and recreational use, noise and lighting, in addition to habitat loss and encroachment.

7. As buildings will be demolished to facilitate construction, a bat survey will be required and should be undertaken by a suitably qualified person.

Kindly forward any further information or in the event of a decision, a copy of said decision to the following address as soon as it issues:

The Manager,
Development Applications Unit,
The Department of the Environment, Heritage and Local Government,
Dún Scéine, Harcourt Lane, Dublin 2.

In addition, please acknowledge receipt of this submission and forward the relevant receipt to the above address.

Is mise le meas,

Proinsias De Bátúin
The Development Applications Unit

[3] Fossitt, J.A. (2000). *A guide to habitats in Ireland.* Heritage Council, Kilkenny.
[4] To include red or amber listed species in the current list of Birds of Conservation Concern in Ireland

i an Chontae,
c na Radharc, Gaillimh.
i an Chontae,
spect Hill, Galway.

Phone: (091) 509 000
s/Fax: (091) 509 010
on/Web: www.galway.ie
www.gaillimh.ie

chtal/Deontais Tithiochta
sing Loans/Grants
091) 509 301
ousing@galwaycoco.ie

tais Tithiochta
sing Applications
091) 509 300
ousing@galwaycoco.ie

eallacht & Tréidliachta
onment & Veterinary
091) 476 402
nvironment@galwaycoco.ie

ire & Iompar
ls & Transportation
091) 509 309
oads@galwaycoco.ie

halann Daonna
an Resources
091) 509 303
r@galwaycoco.ie

rcháin
r Taxation
091) 509 099
otortax@galwaycoco.ie

únais Tiomána
ng Licences
091) 509 305
otortax@galwaycoco.ie

na dToghthóirí
ster of Electors
091) 509 310
ectors@galwaycoco.ie

hisf Uisce
r Services
091) 476 401
ater@galwaycoco.ie

l & Fiontar
munity & Enterprise
091) 746 860
ommunity@galwaycoco.ie

áil
ning
91) 509 308
anning@galwaycoco.ie

tais Ard Oideachais
r Education Grants
91) 509 310
ducation@galwaycoco.ie

harlann
y
91) 562 471
fo@galwaylibrary.ie

02/02/2009

DoEH&LG
Development Applications Unit
Dun Sceine
Harcourt Lane
Dublin 2

Comhairle Chontae na Gaillimhe
Galway County Council

TAG: Uimh. Thag Pleanála: 08/3779 - PERMISSION to construct 59 no. mixed size apartments and shop/retail spaces in three four-storey buildings, basement and all ancillary site facilities and works and the demolition of existing out-buildings. (Gross floor area 8725 sqm)
RE: Planning ref. no.:
i mbaile fearainn / in the townland of: Garraun South

RIALACHÁIN PLEANÁLA AGUS FORBARTHA, 2001-2002

ADMHÁIL ar AIGHNEACHT nó TUAIRIM atá FAIGHTE ar IARRATAS PLEANÁLA

IS DOICIMÉAD THÁBHACHTACH É SEO!

COINNIGH AN DOICIMÉAD SEO GO SÁBHÁILTE. BEIDH ORT AN ADMHÁIL SEO A THAISPEÁINT DON BHORD PLEANÁLA MÁS MIAN LEAT ACHOMHAIRC A DHÉANAMH AR CHINNEADH AN ÚDARÁIS PLEANÁLA

Tá aighneacht/tuairim faighte i scríbhinn ó DoEH&LG ar an 02/02/2009 maidir leis an iarratas pleanála thuas.

Tá an táille cuí de €0.00 íoctha.

Tá an t-aighneacht/tuairim de réir na forálacha cuí de na Rialacháin um Pleanáil agus Forbairt, 2001 agus cuirfidh an tÚdarás Pleanála san áireamh iad nuair atá cinneadh dhá dhéanamh ar an iarratas pleanála.

AIRE
Tabhair faoi deara gur é an dáta is déanaí do chinneadh ar an gcomhad seo ná _____
Má tharlaíonn sé **nach bhfaigheann tú fógra** maidir leis an gcinneadh seo (trí phostas cláraithe) laistigh de **3 – 5 Lá den dáta thuas**, déan teagmháil leis an oifig seo ar an bpointe ag 091 509 308 nó ar ríomhphost ag planning@galwaycoco.ie, chun a chinntiú go gcloíonn tú le sprioc amanna achomharc an Bhord Pleanála.

PLANNING AND DEVELOPMENT REGULATIONS, 2001-2002

ACKNOWLEDEGMENT of RECEIPT of SUBMISSION or OBSERVATION on a PLANNING APPLICATION

THIS IS AN IMPORTANT DOCUMENT!

KEEP THIS DOCUMENT SAFELY. YOU WILL BE REQUIRED TO PRODUCE THIS ACKNOWLEDGEMENT TO AN BORD PLEANÁLA IF YOU WISH TO APPEAL THE DECISION OF THE PLANNING AUTHORITY

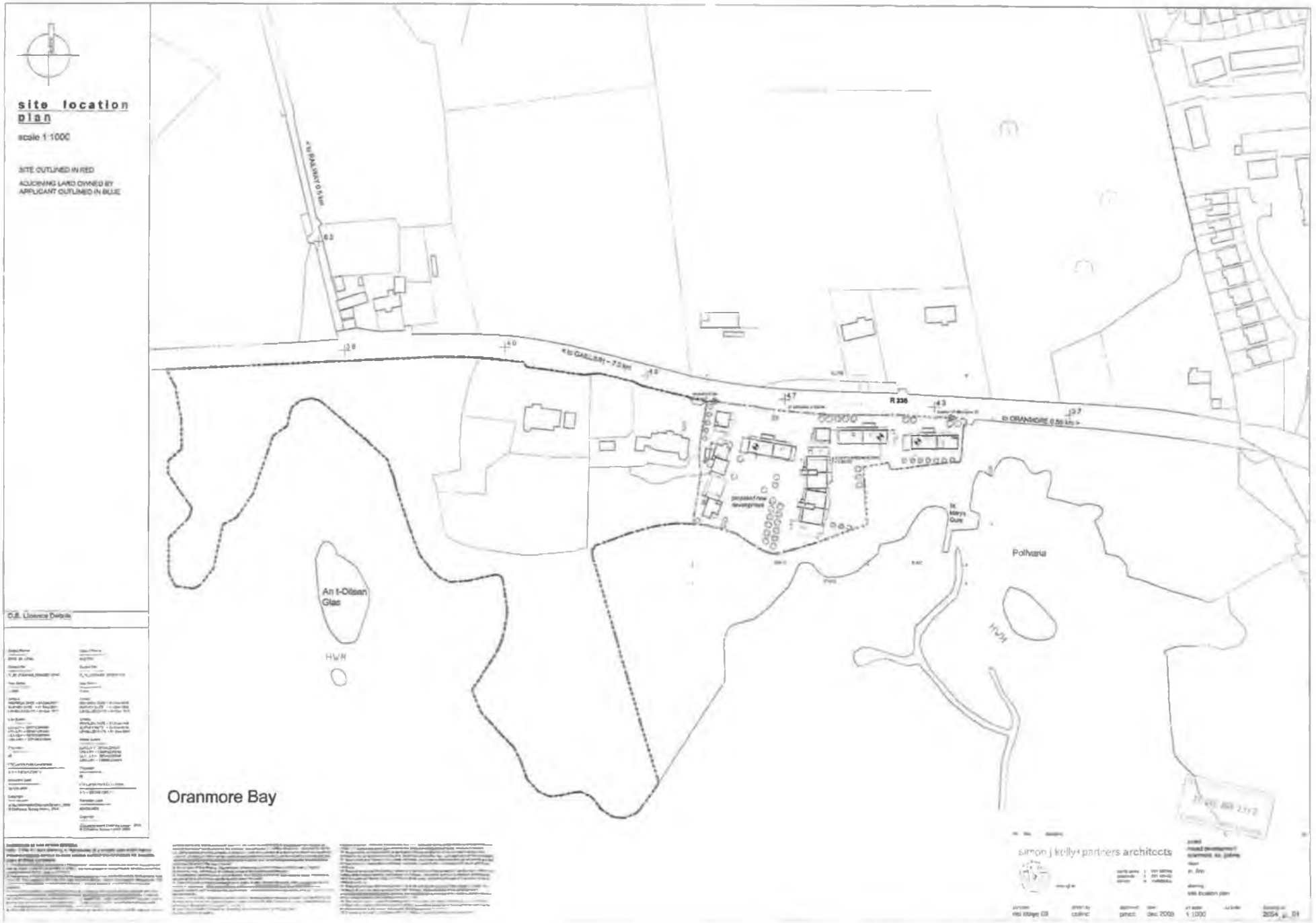
A submission/observation in writing has been received from DoEH&LG on 02/02/2009 in relation to the above planning application.

The appropriate fee of € 0.00 has been paid.
The submission/observation is in accordance with the appropriate provisions of the Planning and Development Regulations, 2001 and will be taken into account by the planning authority in its determination of the planning application.

N.B
Please note that the latest date for decision on this file is 24/2
Should you **not receive notification** of this decision (by registered post) within **3 – 5 days of the above date,** please contact this office immediately at 091 509 308 or email at planning@galwaycoco.ie, in order to ensure that you meet an Bord Pleanála appeal deadlines.

A. Comer
Oifigeach Feidhmeach Sinsearach/
Senior Executive Officer

Tá mile fáilte roimh chomhfhreagras i nGaeilge.


site location plan
scale 1:1000
SITE OUTLINED IN RED
ADJOINING LAND OWNED BY APPLICANT OUTLINED IN BLUE
O.S. Licence Details
Oranmore Bay
An t-Oileán Glas
HWM
Polvaria
St Mary's Guns
R 336
to GALWAY 9.5 km
to GALWAY 7.5 km
to ORANMORE 0.56 km
simon j kelly+ partners architects

APPENDIX 4

Galway County Development Plan 2009-2016
Maps

N

North West Rural Area

North East Rural Area

South West Rural Area

South East Rural Area

Clifden
Headford
Oughterard
Tuam
Dunmore
Glennamaddy
Ballygar
Moylough
Mount Bellew
Gorofin
Ballinasloe
Athenry
An Cheathrú Rua
An Spidéal
Clarinbridge
Craughwell
Kilcolgan
Loughrea
Ardrahan
Kinvara
Portumna
Gort

Legend

- Infrastructure/ Transport Corridor
- Existing Rail
- Proposed Rail
- Galway Metropolitan Gateway
- Local Service Centre
- Service Hub
- Hub Town

Note: Small Settlements not shown (refer to tables)

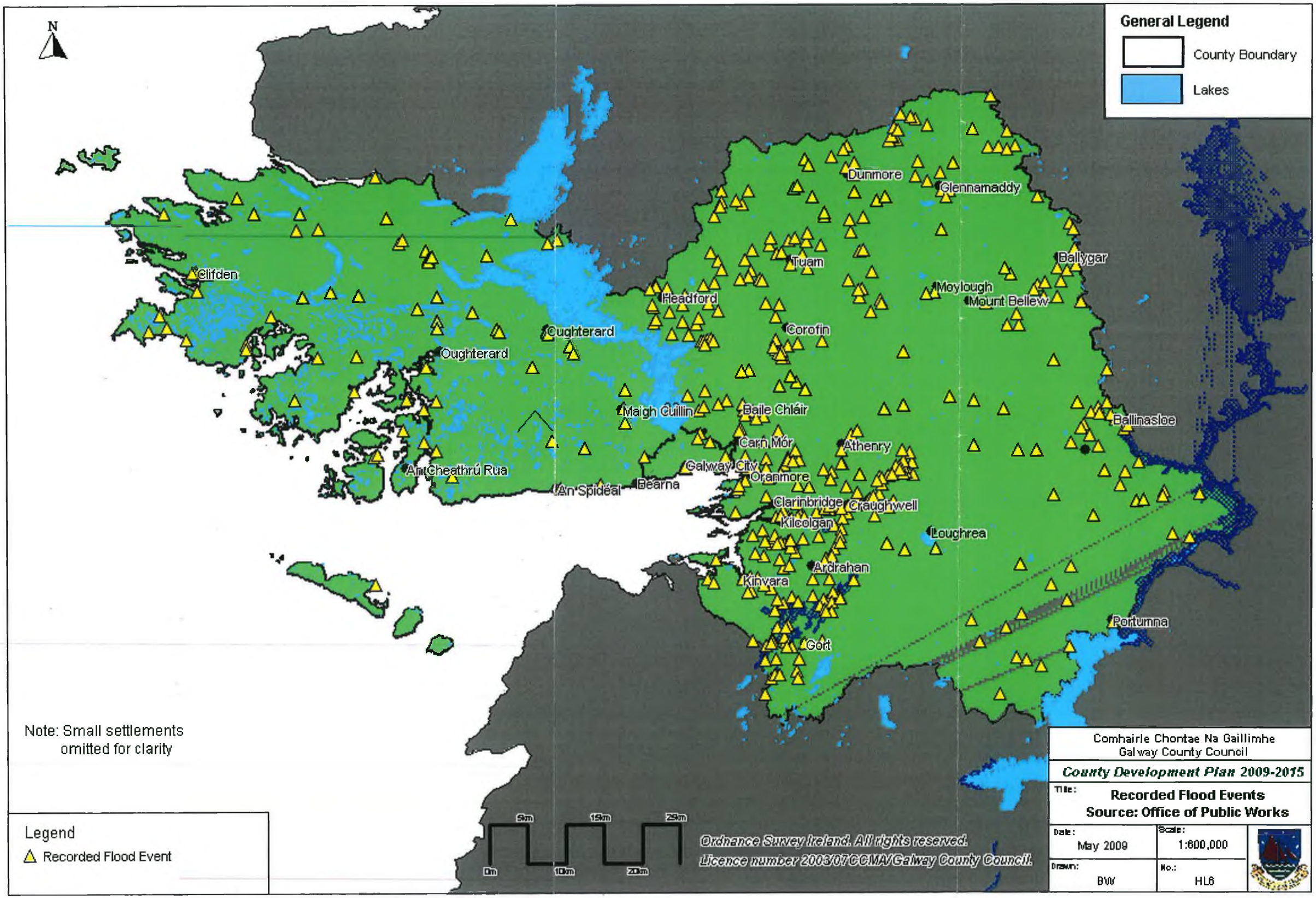
0m 5km 10km 15km 20km 25km

Comhairle Chontae Na Gaillimhe
Galway County Council

County Development Plan 2009-2015

Title:
Settlement Hierarchy

Date:	Scale:
May 2009	1:600,000
Drawn: BW	No.: SS2


N
General Legend
County Boundary
Lakes
Clifden
Oughterard
Cughterard
Headford
Tuam
Dunmore
Glennamaddy
Ballygar
Moylough
Mount Bellew
Corofin
Maigh Cuilin
Baile Chláir
Ballinasloe
Carn Mór
Athenry
Galway City
Oranmore
An Cheathrú Rua
An Spidéal
Béarna
Clarinbridge
Craughwell
Kilcolgan
Loughrea
Ardrahan
Kinvara
Portumna
Gort
Note: Small settlements
omitted for clarity
Legend
Recorded Flood Event
5km
10km
15km
20km
25km
0m
Ordnance Survey Ireland. All rights reserved.
Licence number 2003/07/CCMA/Galway County Council.
Comhairle Chontae Na Gaillimhe
Galway County Council
County Development Plan 2009-2015
Title:
Recorded Flood Events
Source: Office of Public Works
Date:
May 2009
Scale:
1:600,000
Drawn:
BW
No.:
HL6

N

Clifden
Oughterard
Oughterard
An Cheathrú Rua
An Spidéal
Bearna
Maigh Cuillin
Baile Chláir
Carn Mór
Athenry
Galway City
Oranmore
Clarinbridge
Craughwell
Kilcolgan
Loughrea
Ardrahan
Kinvara
Gort
Portumna
Headford
Tuam
Corofin
Dunmore
Glennamaddy
Moylough
Mount Bellew
Ballygar
Ballinasloe

Note: Small settlements omitted for clarity

Preliminary EcoNet

- Class 1
- Class 2
- Class 3
- Class 4
- Class 5
- Near Shore

Comhairle Chontae Na Gaillimhe
Galway County Council

County Development Plan 2009-2015

Title:
Preliminary EcoNet Map

Date:	Scale:
May 2009	1:600,000
Drawn: BW	No.: HL5

N

General Legend

County Boundary

Lakes

Clifden

Tuam

Headford

Oughterard

Maigh Cuillin

Baile Chláir

Ballinasloe

Athenry

An Cheathrú Rua

Galway City

An Spidéal

Oranmore

Clarinbridge

Kilcolgan

Loughrea

Kinvara

Portumna

Gort

Clifden

Tuam

Headford

Oughterard

Maigh Cuillin

Baile Chláir

Ballinasloe

Athenry

An Cheathrú Rua

Galway City

An Spidéal

Oranmore

Clarinbridge

Kilcolgan

Loughrea

Kinvara

Portumna

Gort

Legend

SAC

NHA

SPA

0m 10km 20km 30km 40km

Comhairle Chontae Na Gaillimhe
Galway County Council

County Development Plan 2009-2015

Title:

Designated Environmental Sites

Date:	Scale:
May 2009	1:800,000
Drawn: BW	No.: HL1

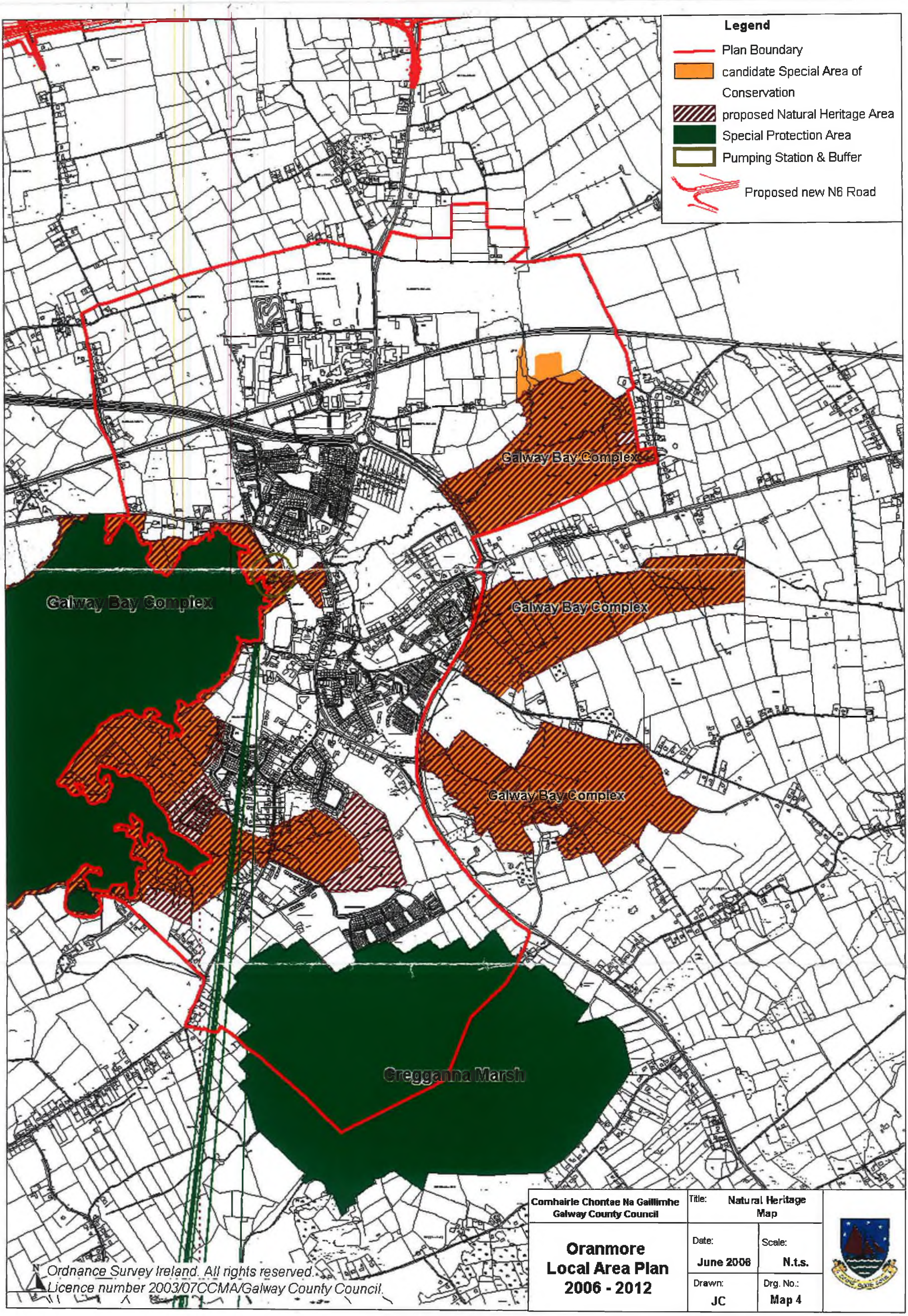
APPENDIX 5

Oranmore LAP 2006-2012 Maps

Zoning Legend

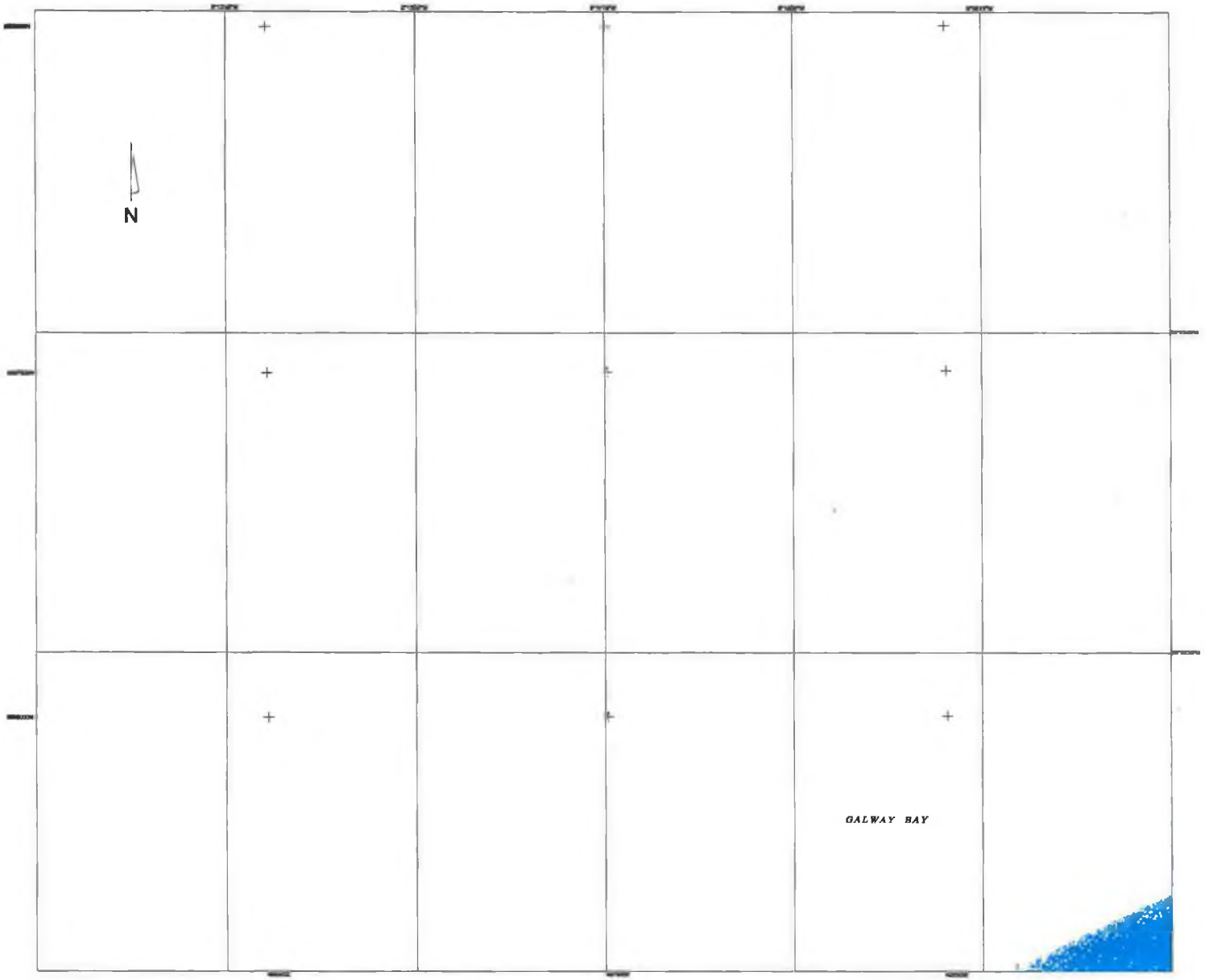
- Plan Boundary
- Residential
- Inner Residential
- Town Centre (Mixed Dev.)
- Industrial
- Business Technology & Retail Park
- Community Facilities
- Recreation and Amenity
- Greenbelt
- Amenity-Environment
- Pumping Station & Buffer
- Proposed new N6 Road

Comhairle Chontae Na Gaillimhe Galway County Council	Title: **Land Use Zoning Objectives Map**	
Oranmore Local Area Plan 2006 - 2012	Date: **Nov 2006**	Scale: **N.t.s.**
	Drawn: **JC**	Drg. No.: **Map 1**


Legend
Plan Boundary
candidate Special Area of Conservation
proposed Natural Heritage Area
Special Protection Area
Pumping Station & Buffer
Proposed new N6 Road
Galway Bay Complex
Galway Bay Complex
Galway Bay Complex
Galway Bay Complex
Cregganna Marsh
N
Ordnance Survey Ireland. All rights reserved.
Licence number 2003/07CCMA/Galway County Council.
Comhairle Chontae Na Gaillimhe
Galway County Council
Title: Natural Heritage Map
Oranmore
Local Area Plan
2006 - 2012
Date: June 2006
Scale: N.t.s.
Drawn: JC
Drg. No.: Map 4

APPENDIX 6

OPW Flooding Report May 2005



LEGEND

+ UTM GRID INTERSECTION

Coastline

Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Hazards may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun Illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : FNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordnance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.2.1
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

NOT TO BE USED FOR NAVIGATION

KEY NO.	REVISION	BY	DATE
1	Approved for		

DRAWN BY: Elroy Warren
CHECKED BY: Chris Johnson

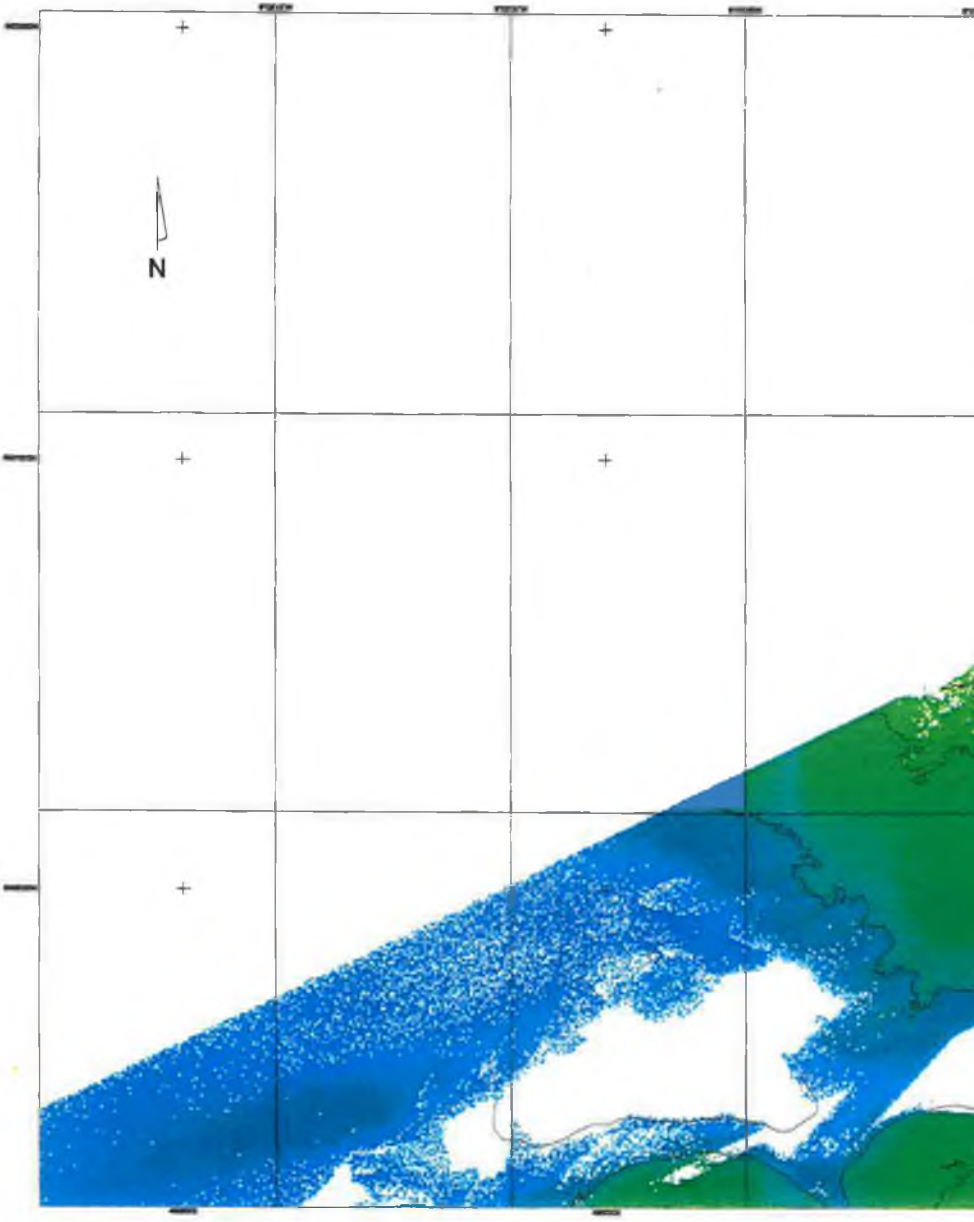
APPROVED BY: Nigel Townsend

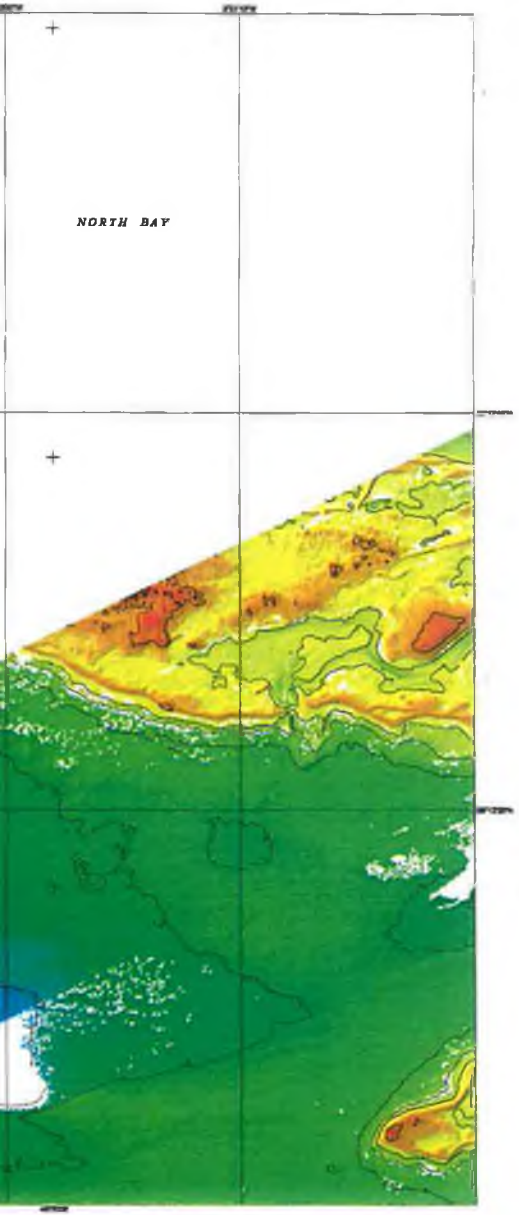
DATE: 28th February 2007

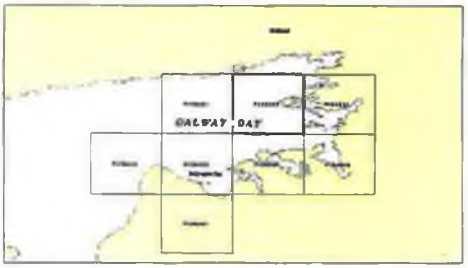
SURVEY DATE: September - October 2006

VESSEL: LADS Mk II Airborne Lidar Bathymetry

DRAWING NO.: LADS_F1234211_SID


N





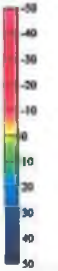
LEGEND

+ UTM GRID INTERSECTION

—— Contours

------ Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres



NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and navigation Beacons may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 6° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : FNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordnance Datum using observed tides at Rinville and Portmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.2.2
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

THIS MAP IS PURELY INFORMATIVE AND IS NOT TO BE USED FOR NAVIGATION. IT IS DESIGNED FOR GENERAL PLANNING ONLY. BATHYMETRY IS ACCURATE TO THE YEAR OF COMPILATION. THE ACCURACY OF THE DATA USED OR INTERPOLATED MADE IT UNSUITABLE FOR DETAILED ANALYSIS. INTERPOLATION OF SPECIFIC SITES WILL NORMALLY REQUIRE FURTHER AND MORE DETAILED ASSESSMENTS AND WILL FREQUENTLY REQUIRE SITE VERIFICATION.

NOT TO BE USED FOR NAVIGATION

REV NO.	REVISION	BY	DATE
1	Approval date	EW	[illegible]

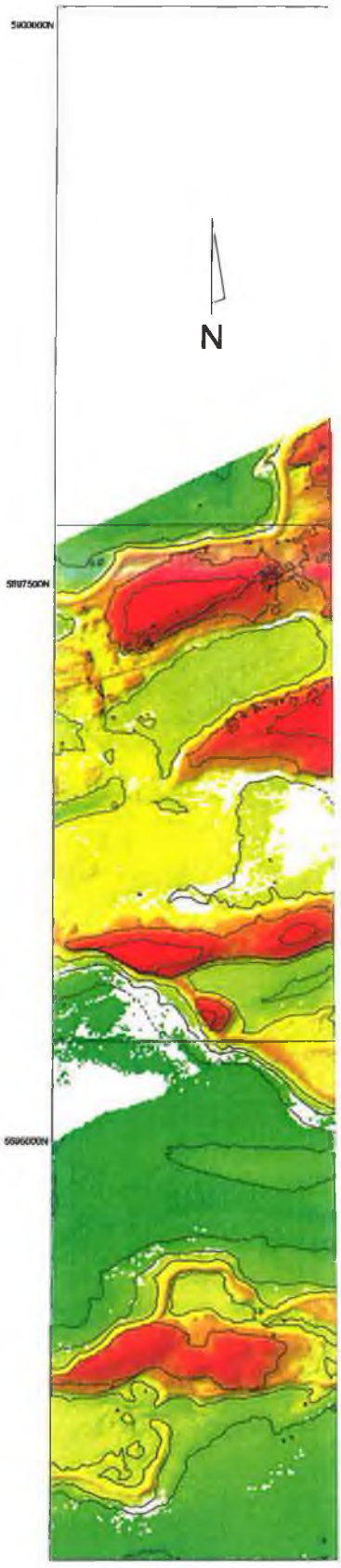
DRAWN BY: Elena Monteys
CHECKED BY: Chris Johnson

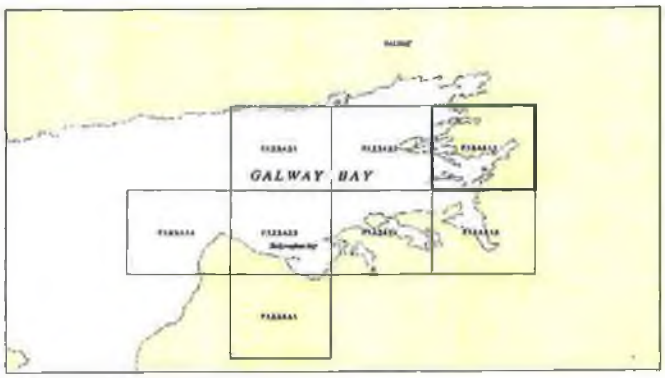
APPROVED BY: Nigel Townsend

DATE: 28th February 2007

SURVEY DATA: September - October 2006

VESSEL: LADS Mk II Airborne Laser Bathymetry





LEGEND

+ UTM GRID INTERSECTION

Contours

Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Beacons may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : PNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordinance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.4.3.1.1
SUN ILLUMINATED IMAGE

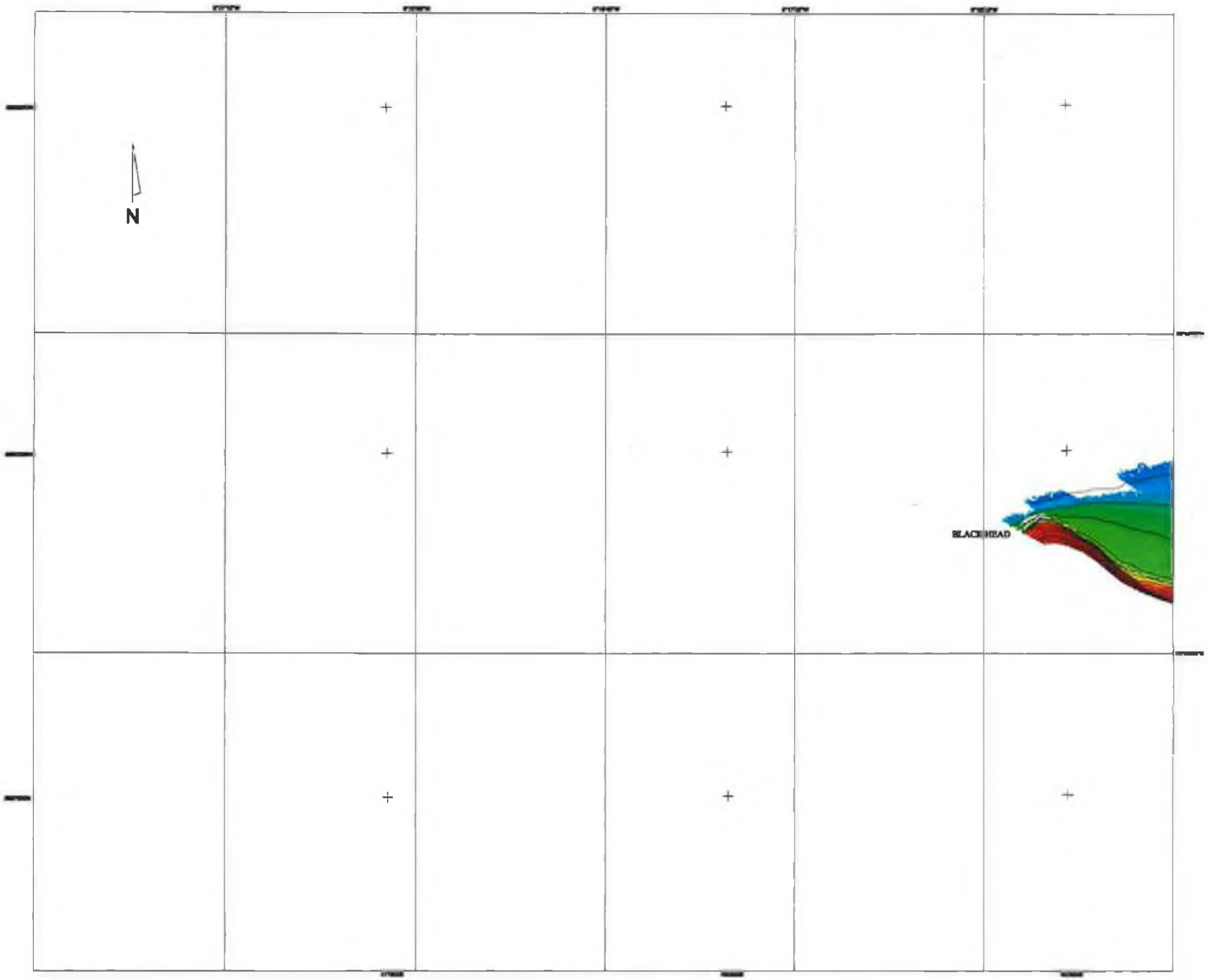
GSI Marine Institute Tenix

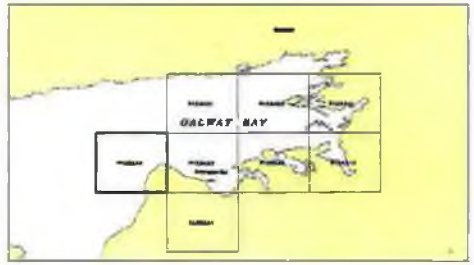
THIS MAP IS PURELY REPRESENTATIONAL AND IS DESIGNED FOR GENERAL INFORMATION AND STRATEGIC PLANNING ONLY. BATHYMETRY IS BASED ON DATA AVAILABLE TO THE GSI AT THE TIME OF COMPILATION. THE ACCURACY OF THE DATA USED OR INTERPOLATIONS MADE, IS NEITHER STATED OR IMPLIED. EVALUATION OF SPECIFIC SITES WILL NORMALLY REQUIRE FURTHER AND MORE DETAILED ASSESSMENTS AND WILL FREQUENTLY REQUIRE SITE INVESTIGATIONS.

NOT TO BE USED FOR NAVIGATION

REV NO.	REVISION	SIGNED	DATE
1	Approved data	KW	28/02/07

DRAWN BY: Kirsty Watson CHECKED BY: Chris Johnson	APPROVED BY: Nigel Townsend	DATE : 28th February 2007
SURVEY DATE : September - October 2006	VESSEL: LADS Mk II Airborne Lidar Bathymetry	
	DRAWING NO.: LADS_F134311_322	





LEGEND

UTM GRID INTERSECTION

Contours

Contours - 5m intervals (interpolated)

DEPTH LEGEND
Metres
-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES
1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Features may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL
Spheroid : WGS-84
Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL
Real-time : Fugro OmniStar WADGPS
Post-processed : PPAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL
Bathymetric data reduced to Malin Head Ordnance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND
SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN
DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES
RODIN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

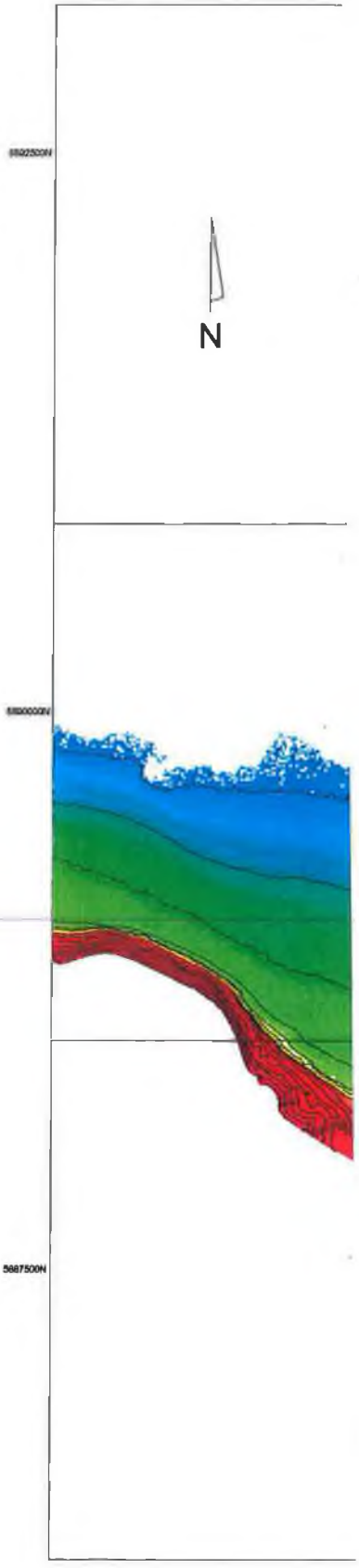
IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.1.4
SUN ILLUMINATED IMAGE

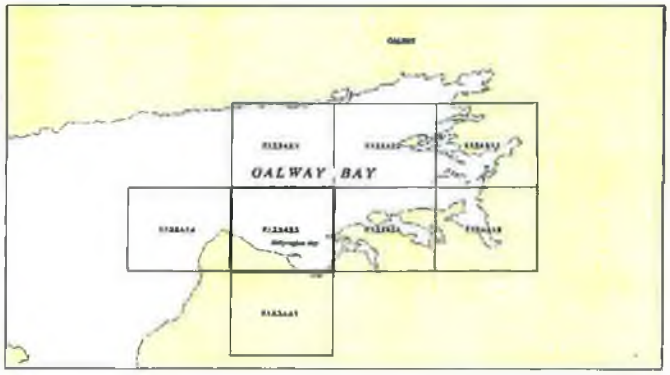
GSI Marine Institute Tenix

NOT TO BE USED FOR NAVIGATION

REV NO.	REMARKS	SIGNED	DATE
1	Approved Ref.	EW	28/2/07

DRAWN BY: Chris Wilson
CHECKED BY: Chris Johnson
APPROVED BY: Vigil Townsend
DATE : 28th February 2007
SURVEY DATE : September - October 2006
VESSEL : LADS Mk II Airborne Lidar Bathymetry
DRAWING NO. : LADS_F1234.1.4.1.4





LEGEND

+ UTM GRID INTERSECTION

Contours

Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Beacons may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : PNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordinance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

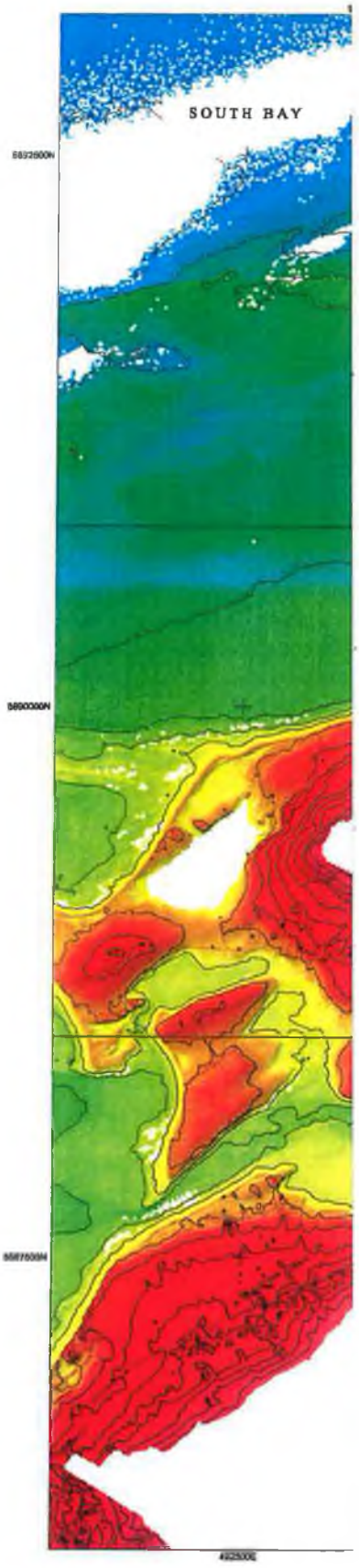
ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.2.3
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

REV NO.	REVISION	SIGNED	DATE
1	Approved data	KW	28/02/07

DRAWN BY: Kirsty Watson CHECKED BY: Chris Johnson	APPROVED BY: Nigel Townsend	DATE : 28th February 2007
SURVEY DATE : September - October 2006	VESSEL: LADS Mk II Airborne Lidar Bathymetry	
	DRAWING NO.: LADS_F123423_SI2	



LEGEND

+ UTM GRID INTERSECTION

Contours

Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Beacons may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : FNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordinance Datum using observed tides at Rinville and Parknore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

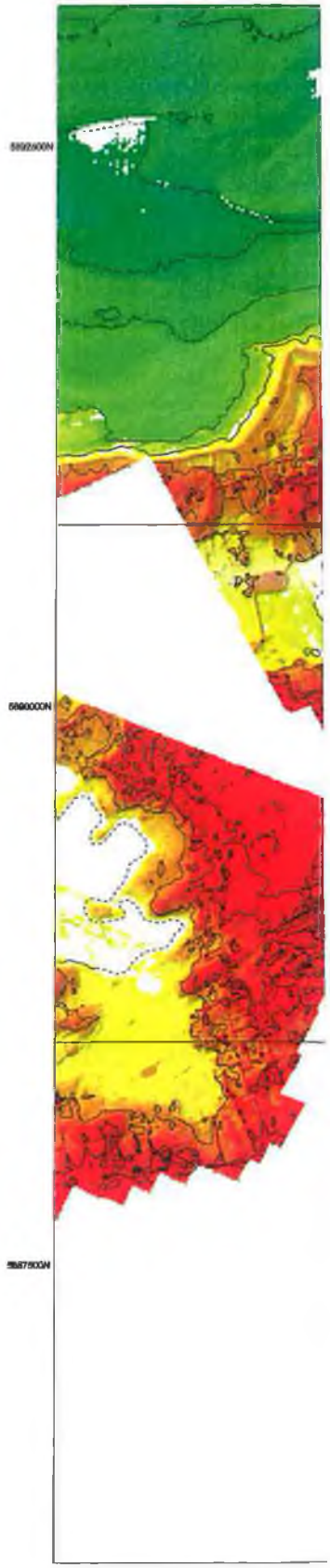
ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

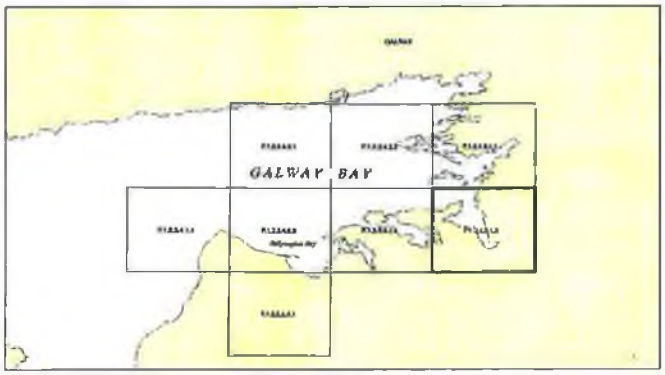
IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.2.4
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

REV NO.	REVISION	SIGNED	DATE
1	Approval data	KW	28/02/07

DRAWN BY: Kirsty Watson CHECKED BY: Chris Johnson	APPROVED BY: Nigel Townsend	DATE : 28th February 2007
SURVEY DATE : September - October 2006	VESSEL: LADS Mk II Airborne Lidar Bathymetry	
	DRAWING NO.: LADS_F123424_SI2	





LEGEND

+ UTM GRID INTERSECTION

Contours

Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Beacons may be present in the data but have not been indicated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : PNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordinance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉIREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.4.3.1.3
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

REV NO.	REVISION	SIGNED	DATE
1	Approved data	KW	28/02/07

DRAWN BY: Kirsty Watson
CHECKED BY: Chris Johnson

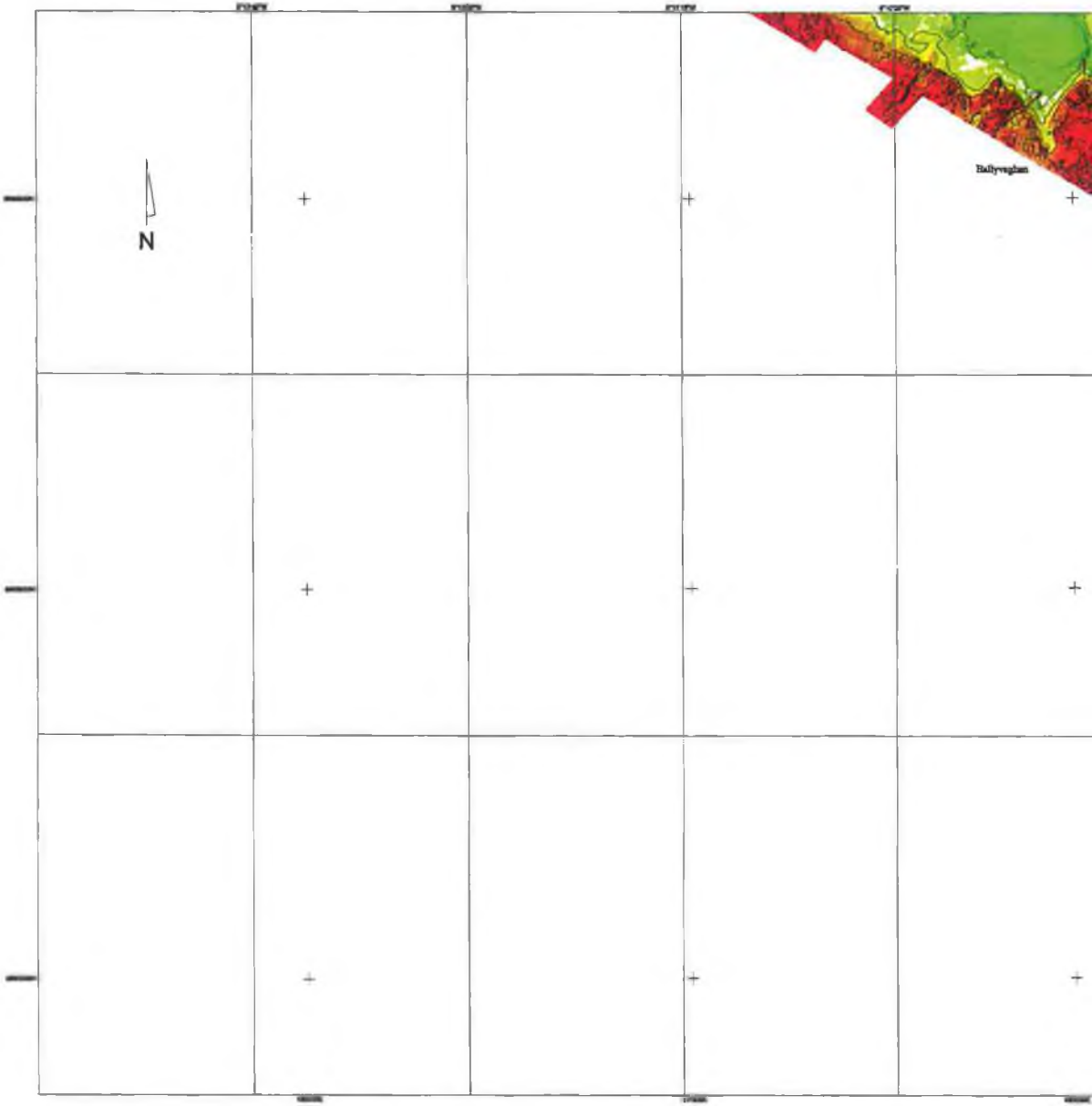
APPROVED BY: Nigel Townsend

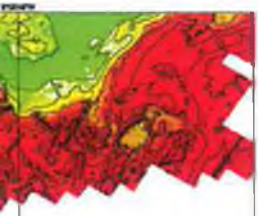
DATE : 28th February 2007

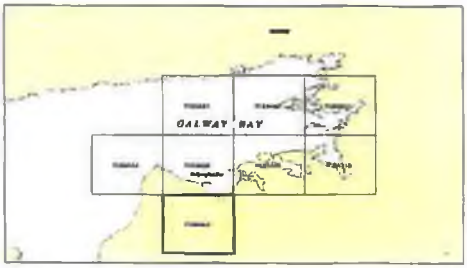
SURVEY DATE : September - October 2006

VESSEL : LADS Mk II Airborne Lidar Bathymetry

DRAWING NO.: LADS_F12413_SI2


N
Ballyveghan





LEGEND

+ UTM GRID INTERSECTION

—— Contours

- - - - Contours - 5m intervals (Interpolated)

DEPTH LEGEND
Metres

-50
-40
-30
-20
-10
0
10
20
30
40
50

NOTES

1. Bathymetric data acquired using LADS Mk II Lidar
2. Sheet name assigned by Geological Survey of Ireland (GSI)
3. Wrecks and Navigation Beacons may be present in the data but have not been delineated by symbols on this sheet
4. Topographic features remain in the dataset
5. Sun illumination from the North West

GEODETIC CONTROL

Spheroid : WGS-84

Projection : Universal Transverse Mercator, Zone 29 N, CM 9° W

HORIZONTAL CONTROL

Real-time : Fugro OmniStar WADGPS

Post-processed : FNAV Post-processed Dual Frequency KGPS

VERTICAL CONTROL

Bathymetric data reduced to Malin Head Ordinance Datum using observed tides at Rinville and Parkmore

CHART SCALE Horizontal 1 : 15,000

0 500 1000 1500 Metres

0 0.25 0.5 Nautical Miles

GEOLOGICAL SURVEY OF IRELAND

SUIRBHÉITREACHT GHEOLAÍOCHTA ÉIREANN

DEPARTMENT OF COMMUNICATIONS,
MARINE & NATURAL RESOURCES

ROINN CUMARSÁIDE, MARA AGUS ACMHAINNÍ NÁDÚRTHA

IRISH NATIONAL SEABED SURVEY
ZONE 1 : F.1.2.3.4.4.1
SUN ILLUMINATED IMAGE

GSI Marine Institute Tenix

REVNO.	DETAILS	BY	DATE
1	Approved Sun	KW	28/2/07

DRAWN BY: Kitty Wynne
CHECKED BY: Chris Johnson
APPROVED BY: Nigel Townsend
DATE: 28th February 2007
SURVEY DATE: September - October 2006
VESSEL: LADS Mk II Airborne Lidar Bathymetry
DRAWING NO.: LADS_F1234_SI

APPENDIX 8

Project Management

	Jun-10				Jul-10				Aug-10					Sep-10	
Tasks	07/06/2010	14/06/2010	21/06/2010	28/06/2010	05/06/2010	12/07/2010	19/07/2010	26/07/2010	02/08/2010	09/08/2010	16/08/2010	23/08/2010	30/08/2010	06/09/2010	13/09/2010
Literature Review															
Site Surveys															
Mapping															
Model of Galway Bay															
Interviews															
Critical Analysis															
Best Practice Review															
Case Study Development															
SEA Review															
Testing of Planning Policies															
Conclusions															
Drafting of Thesis															
Submission of Thesis															

Galway County Council					Outcome
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
Planning & Sustainable Development Unit	Mr Kevin Kelly	Director of Services	kkelly@galwaycoco.ie	091 509308 general	Got questionnaire responses from Anton Martens, Forward Planning
	Ms Catherine McConnell	Senior Planner			
Environment & Water Services Unit	Mr Jim Cullen	Director of Services	jcullen@galwaycoco.ie	091 476402 general	
	Mr Liam Gavin	Senior Engineer			
Conservation	Ms Mairín Doddy	Conservation Officer	mdoddy@galwaycoco.ie	091 509197	
Heritage	Ms Marie Mannion	Heritage Officer	mmannion@galwaycoco.ie	091 509198	Interview with Mmannion
Roads and Transportation	Mr Frank Gilmore	Director of Services	fgilmore@galwaycoco.ie	091 509309 general	Met with Kevin Finn, Harbours & Piers Engineers
	Martin Lavelle	Senior Engineer			
Environmental Protection Agency					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
Executive Board	Dr Mary Kelly	Director General			Interview with Dr M Desmond
Climate Research			climateresearch@epa.ie	01 2680100.	
Irish Climate Analysis & Research Units (ICARUS) NUI Maynooth					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
Research - Climate Change	Professor John Sweeney	Lecturer	john.sweeney@nuim.ie	01 708 3684	Interview with Prof Sweeney
	Jackie S. McGloughlin	Research Fello	jackie.mcgloughlin@nuim.ie		Telephone discussion with J McGloughlin

Department of Environmental Studies University of Ulster, Coleraine					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
	Professor Andrew Cooper	Professor of Coastal Studies	jag.cooper@ulster.ac.uk	+44 (0) 2870 324429	
Environmental Sciences Research Institute	Dr John McKenna	Lecturer in Environmental Sciences	j.mckenna@ulster.ac.uk	44 (0) 2870 324055	
An Taisce					
	Name	**Position**	**Contact Details**	**Phone No.**	
	Professor John Sweeney	President	john.sweeney@nuim.ie		
	Charles Stanley-Smith	Chairman	chair@antaisce.org	01-7077070	
	Ian Lumley	Heritage Officer	heritage@antaisce.org	01-7077064	
	Derrick Hambleton	Chairman Galway Association	derrickhambleton@ireland.com		Met with Derrick Hamblelton
Environmental Change Institute (ECI) NUI Galway					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
	Colin Brown	Director	colin.brownnuigalway.ie	091 492 691	
Centre for Climate and Air Pollution Studies	Colin O Dowd	Director	colin.odowdnuigalway.ie	091-493306	
Ecology	Dr David Bourke				Met with Dave Bourke
National Parks and Wildlife Service (NPWS)					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
Research Branch			natureconservation@environ.ie.	01-8882000 general	
Heritage Council					
Department	**Name**	**Position**	**Contact Details**	**Phone No.**	
Policy and Research	Beatrice Kelly	Head of Policy and Research		056 777 0777 general	

	Alison Harvey	Planning & Development Officer			
Local Councillors (Oranmore)					
Jarlath McDonogh	**Fine Gael**				Awaiting response to email
Jim Cuddy	**Non Party**				Awaiting response to email
Malachy Noone	**Fianna Fail**				Awaiting response to email
Liam Carroll	**Fine Gael**				Awaiting response to email