CARO

CLIMATE READY SLIGO

ENGAGE | PLAN | ADAPT

SLIGO COUNTY COUNCIL

Climate Adaptation Strategy

September 2019

ACKNOWLEDGEMENTS

Grateful acknowledgement is made to the Climate Action Regional Office - Atlantic Seaboard North Region with regard to the development of the Sligo County Council Climate Adaptation Strategy. In addition, Sligo County Council would also like to express gratitude to the following sources for their assistance and contributions to draft strategy:

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- Climate Ireland, Dr Barry O' Dwyer and the Team at the Centre for Marine and Renewable Energy Ireland, Cork.
- The Department of Communications, Climate Action and Environment.
- The Regional Climate Action Steering Group and the Climate Adaptation Team Leaders from Donegal, Mayo County Council, Galway County Council and Galway City Council.

FOREWORD

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In recent years the awareness and understanding of the potential impacts of Climate Change has grown to a stage where it can no longer be ignored, or viewed as just another challenge that our society has to face. Any lingering doubt that there may be is being dissipated by the impacts that are being seen and experienced by people all over the world. So it is the main challenge for this generation, and because of its nature, is likely to be the main challenge for generations yet to come.

In the very recent past, we have seen enormous wildfires in California , the Arctic and the Amazon, record breaking heat waves in Australia, while devastating storms which have brought rainfall and flooding have cost hundreds of lives and destroyed communities in Mozambique, Pakistan and North America. Meanwhile, here at home, we have seen one of the warmest summers on record last year, and have been counting the costs of Atlantic storms that appear to be growing stronger and which have been responsible for massive damage due to high winds and severe flooding.

We can no longer ignore the fact that we have a responsibility not only to try to reduce and mitigate our impacts on a changing climate, but we must also prepare for a future where these events and pressures are predicted to increase in frequency and in strength. Even in the impossible situation where we reduce our emissions to zero immediately, the impact of human activity on our Climate is locked in for years to come.

This means that we, as a Local Authority, will have to change and adapt to these new circumstances. In order to do this, we must review and amend the policies and procedures that we use to carry out the business of Local Government, but we will also engage with the citizens of Sligo in order to ensure that our communities are as well informed and as well prepared as possible.

But with adversity comes opportunity, and we can use the process of Climate Adaptation as a way to start dialogues between individuals and groups and to harness the great potential that there is in the people of Sligo. There is no-one who will remain unaffected and it is a problem which requires cooperation from all parties involved, big and small. Now is the time to think globally, and to act locally.

The approach outlined in Sligo's Local Adaptation Strategy has three parts; Engagement, Planning & Adaptation, and this is the start of a dedicated and formalised approach to the profound challenges of Climate Change. So as well as outlining new actions and undertakings, it will also seek to consolidate the climate related goals & objectives outlined in other Corporate Plans such as the County Development Plan and the Local Economic Community Plan.

Finally, while the scale of the task appears to be enormous, and there is no hiding from the fact that it will require significant effort to make the necessary changes, we should consider that all that is required in order for us to succeed is a genuine appreciation for our environment, and a desire to protect the one home that we all share. If we can utilise the significant human resources available to us, and couple this with careful and considered use of our natural resources, then we can ensure that County Sligo, and the people who live here, should be as well prepared as they can be for whatever our Climate has in store for us.

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INTRODUCTION

Sligo County Council recognises the risks associated with the increased frequency of climate change related events such as flooding, wind & rain storms and extended periods of warm or cold weather.

In order to adapt to these changing conditions and to mitigate the potential impacts of them on communities and businesses in Co. Sligo, we will develop an adaptation strategy which will evaluate the impacts of similar events in the recent past, and which seeks to outline plans and contingencies which have been drawn up as a result of the lessons learned while dealing with these events. We will also consider the projected changes that are expected to happen and how these may influence how we deliver services and how we can continue to develop the County in the most sustainable manner possible.

Every section within the Local Authority has been affected in some shape or form by these events and it is important to use the experiences gained in the past to inform how we deal with our changing climate. So it is important to ensure that adequate understanding and appreciation of our environment is fostered and maintained at all levels of the Local Authority.

But where there is risk, there can also be opportunity, and Sligo County Council will use the process of developing and implementing a Local Adaptation Plan to examine our existing processes and to amend these in such a way as to ensure that the work that we are involved in is carried out in as sustainable a manner as it possible.

Sligo County Council's Climate Change Adaptation Strategy 2019-2024 (the Adaptation Strategy) sets out our strategic priorities, measures and responses for adaptation in County Sligo over the next five years; as required by *the Climate Action and Low Carbon Development Act 2015*. While the Adaptation Strategy recognises and builds on climate adaptation action already underway, it also lays the groundwork for a new, integrated approach to adaptation under the National Adaptation Framework.

The Climate Action and Low Carbon Development Act 2015 also requires climate change principles and objectives to be considered in all our policies and programs. In doing so, the Strategy will provide an opportunity to not only enhance our adaptive capacity and resiliency but also an opportunity to reduce the long-term costs and impacts associated with climate change.

The aim of this first strategy is to identify the risks, challenges and opportunities that need to be considered and to take coherent coordinated action. The National Strategy is based on five main themes: ***Critical Buildings and Infrastructure, Natural and Cultural Capital, Water Resource & Flood Risk Management, Community Services*** and ***Governance.***

Sligo's Adaptation Strategy will provide for many actions that will be developed and implemented over the next five years. Priority is awarded to actions where severe weather has impacted the safety of citizens and critical infrastructure, however assets which are currently or may in the future be susceptible to severe weather impacts are also considered.

These actions will be driven by Senior Management and Elected Members via existing Strategic Policy Committees (SPCs) and an SPC focused on Climate Action following the local elections in May 2019.

Climate Action Regional Office – Atlantic Seaboard North

The newly established Climate Action Regional Office – Atlantic Seaboard North is one of four regional climate change offices that have been set up in response to Action 8 of the 2018 National Adaptation Framework – Planning for a Climate Resilient Ireland.

Mayo County Council is the lead authority for the Atlantic Seaboard North Region, which consists of Donegal County Council, Sligo County Council, Mayo County Council, Galway County Council and Galway City Council.

OUR APPROACH

ENGAGE

The first key step in our approach is improving our understanding and communication of the risks from a changing climate across the Local Authority departments, businesses, communities and individuals. The Strategy aims to engage with communities and place them at the centre of this adaptation process, and to encourage broad participation and collective decision making on how our citizens want to adapt to the challenges and opportunities, and how we as a Local Authority can support this change. Tailored training and development programs will be essential components to aid the delivery of the plan.

PLAN

The planning process will include details on how our climate is changing, potential impacts and opportunities, as well as the identification of areas at risk to inform planning and decision-making. The compilation of inventories and baselines with the assistance of relevant state agencies and third level academic institutions will assist operations as the adaptation journey of Sligo County Council progresses. The integration of climate change principles throughout future plans and procedures will be fundamental in strengthening our resilience.

ADAPT

The success of this plan will be measured by our ability to develop and implement co-ordinated responses to climate risk where needed. Some adaption actions are already underway within Sligo County Council and mainstreaming adaptation measures into all levels of operations and policies within the Local Authority will be an important aspect of implementing climate action at local level. Sligo Co. Co, in conjunction with the CARO, will develop a progress report to document observed climatic changes or impacts in the County; successfully implemented actions; barriers to the implementation of actions; new sources of funding; and windows of opportunity for climate action.

ADAPTION & MITIGATION

Climate change **Adaptation** and **Mitigation** are distinct but complementary activities.

Adaptation means anticipating the adverse effects of climate change and taking appropriate action to prevent or minimise the damage that it causes additionally it means taking advantage of opportunities that may arise. This includes green growth, innovation, jobs and ecosystem enhancement as well as improvements in areas such as water and air quality, the natural and built environment.

Mitigation is the process of reducing carbon pollution and greenhouse gas emissions to limit the extent to which our climate changes in the future. It involves improving energy efficiency, switching to more sustainable energy sources and trapping and storing carbon in vegetation and soils.

Substantial and sustained reductions in GHG emissions are required to limit the extent of climate change and reduce the likelihood of encountering severe, irreversible changes (IPPC, 2013). This needs to be accompanied with action to prepare for the effects of climate change, as the world will continue to warm for several decades.

This Strategy is concerned with preparing for the changes that a changing climate will bring through climate adaptation. The process involves developing a comprehensive understanding of how changes will affect Sligo County Council and the communities within its functional areas as well as actively working to reduce our exposure to new and increased risks.

STATUTORY CONTEXT

STATUTORY CONTEXT

A key driver for the development of Sligo County Council's Climate Adaptation Strategy is the need to respond to International, European and National Climate Change action through a wide range of agreements, directives, legislation and regulations. This includes the Irish Government's Climate Action and Low Carbon Development Act 2015, National Mitigation Plan, National Adaptation Framework and National Planning Framework.

International and European Policies & Agreements

United Nations Framework Convention on Climate Change – 1992
The UNFCCC is an international environmental treaty adopted on 9 May 1992. It entered into force on 21 March 1994 with the objective of *"stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"*

Kyoto Protocol - 1997
The Protocol is based on the principle of common but differentiated responsibilities: it acknowledges that individual countries have different capabilities in combating climate change, owing to economic development, and ergo puts the obligation to reduce current emissions on developed countries on the basis that they are historically responsible for the current levels of greenhouse gases in the atmosphere.

EU Adaptation Strategy -2013
A White Paper an EU framework for adaptation to climate change was produced in 2009 which led to a comprehensive EU adaptation strategy in April 2013. The EU Adaptation Strategy has an overall aim of contributing to a more climate resilient Europe.

Paris Agreement - 2015
The Paris Agreement was adopted in 2015. The aims of the Agreement are to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. There are 195 Parties to the UNFCCC.

National Policies & Agreements

Climate Action and Low Carbon Development Act 2015

National Mitigation Plan (2017)
Initial step to set us on a pathway to achieve the level of decarbonisation required.

National Adaptation Framework (2018)
Sets out the potential implications of climate change for Ireland and specifies the national strategy for the development of adaptation measures by key sectors and by local authorities.

Climate Change Advisory Council
Has several reporting obligations, including Annual and Periodic Reviews of progress towards meeting the national transition objective.

National Planning Framework – Ireland 2040

The transition to a Low Carbon and Climate Resilient Society is one of ten key national strategic outcomes which will guide the implementation of the new National Planning Framework. The National Development Plan 2018-2027 brings almost €22 billion between Exchequer and non-Exchequer resources to addressing the transition to a low-carbon and climate resilient society.

SECTORAL ADAPTATION PLANNING

Under the National Adaptation Framework – Planning for a Climate Resilient Ireland, seven Government Departments (or Agencies, where appropriate) with responsibility for twelve priority sectors are required to prepare sectoral adaptation plans.

The broad objective of the sectoral plans will be for government departments and relevant agencies to consider their own vision for a climate resilient future which will have a sector specific focus. This is essential in terms of understanding the key risks that face each sector. The National Adaptation Framework aims to present an overarching view of how each sector can contribute to a climate resilient Ireland in line with National, European and International policy.

The National Adaptation Framework has grouped the sectors into four key thematic areas:

1. **Critical Infrastructure and Buildings**
2. **Natural & Cultural Capital**
3. **Water Resources & Flood Risk Management**
4. **Public Health**

This approach reflects trends at EU level which incorporate a thematic focus on climate adaptation which may be expanded upon in future National Adaptation Frameworks. Our Strategy has considered these thematic areas in order to facilitate potential synergies and efficiencies that can be achieved in bringing forward coherence between sectoral adaptation policies and measures.

The Sligo County Council Adaptation Strategy will facilitate partnerships via the Climate Action Regional Office with key stakeholders in the twelve priority areas to ensure that our adaptive actions are complementary, mutually reinforcing and avoid conflicting outcomes.

Theme	Sector Level	Lead Department for Sectoral Adaptation Plans
Natural and Cultural Capital	Seafood	Department of Agriculture, Food and the Marine
	Agriculture	
	Forestry	Department of Culture, Heritage and the Gaeltacht
	Biodiversity	
	Built & Archaeological Heritage	
Critical Infrastructure and Buildings	Transport infrastructure	Department of Transport, Tourism and Sport
	Electricity and Gas Networks	Department of Communications, Climate Action and Environment
	Communications networks	
Water Resources and Flood Risk management	Flood Risk Management	Office of Public Works
	Water Quality	Department of Housing, Planning and Local Government
	Water Services Infrastructure	
Public Health	Health	Department of Health

SUSTAINABLE DEVELOPMENT GOALS

In September 2015, Transforming Our World, the 2030 Agenda for Sustainable Development (the 2030 Agenda) was adopted by all 193 Members States of the United Nations (UN). The 2030 Agenda aims to deliver a more sustainable, prosperous and peaceful future for the entire world and sets out a framework for how to achieve this by 2030.

17 Goals to Transform Our World

The Agenda is made up of 17 Sustainable Development Goals (SDGs) which cover the social, economic and environmental requirements for a sustainable future. Ireland is fully committed to achieving the SDGs and the National Implementation Plan 2018-2020 represents Ireland's initial framework for doing so. It is the first in what will be a series of SDG Implementation Plans in the period to 2030.

The SDGs address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, peace and justice.

Climate change presents the single biggest threat to sustainable development everywhere and its widespread, unprecedented impacts disproportionately burden the poorest and most vulnerable. Urgent action to halt climate change and deal with its impacts is integral to the successful implementation of the SDGs.

Goal 13. Climate Action

Take urgent action to combat climate change and its impacts, focuses on the integration of climate change measures into national policies, the improvement of education, awareness-raising and institutional capacity on climate change mitigation, adaptation, impact reduction and early warnings.

ROLES & RESPONSIBILITIES

SHARED RESPONSIBILITY

The impacts and opportunities of climate change are complex and cover many cross sectoral issues. It is important to recognise that the response to climate change requires a whole of society approach and that the implementation and monitoring of this Strategy will involve working collaboratively with several agents. Partnership is key. This Strategy taken in isolation is not going to provide solutions for all of society's adaptation needs.

Climate change will impact both the services and assets that Sligo County Council manage and the local communities within our functional area. Local Authorities play an influential role in preparing communities for climate change through the services they deliver, such as planning and development, critical infrastructure, environmental facilities and socio-economic programmes. However working together with government departments and agencies, local businesses, communities and individuals will be essential in achieving the ambitions of this Climate Adaptation Strategy, with each sector having different but complementary and important roles to play in managing climate risks.

Crucially however one of Sligo's great strengths is its communities (including third level, business, voluntary, other government agencies) and their support is vital to the success of this Strategy. Action at a local level will have a significant impact on our overall ability to meet our climate targets and will extend and complement action being undertaken at national and international levels.

The local communities that will be most impacted by climate change are also best placed to identify the opportunities they have in the future. It is in our best interest to ensure that these communities are empowered and enabled to play an effective role and that policies where possible, encourage 'place-based' initiatives.

Community groups are often led by volunteers who tap into the resources of their local community to achieve effective on-the-ground results. Sligo County Council recognises the importance of this type of community action and proposes to support these initiatives.

ROLES & RESPONSIBILITIES

Governments at all levels, businesses, households and the community each have important, complementary and differentiated roles in adapting to the impacts of climate change.

Government Departments & Agencies

Some climate change risks have the long-term potential to undermine the national economy or affect critical infrastructure and natural systems of national significance. Addressing risks, as well as managing and adapting to climate change impacts will be a long-term obligation for all levels of government.

Government departments and agencies will work collaboratively with all stakeholders to evaluate adaptation tasks to effectively manage climate change risks to public infrastructure and the environment, deliver government services and create the regulatory environment that supports and promotes resilience and action among individuals and groups. One of the most important roles of government is to ensure that society has the information required to make informed decisions and to adjust its behaviour for positive climate action.

Sligo County Council

Sligo County Council is responsible for a broad range of services, the administration of a range of EU and National legislation as well as the management of a substantial number of assets and infrastructure of local, regional, state and national significance. We are on the frontline in dealing with the impacts of climate change and have a critical role to play in ensuring that local circumstances are adequately considered in the overall adaptation process and in involving the local community directly in efforts to facilitate effective change. We are strongly positioned to inform government departments and agencies about the needs of local communities, to communicate directly with communities and to respond appropriately to local climate events.

Climate Action Regional Office

The CARO will coordinate a consistent approach in terms of adaptation strategies at local authority level in the Atlantic Seaboard North Region, assisting the local authorities to prepare and implement their own Climate Adaptation Strategies. In addition they will collaborate with government agencies and third level institutes on research, information and resources on climate change adaptation.

Businesses

To enable businesses to manage the risks to their own assets and activities from climate change, they will need to be aware of the risks, their responsibility and supports available. In addition it is necessary for this sector to take steps to understand the magnitude and nature of the specific risks to their assets and activities and to develop strategies and actions to manage the risks. Businesses will need to consider climate risk in plans and investments but simultaneously they can identify and invest in emerging opportunities that our changing climate will bring.

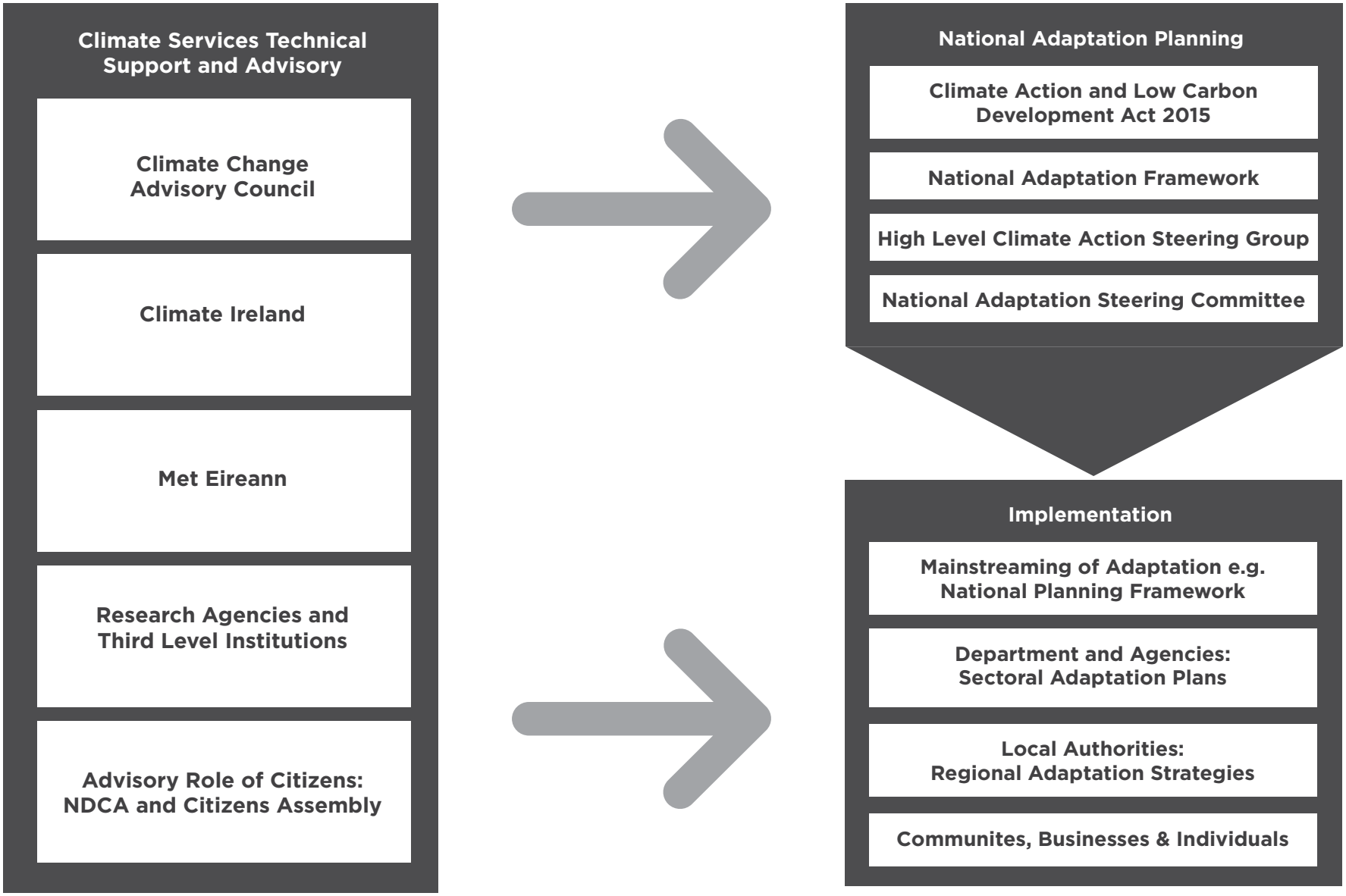
Academia

Academia have a critical role to play in preparing society to adapt to the impacts of climate disruption by providing research and education around adaptation strategies. Communicating and translating science and big data into information that policymakers, businesses and communities can apply to their work.

Communities & Individuals

Community based adaptation to climate change focuses on empowering communities and individuals to use their knowledge and decision-making processes for action on climate change. To achieve this communities need to engage with the other stakeholders to build awareness and understanding of climate change, to consider the risks and opportunities, to develop local resilience and response plans to emerging risks.

NATIONAL ADAPTATION GOVERNANCE STRUCTURE



Source Adapted from NAF 2018

REGIONAL & COUNTY PROFILES

ATLANTIC SEABOARD NORTH REGION

The Atlantic Seaboard North Region (ASBN), consists of the counties of Donegal, Sligo, Mayo and Galway. Its geographic area covers 18,354 km2 and a population of 613,292 persons based on the Central Statistics Office data from Census 2016. The counties of Mayo and Donegal have the second and third highest dependency ratios respectively in the country; with 17.6% of the population over 65 and 20.3% under 15 in Mayo. While 15.7% of Donegal's population is over 65 and 22% is under 15 years of age.

Natural & Cultural Capital

The ASBN region is home to half of the State's National Parks, with many other outstanding assets, including blue flag beaches, forest parks, trails, and a growing number of established Greenways and Blueways, with additional projects in development. A significant area of the Region is subject to conservation including SACs, SPAs, NHAs or proposed NHAs and hosts extensive areas of peatlands which are of high biodiversity value as well as important carbon sinks. There is also rich built and cultural heritage throughout this region that creates a link to our past and fosters our sense of place and wellbeing. The protection of our built and natural environment against the impacts of climate change will contribute to the retention of a sense of continuity with our history and the attractiveness of our region as a place to live, work and enjoy.

Transport Infrastructure

Travel in the region is primarily by private vehicle with the quality of the national road network substantially improved over the last two decades. Intercity rail offers sustainable travel alternatives for longer distance trips to the region, except for county Donegal, which does not have a rail service. International air connectivity is provided at Ireland West Airport Knock (IWAK) and Donegal Airport. The region does not have a port of "National Significance", at Tier 1 or Tier 2 levels however the Port of Galway is categorised as a Port of Regional Significance, (Tier 3) while ports such as Killybegs, Sligo, Greencastle and Ros an Mhíl perform specific roles.

Atlantic Seaboard North Region

Local Authorities in the Region
Donegal Co Co, Sligo Co Co, Mayo Co Co, Galway Co Co and Galway City Council.

Regional Profile

Area: 18,354 km2

Coastline Length: 2,702km, which is 48% of the country's coastline
Length of Coastline which is deemed at risk of erosion – 1,011km (Ecopro, 1996)
Total Population: 613,292, of which 305,151 live within 5km of the coast
Major Towns and Cities: Galway City, Sligo City, Ballina, Castlebar, Tuam, Ballinasloe, Letterkenny, Buncrana.
18 inhabited offshore islands that contain some of our most vibrant and culturally distinctive communities, with many areas forming part of the Gaeltacht

Natural & Cultural Capital

Significant number of **Natura 2000 sites**
National Parks - Ballycroy National Park (Co. Mayo); Connemara National Park (Co. Galway); Glenveagh National Park (Co. Donegal)
33 Blue Flag Beaches
2.1 million overseas tourists in 2015
Transport Infrastructure
Ports: Galway Port (Tier 3), Killybegs, Sligo, Greencastle and Ross a Mheal perform specific roles
International Air Connectivity – Ireland West Airport Knock (770,000 passengers in 2018) and Donegal Airport

COUNTY SLIGO

County Sligo currently has a population of 65,535 which is predominately rural, 60.2% living in rural areas and 39.8% in urban areas. The 'older' population fraction (those aged 65 years and over) in Sligo has increased by 22% for men and 16.7% for women since 2011. Significantly, the national 'very old' population (those aged 80 years and over) is projected to rise from its 2016 level of 147,800 to 541,700 in 2051. This growing population of older persons will increase sensitivity to climate related hazards, especially heatwaves and associated health related illness.

Archaeology

Sligo has a very rich archaeological heritage ranging from the important megalithic sites at Carrowmore, Carrowkeel and Creevykeel, which are over 3500 years old, to more recent sites like Ballymote Castle and Sligo Abbey. It is believed that some of the first human settlers to arrive in Ireland landed in the Northwest, and therefore there is a long history of man's impact on the landscape.

Architectural Heritage

County Sligo possesses a wonderfully diverse architectural heritage. In the broadest sense it includes the whole of our built environment, from streetscapes, gardens and parks, country houses and vernacular buildings to doorways and street furniture.

Tourism

Significant tourist attractions in Sligo include the seaside towns of Rosses Point, Strandhill, Enniscrone & Mullaghmore, and there are ideal conditions for water sports enthusiasts, particularly surfers. There are also several music festivals held throughout the year, as well as the Sligo Food Trail, the Sligo Way & other adventure holiday opportunities taking place all around the beautiful natural landscape of the County.

Economy

Some of the main employers in Sligo include Abbvie & Abbott, Amcor, Braun, Bruss and Hospira. The Public Sector is also a major employer in the County. Sligo has grown to be a regionally important urban centre, serving as the administrative, commercial, service, health and educational focus for a large hinterland. It has a significant industrial role and also acts as a distribution centre in the North-West (See CDP17-23 for further details).

County Sligo

County Profile

Area: 1838km^2

Coastline Length: 110km (excluding 5 estuaries)

Total Population: 65535 (2016 census), with just under 20,000 living in Sligo Town.

Major Towns: Ballisodare, Ballymote, Cliffoney, Collooney, Coolaney, Dromore West, Easkey, Enniscrone, Grange, Sligo, Strandhill, Rosses Point, Riverstown, Tubbercurry.

Transport Infrastructure

There are a total of 2800 km of roads in Co. Sligo, with this being made up of: National Primary – 106km, National Secondary – 47.5km, Regional Roads – 237km, Local Roads – 2410km.

Over 70% of people relied on private cars to get to work/school, while only around 1.5% of people used public transport, but nearly 10% walked or cycled.

There are several harbours/piers in the county, but only Sligo Harbour receives any significant commercial activity. Others such as Mullaghmore, Raghly, Aughris, and Enniscrone cater to small private fishing & leisure craft.

Sligo is also served by MacDiarmada Train Station in Sligo Town, which is linked to Connolly Station in Dublin.

Housing:

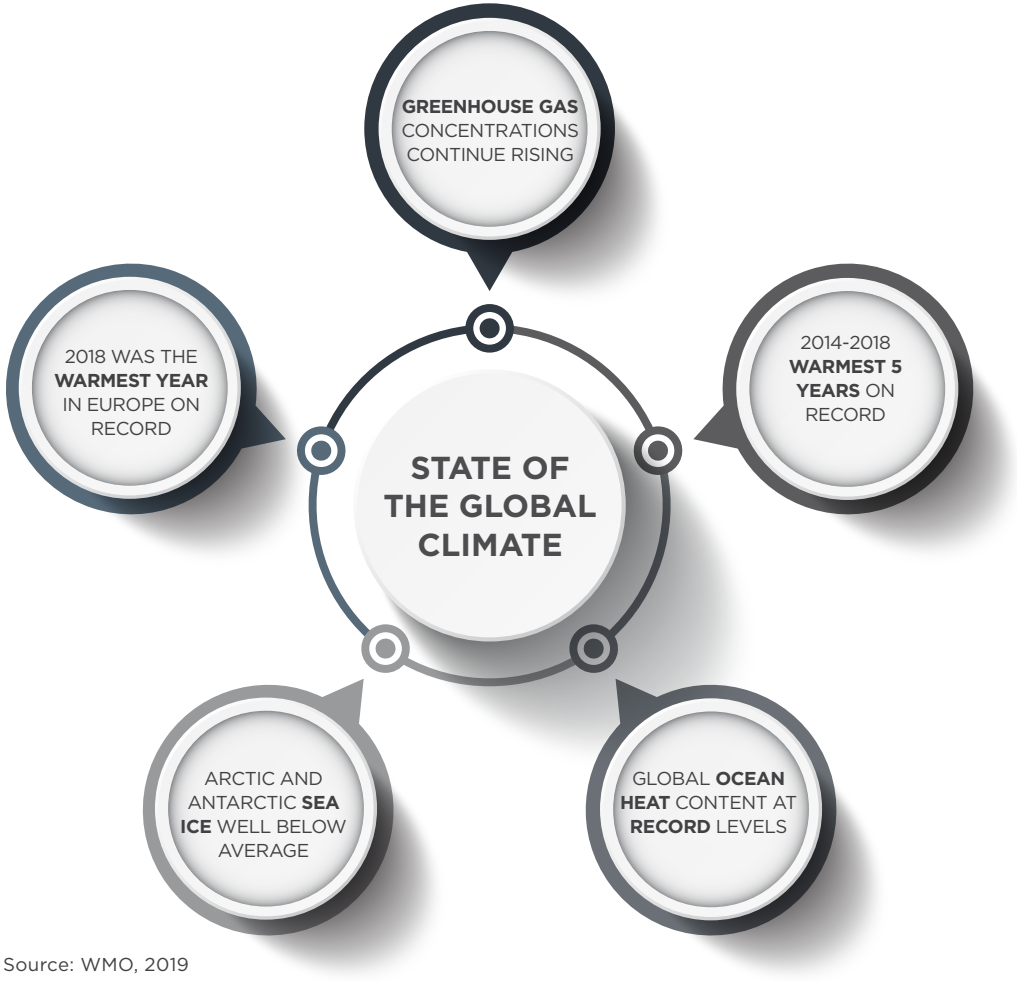
The total housing stock was 32,764, of which vacant households (excluding holiday homes) numbered 4,727. There were 24831 private households in Co. Sligo. Over 85% of households also relied on fossil fuels for home heating purposes. Less than 10% used renewable energy for this purpose.

OBSERVED & PROJECTED CLIMATE CHANGE

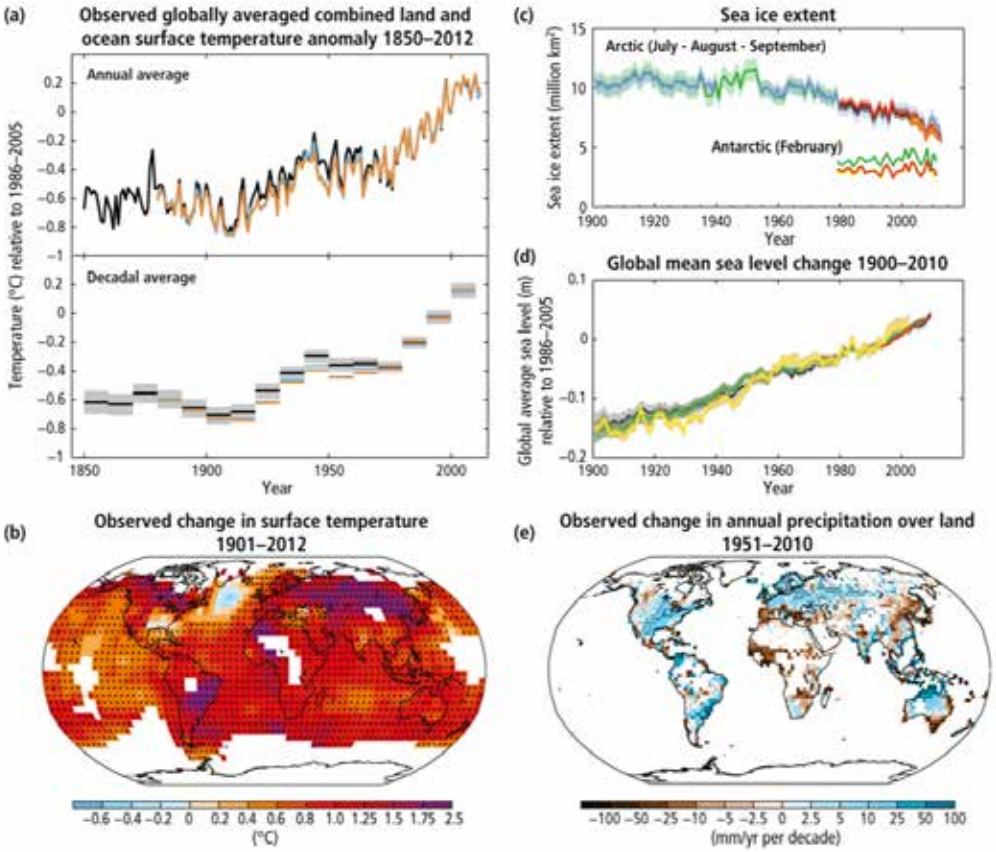
OBSERVED CLIMATE CHANGE

Global Climate Indicators

The Global Climate Indicators are a set of parameters that describe the changing climate. They comprise key information for the most relevant domains of climate change: temperature and energy, atmospheric composition, ocean and water as well as the cryosphere (part of the earth's surface where water exists as ice). Analysis of these different indicators and independent data sets unequivocally point to one thing: the world has warmed since the late 19th century.



Source: WMO, 2019



"Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen". [IPCC AR5]

Source: IPCCAR5

OBSERVED CLIMATE CHANGE

Overview of 2018 Global Temperatures

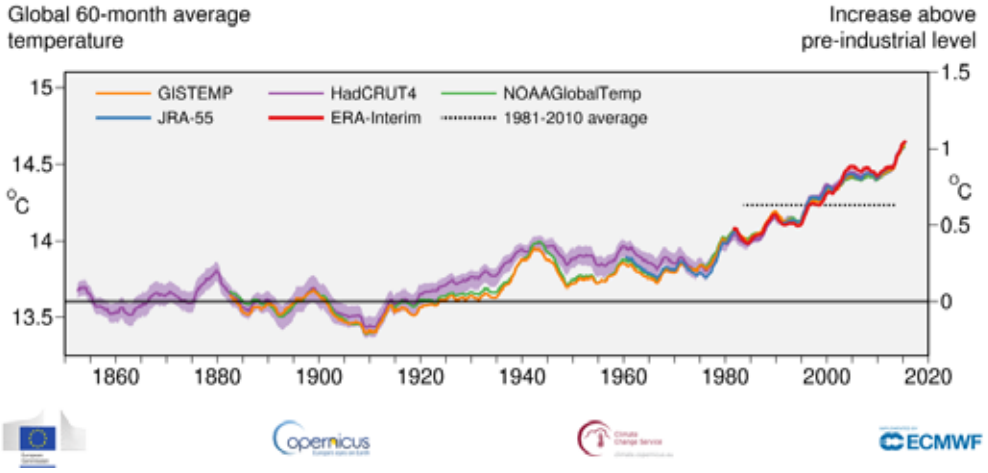
Data released by the Copernicus Climate Change Service (C3S) show that 2018 was the fourth in a series of exceptionally warm years and together with the Copernicus Atmosphere Monitoring Service (CAMS), C3S reports that atmospheric CO2 concentrations have continued to rise.

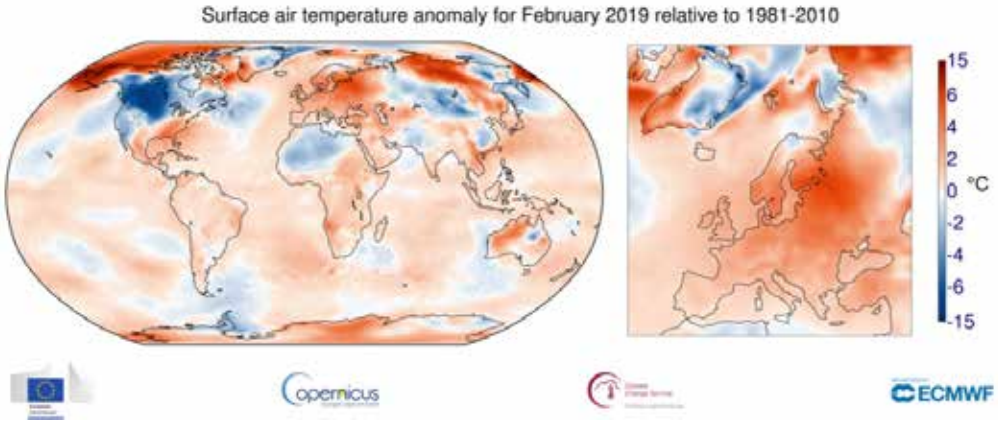
The Copernicus C3S data show that 2018 surface temperatures were more than 0.4°C higher than the long-term average recorded over the period 1981-2010. The most pronounced warming compared to the long-term average occurred in the Arctic. Most land areas were warmer than average, especially Europe, the Middle East and the western USA.

Apart from a relatively cold February and March 2018, Europe saw above average temperatures during all months of the year. Starting at the end of spring and continuing well into autumn and even winter, northern and central Europe experienced weather conditions that were persistently warmer and drier than average.

Copernicus is the European Union's Earth Observation programme, looking at our planet and its environment for the ultimate benefit of all European citizens. It offers information services based on satellite **Earth Observation and in situ (non-space) data**.

The C3S mission is to support adaptation and mitigation policies of the European Union by providing consistent and authoritative information about climate change.





Source: Copernicus Climate Change Website

OBSERVED CLIMATE CHANGE

Observed Global Climate Change

Warming of the global climate system has been observed via global average air and ocean temperatures, the widespread melting of snow and ice, the rising sea level and the more frequent occurrence of extreme weather events.

Surface Temperature

- Each of the last three decades has been successively warmer at the Earth's surface than any of the preceding decades since 1850.
- In the Northern Hemisphere, 1983-2012 was likely the warmest 30-year period of the last 1400 years (NAF, 2018).
- In 2017, global mean temperatures were 1.1 °C ± 0.1 °C above pre-industrial levels, and it was one of the three warmest years on record (WMO, 2018).
- The increase in global temperature is closely correlated to the increase in greenhouse gas emissions. Levels of greenhouse gases are now 30% higher than any time during the last 800,000 years, thus enhancing the greenhouse gas effect resulting in global warming.

Shrinking Ice Sheets & Glaciers

- Over the period 1992 to 2011, the Greenland and Antarctic ice sheets have been losing mass, likely at a larger rate over 2002 to 2011. Glaciers have continued to shrink almost worldwide.
- Data from NASA's Gravity Recovery and Climate Experiment show Greenland lost an average of 281 billion tons of ice per year between 1993 and 2016, while Antarctica lost about 119 billion tons during the same time period.

Ocean Warming & Sea Level Rise

- Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 with only about 1% stored in the atmosphere.
- "Thermal Expansion" of the ocean has contributed about half of the 70mm of global mean sea level rise we've seen over the last 25 years.
- The rate of SLR is nearly double that of the last century and is accelerating slightly every year.
- Estimates derived from satellite measurements for the period 1993 to 2012 indicate a rise in global average sea level rise of 3.18 mm per year.
- Over the period 1901 to 2010, global mean sea level rose by 0.19m. The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia.
- Oceanic uptake of CO2 has also resulted in acidification of the ocean; the pH of ocean surface water has decreased by 0.1, corresponding to a 26% increase in acidity, measured as hydrogen ion concentration.

Source: IPCCAR5 Summary

PROJECTED CLIMATE CHANGE

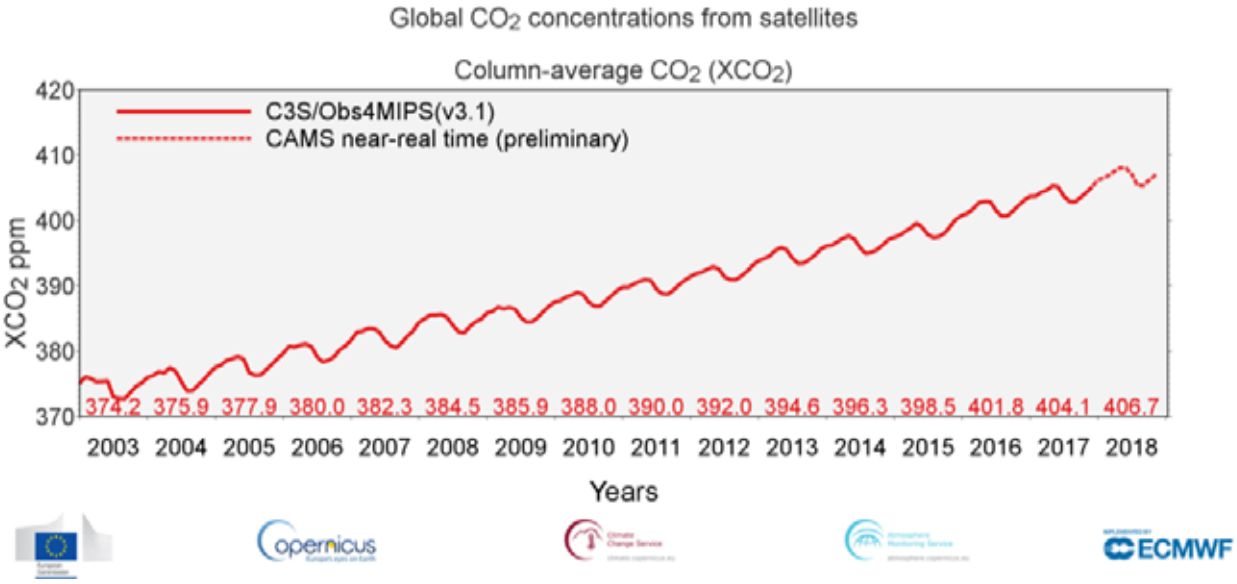
Projecting Climate Change

In order to predict the potential impacts of climate change in the future, many different variables must be considered. One of the key pieces of data is the emission of greenhouse gases, including carbon dioxide. This in turn must take account of several other factors which affect these emissions such as; population, economic activity, lifestyle, energy use, land use patterns, technology and climate policy.

Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks" [IPCC, AR5]

The analysis of satellite data from the Copernicus Climate Change Service indicates that carbon dioxide concentrations have continued to rise in recent years, including in 2018. The recent special report 'Global warming of 1.5°C' by the Intergovernmental Panel on Climate Change (IPCC) further underlines the urgency of implementing effective measures to mitigate climate change.

The estimated annual mean XCO2 growth rate for 2018 is 2.5 +/- 0.8 ppm/year. This is larger than the growth rate in 2017, which was 2.1 +/- 0.5 ppm/year



Source: Copernicus Climate Change Website ECMWF January 2019

PROJECTED CLIMATE CHANGE

Representative Concentration Pathways (RCPs)

RCPs are scenarios that describe alternative trajectories for carbon dioxide emissions and the resulting atmospheric concentration from 2000 to 2100. They encompass the range of possible climate policy outcomes for the 21st century.

As part of the IPCC's Fifth Assessment Report (AR5), 4 Representative Concentration Pathway scenarios **(RCP2.6, RCP4.5, RCP6.0 and RCP8.5)** were selected for climate modeling and research based on different assumptions about population, economic growth, energy consumption and sources and land use over this century.

RCP 2.6
Global CO2 emissions peak by 2020 and decline to around zero by 2080. Concentrations in the atmosphere peak at around 440ppm in mid-century and then start slowly declining.

RCP 4.5
Emissions peak around mid-century at around 50% higher than 2000 levels and then decline rapidly over 30 years and then stabilise at half of 2000 levels. CO2 concentration continues to trend to about 520ppm in 2070 and continues to increase but more slowly.

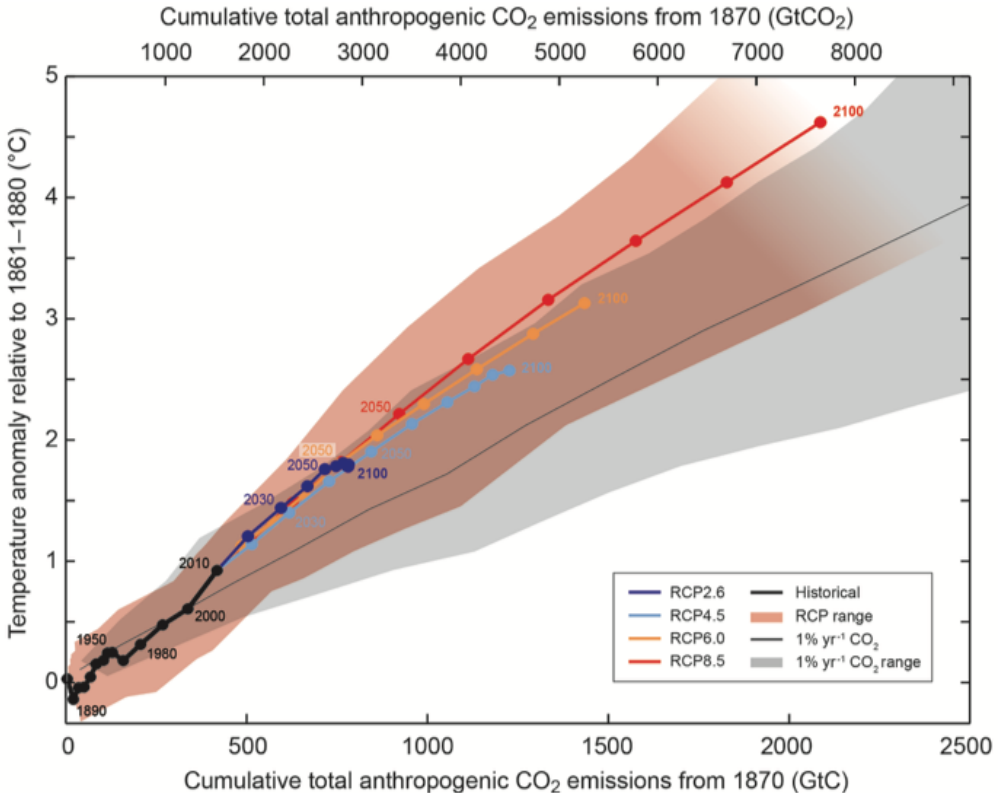
RCP 6
Emissions double by 2060 and then dramatically fall but remain well above current levels. CO2 concentration continues increasing, though at a slower rate in the latter parts of the century, reaching 620ppm by 2100.

RCP 8.5
Emissions continue to increase rapidly through the early and mid-parts of the century. By 2100 annual emissions have stabilised at just under 30 giga tonnes of carbon compared to around 8 giga tonnes in 2000. Concentrations of CO2 in the atmosphere accelerate and reach 950 ppm by 2100 and continue increasing for another 100 years.

Climate Forecasts
The IPCC's AR5 report forecasts temperature change under these scenarios, from best (RCP2.6) and worst (RCP8.5) scenario.

Scenario	2046-2065	2081-2100
	Mean and Likey Range	Mean and Likey Range
RCP2.6	1.0° (0.4 to 1.6)	1.0° (0.3 to 1.7)
RCP4.5	1.4° (0.9 to 2.0)	1.8° (1.1 to 2.6)
RCP6.0	1.3° (0.8 to 1.8)	2.2° (1.4 to 3.1)
RCP8.5	2.0° (1.4 to 2.6)	3.7° (2.6 to 4.8)

AR5 global warming increase (°C) projections



Source: IPCCAR5

PROJECTED CLIMATE CHANGE

Global Projections (IPCC AR5)

Surface Temperature (Global)

The global averaged combined land and ocean temperature data indicate a warming of 0.85°C, over the period 1880 – 2012 and surface temperature is expected to rise over the 21st century. Relative to 1850-1900, temperatures at the end of the 21th century (2081-2100) are expected to be 1.5°C - 2.0°C higher, depending on the greenhouse gas concentration scenario used. It is very likely that heatwaves will be more frequent and last longer. It is virtually certain that there will be more hot weather extremes and fewer cold weather extremes over most land areas on daily and seasonal timescales. Occasional cold winter extremes will continue to occur.

Precipitation (Global)

Changes in precipitation will not be uniform. In many mid-latitude and subtropical dry regions, mean precipitation will likely decrease, while in many mid-latitude wet regions, precipitation will very likely become more intense and more frequent.

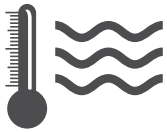
Sea Level Rise (Global)

Ocean thermal expansion and glacier melting have been the dominant contributors to 20th century global mean sea level rise. Observations since 1971 indicate that thermal expansion and glaciers (excluding Antarctic glaciers peripheral to the ice sheet) explain 75% of the observed rise. The global ocean will continue to warm during the 21st century, with the strongest warming projected for the surface in the Tropic and Northern Hemisphere Subtropical region. Global mean sea level rise will continue during the 21st century, very likely at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely be in the ranges of 0.26 to 0.55 m for RCP2.6, and of 0.45 to 0.82 m for RCP8.5 (medium confidence). Earth System Models project a global increase in ocean acidification for all RCP scenarios by the end of the 21st century, with a slow recovery after mid-century under RCP2.

Rising Sea Level
Sea Level is projected to rise by up to 0.82m relative to 1986-2005.

Higher Temperatures
Maximum and. minimum average temperatures are projected to rise

Hotter & More Frequent Hot Days
Increase in temperatures reached on hottest days, and an increase in frequency of hot days.



Warmer & More Acidic Ocean
Sea surface temperatures are expected to increase, and the ocean will become more acidic.

Fewer Frost
A decrease in the frequency of frost risk is projected.

More Frequent Sea Level Extremes
Higher sea levels will increase the risk of coastal storm surge and storm tide inundation.

More Intense Rainfall Events
High variability in rainfall, with the intensity of heavy rainfall events likely to increase.

Source: IPCCAR5

OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND SUMMARY

Observed Changes

Ireland's climate is changing in line with global patterns:

- Temperatures are rising across all seasons.
- The timing and spatial distributions of precipitation is changing.
- Sea levels are rising.
- The frequency and intensity of extreme weather events are changing.

These changes are expected to continue and intensify into the future with a wide range of economic, environmental and social impacts.

For Ireland, the key long term climate change trends are:

- Temperatures are increasing and are expected to continue to increase everywhere and across all seasons.
- When compared with temperature, projections of precipitation are less certain. However, significant reductions in levels of average precipitation are expected in Spring and Summer while projections indicate the increased occurrence of extreme precipitation events, particularly during winter.
- Projections show little change in average wind speed and direction. The frequency of extreme wind conditions are expected to increase, particularly during winter.
- Sea levels will continue to increase by up to 0.81m by 2100.

We can also expect to see:

- Increases in the frequency and intensity of summer heat waves, extreme temperatures and drought.
- Reductions in the frequency of frost and snowfall.
- An increase in the duration of the growing season (phenological cycle).
- Increases in the frequency and intensity of coastal inundation and erosion.

Source: Climate Ireland

PROJECTED CLIMATE CHANGE FOR IRELAND

SEA LEVEL RISE

- Sea levels are expected to increase for all Irish coastal areas. Projected changes in sea level will magnify the impacts of changing storm surge and wave patterns in coastal areas.
- Decrease in mean and extreme wave heights by the end of the century. Increase in magnitude and intensity of storm wave heights.

WIND

- An increase in the intensity of extreme wind storms is expected.
- Decrease in wind speeds for summer and increases for winter rainfall events is likely.

PHENOLOGY

- An increase in the duration of the growing season is likely with spring occurring earlier.
- Projections indicate that bud burst will continue to advance until at least 2100.

PRECIPITATION

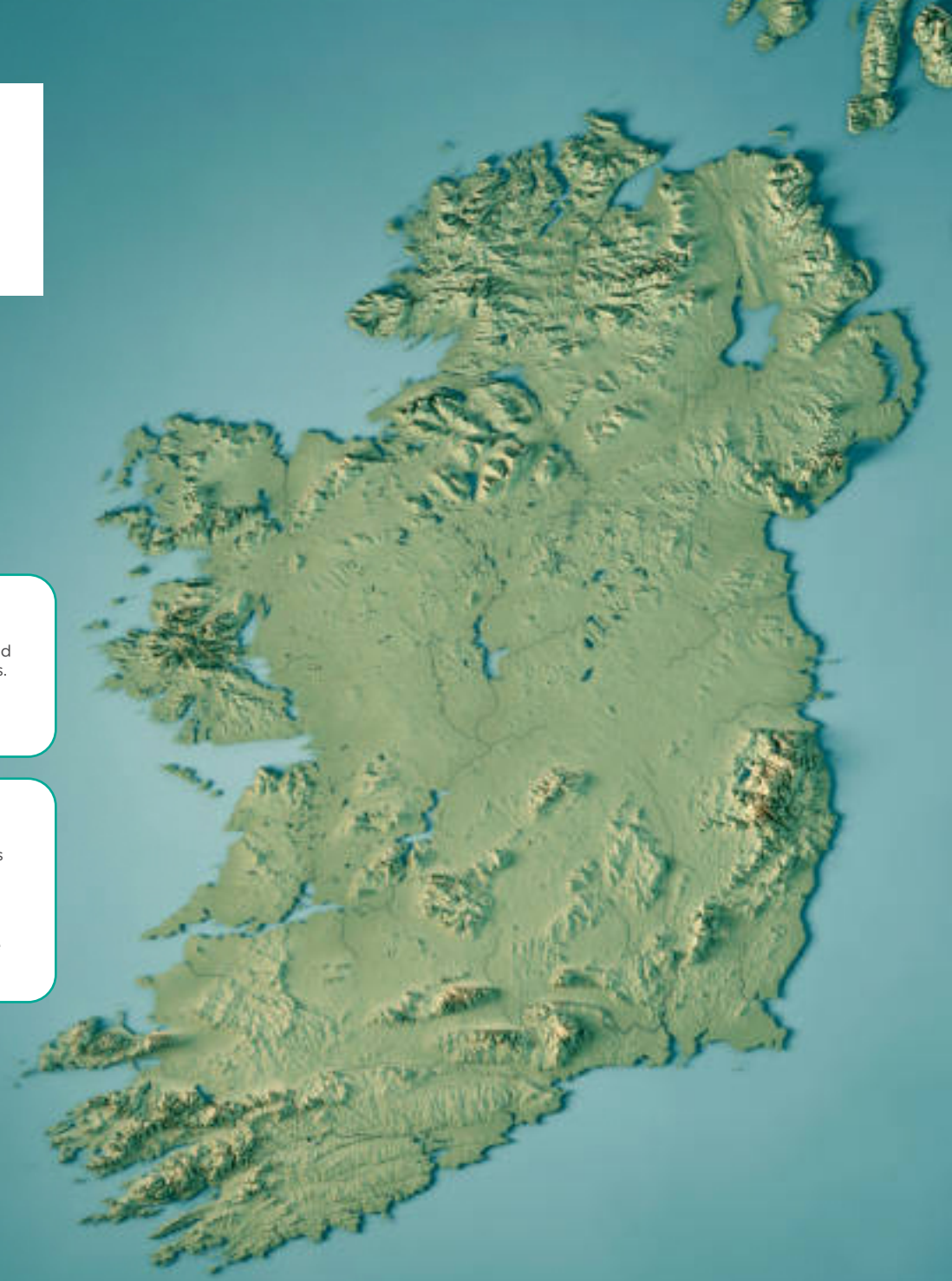
- Changes in precipitation can be expected with significant decreases projected for spring and summer and increases for winter.
- An increase in the occurrence of extreme rainfall events is likely.

SURFACE AIR TEMP

- Average surface air temperatures are expected to increase everywhere and across all seasons.
- An increase in the intensity and duration of heatwaves is expected.

HYDROLOGY

- Increasing seasonality in hydrological regimes can be expected with decreased summer and increased winter flows likely.
- Flood risk will increase due to a combination of higher river-flows and increases in extreme precipitation events.



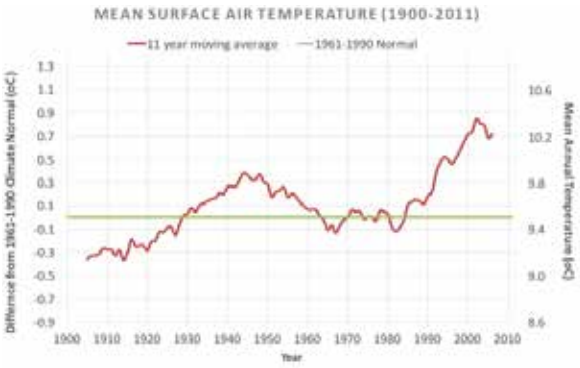
OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - TEMPERATURE

Observed Changes

Average annual temperatures have increased by 0.8 ºC nationally since 1900.

The number of warm days (>20 ºC) has increased while the number of frost days (<0ºC) has decreased.

There has been an increase in the duration of the growing season.



A time series graph of mean annual observed temperature for Ireland (1900-2011). The green bar shows the mean temperature for the period 1961-1990 (Dwyer, 2012)

Source: Climate Ireland

Temperature Projections for mid-century (2041-2060) compared with the baseline period (1981–2000)

- Projections suggest average temperatures will continue to increase, with warming across all seasons. Future climate simulations indicate a rise of 1 to 1.6°C in mean annual temperatures.
- Levels of warming are greater for the extremes (i.e. hot and cold days), the number of warm days are expected to continue to increase and heatwaves are expected to occur more often.
- The warmest 5% of daily maximum summer temperatures are projected to increase by 0.7-2.6°C.
- The coldest 5% of winter night time temperatures are projected to increase by 1.1-3.1°C.
- Increases in minimum temperatures will mean that frost days (days when minimum temperature is less than 0ºC) and ice days (days when maximum temperatures are less than 0 ºC) are expected to occur less often.
- Increasing temperatures will mean that the growing season will occur earlier and extend further. Projections for mid-century indicate an increase of 35-40 days.

OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - PRECIPITATION

Observed Changes

When compared with the period 1961-1990, average annual rainfall has increased by 5% (60mm) for the period 1981-2010.

The largest increases are observed over the western half of the country.

There is no consistent trend in the frequency

Annual average rainfall totals (right axis) and the annual anomalies, or differences from the 1961 to 1990 average (left axis) (Dwyer, 2012).

Source: Climate Ireland

Precipitation Projections for mid-century (2041-2060) compared with the baseline period (1981–2000)

- Changes in precipitation over the course of the present century are likely to have a greater impact on Ireland than changes in temperature, due to the potential of increased flooding during the winter months and reductions in river flow during the summer months. Projected changes in precipitation suggest that there will be wetter winters and drier summers and a change in the spatial distribution of rainfall we receive is likely for all future time periods.
- For winter and autumn, projections indicate an increase in average precipitation, particularly for the high scenario.
    - Increase in the number of “wet days” (>20mm rainfall) for winter (mean value 24%) and autumn (mean value 18%).
    - Increase in the number of “very wet days” (>30mm rainfall) for winter (mean value 24%) and autumn (mean value 49%).
- Significant reductions are expected in average levels of annual, spring and summer precipitation and are largest for summer (0-20%).
- Dry periods are expected to occur more often and particularly in summer (12-40% reduction).
- Increases in dry periods (> 5 consecutive days with less than 1mm rainfall) are largest for summer.
- An increase in the number of dry periods (> 5 consecutive days with less than 1mm rainfall) are projected across all seasons with largest increase projected for summer with likely values ranging from 12% to 40% .

OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - WIND

Observed Changes

No long-term change in average wind speed can be determined with confidence

Similarly, there is no long-termchange evident in number of gale gusts (a wind speed of >17.5m/sec).

Wind direction has remained stable

Source: Climate Ireland

Wind Projections for mid-century (2041-2060) compared with the baseline period (1981–2000)

Projected change information relate to levels of wind power at 60m, useful in the context of projecting future energy resources.

- Projections indicate a decrease in wind speeds for spring, summer and autumn months.
- For winter, projections show a large range (increase and decrease) of change and should be viewed with caution.
- Small increases in extreme wind speeds over Ireland projected. A small increase in extreme wind speeds is expected during winter, which may impact on turbines and the continuity of power supply.
- Projections indicate an overall decrease in wind power over the entire year and during the spring, summer and autumn months by mid-century.
- Projections of wind direction show no substantial change.

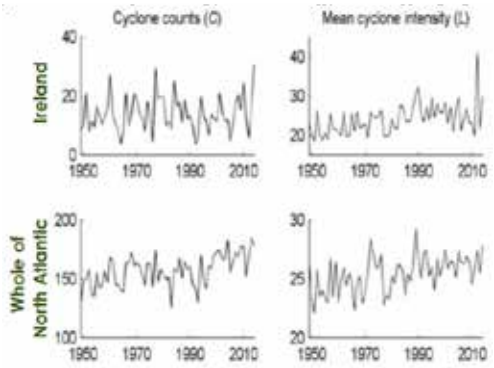
OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - STORMS

Observed Changes

The number of storms ("cyclones") in the North Atlantic has increased by approx. 3 storms per decade (1950-2012)

The intensity of North Atlantic Storms has also increased.

The number of these storms tracking over Ireland has remained variable.



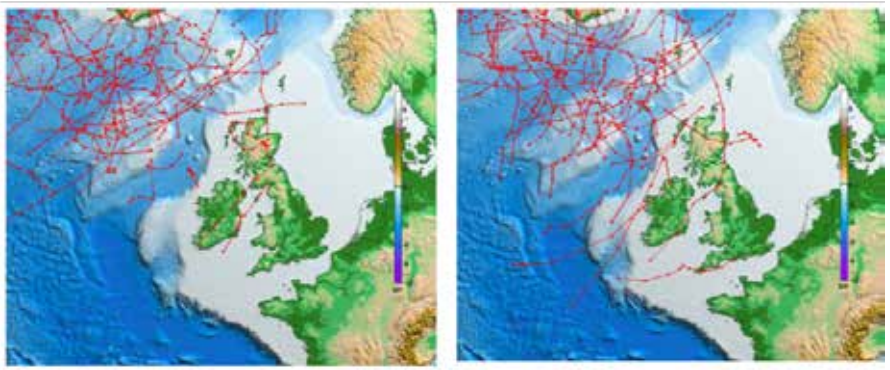
Left: Count of storms for Ireland (Top) and the whole North Atlantic (Bottom) during winter Right: Mean intensity of storms for Ireland and whole North Atlantic – modified from Mathews et al. (2014)

Source: Climate Ireland

Storm Track Projections for mid-century (2041-2060) compared with the baseline period (1981–2000)

Storms are rare events and projections should be considered with a level of caution.

- The number of very intense storms is expected to increase in the North Atlantic Region.
- Projections indicate that the winter tracks of these very intense storms may extend further south than the current situation, meaning that more of these storms (e.g. winter 2012/2013) will reach Ireland.
- However, due to our limited understanding, further work is required to increase confidence in these projections.



Tracks of storms with a core MSLP of less than 940 hPa and with a lifetime of at least 12 hours. Left: Past RCM 18km simulations (1981-2000); Right: RCP 8.5 18-km simulations (2041-2060) (Nolan, 2015)

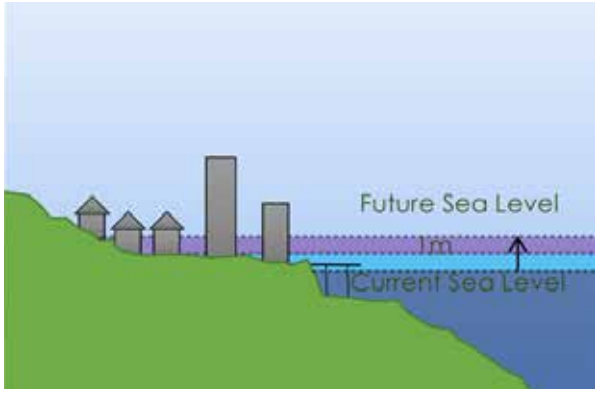
OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - SEA LEVEL

Observed Changes

Sea levels are rising at around 3.5 cm per decade in the marine territories surrounding Ireland.

Increasing Sea Levels are resulting in record high tides (>2.9m)

Increases are greatest for the Irish sea. This is due to a more pronounced warming of the Irish sea which contributes to sea level rise due to thermal expansion



Conceptual outline of simple coastal inundation due to relative sea level rise

Source: Climate Ireland

Sea Level Projected Changes for the Period 2081-2100 (relative to 1986-2005)

Sea levels are rising primarily because of thermal expansion due to increasing global temperatures but also due to melting ice sources (e.g. glaciers and ice sheets).

Regional projections of sea level rise are subject to a high degree of uncertainty as warming of the surface layers of the oceans is not likely to be uniformly distributed across the ocean surface. Regional changes in atmospheric pressure and ocean circulation will also affect the distribution of sea level rise (Hulme et al., 2002). Determining future changes in sea level around the Irish coast is further complicated due to isostatic rebound, i.e. post-glacial changes in the elevation of the land relative to the sea. Combining these sea level projections with isostatic rebound rates for Ireland means that projected rates of relative sea level will vary substantially around the Irish coast.

- Sea levels will continue to rise for all Irish coastal areas i.e. up to 0.81m by the end of the century.
- Increases will be greatest in the south of Ireland. This is because the north of Ireland is still rising after the last ice age.
- Increased sea levels will result in increased levels of high tide and when combined with storm surge, significant increases in levels of coastal inundation and erosion can be expected.
- The projected increase in relative sea level is likely to result in an increase in wave energy being transmitted to the shoreline.

OBSERVED & PROJECTED CLIMATE CHANGE FOR IRELAND - WAVE HEIGHT

Observed Changes

Analysis of data from satellite altimetry shows a general increase in wave heights in the Northeast Atlantic for the period 1988-2002.

Data from the Irish buoy network covers a relatively short period and there is no observable change.

Irish Marine Data Buoy Observation Network

Source: Climate Ireland

Wave Height Projected Changes for the Period 2077-2099 (relative to 1980-2009)

Projections of average significant wave height for Ireland suggest a decrease in annual and seasonal wave heights for both the medium-low and high emission scenarios.

- The largest decreases are expected for summer (up to 15%), particularly off the south coast, and for winter (up to 10%), particularly off the west coast.
- Projected changes for autumn and spring are small and considered less robust than those for winter and summer so should be treated with caution.
- Further work is required to improve the estimates and to further clarify uncertainties in projected changes.

Irish Marine Weather Buoy Network

The Irish Marine Weather Buoy Network is the result of successful collaboration between the Marine Institute, Met Eireann, The UK Met Office and the Irish Department of Transport joint.

The project is designed to improve weather forecasts and safety at sea around Ireland, and provides vital data for weather forecasts, shipping bulletins, gale and swell warnings as well as data for general public information and research.

THE ADAPTATION STRATEGY PROCESS

OUR APPROACH TO DEVELOPING THE STRATEGY

The approach to the development of the Climate Adaptation Strategy for Sligo County Council follows a five-step process provided for within the Local Authority Adaptation Strategy Development Guidelines (DCCAE, 2018).

The Climate Action Regional Office supported the process by providing workshop presentations, materials and templates, as well as providing a link to other Sectors involved in preparing Climate Adaptation Strategies.

Climate Adaptation Team

Local Government has a very broad remit undertaking many actions on behalf of Central Government Departments and Agencies. Given this broad scope of operations it was necessary to form a Climate Adaptation working group with representation across all departments, in order to assess the current adaptation baseline for climate change.

Activities included two workshops, which allowed for inter-departmental dialogue on both qualitative and quantitative aspects around how climate events of the past had created challenges and opportunities for Sligo County Council.

Having now drafted the Strategy we are at 'Step 5' in the Implementation and Monitoring Phase of the Strategy.

STEP 1: PREPARING THE GROUND | STEP 2: BASELINE ASSESSMENT | STEP 3: FUTURE CLIMATE RISKS | STEP 4: GOALS, OBJECTIVES & ACTIONS | STEP 5: IMPLEMENTATION

STEP 1: PREPARING THE GROUND

PREPARING THE GROUND

Climate Change has an impact on all functional areas of Sligo County Council. Staff from all of the sections within the Organisation were invited to workshops, where we were able to draw upon their various skills and experiences.

Participants were asked to list events or incidents that they were aware of or had experienced which were related to weather events in the past.

There was then a discussion around these incidents, what the Council's experiences were and how we could be better prepared for similar events in the future.

Issues relating to each of the five themes below were considered:

- **Water Resource & Flood Risk Management**
- **Critical Buildings & Infrastructure**
- **Natural & Cultural Capital**
- **Community Services and**
- **Governance**

The final results of these workshops is contained within the Actions outlined later in this document.

ADAPTATION STRATEGY TEAM

STEP 2: ASSESSING CURRENT BASELINE

SLIGO ADAPTATION BASELINE

Understanding how Sligo County Council has been impacted by climate hazards in the past is a crucial first step in the development of an Adaptation Strategy for the future.

A baseline assessment was carried out taking account of the range of climate hazards that have affected Sligo in the past and assess the consequences of these for services and functions of Sligo County Council.

Past Climate Events & Trends

The characteristics of County Sligo presents challenges and opportunities in terms of climate change which differ from other counties due to; our disperse settlement patterns, high level of natural heritage & conservation areas, as well unique groundwater systems which present diverse exposure and vulnerability factors.

The first step in the assessment of the adaptation baseline was the identification and compilation of past weather events, as well as periods of climate variability within Sligo County Council's functional region and its bordering counties. Climate events and associated impacts over the last 30 years were taken as the base period to establish and review the current state of play.

Event Type / Name	Year	Climate Hazards	Outline Description
Storm Ali	2018	Strong Winds	Orange Wind Warning - gale-force winds of up to 120km/h, stormy conditions
High Temperatures, Heatwave & drought	2018	High Temperature	High Temperatures, Heatwave and drought
Storm Hector	2018	Strong Winds	Heavy rain and gales
Storm Emma & Beast from the East	2018	Snowfall	Snowfall Blizzard / Heavy Snowfall
Storm Doris	2018	Strong Winds	Gale force winds, heavy rainfall, sleet and snow
Storm Elanor	2018	Strong Winds	Orange Warning - Westerly gale to storm winds together with high tides and exceptionally high seas - coastal damage and flooding.
Storm Dylan	2017	Strong Winds	Orange warning of "violent gusts" and coastal flooding from high seas. Strong Winds Winds recorded at Mace Head in Co Galway (119 km/h) and Newport, Co Mayo (111 km/h)
Storm Ophelia (Ex-Hurricane Ophelia)	2017	Strong Winds	Red warning - gale force winds, heavy rain and storm surges along Strong Winds some coasts (flooding).
Heavy Rain	2017	Extreme Rainfall	Cloud Burst in Donegal Inishowen Landslide
Storm Jake	2016	Strong Winds	Orange wind warning and yellow snow-ice warning
Storm Frank	2015	Strong Winds	Red warning - gale force winds, heavy rain and storm surges along Strong Winds some coasts (flooding).
Storm Eva	2015	Strong Winds	Orange WW, strong winds
Storm Desmond	2015	Flooding	Extratropical cyclone with heavy rain, flooding, Flooding in Flooding Crossmolina / Teresa Mannion-Salthill
Storm Darwin	2015	High Temperature	Orange Warning for strong winds
Winter Storms	2013/4	Strong Winds	Winter storms - serious coastal damage and widespread, persistent Extreme Rainfall flooding.
Tropical Storm Katia	2011	Strong Winds	Met Eireann issued an extreme weather warning after predicting that storm gusts would reach up to 80mph, attacking mostly the west and northwest coasts. Sea Flooding. Strong Winds Trains and bus routes were cancelled as power lines were damaged and fallen trees blocked roads, which caused car crashes and road build-up
Winter Cold Spell	2010	Cold Snaps / Frost	Severe Cold Spell
Winter Cold Spell	2009 /10	Cold Snaps / Frost	Coldest winter in almost 50 years (Met Eireann)
Severe flooding	2009	Flooding	CS 6: Severe flooding
Heavy Rain & Flooding	2008	Extreme Rainfall	Heavy Rain & Flooding
High Temperature/ Heatwave	2006	High Temperature	Warmest summer since record breaking 1996
Heavy Rainfall / Cloud Burst	2003	Extreme Rainfall	Pollatomish Landslide
Hurricane force winds over north & northeast	1998	Strong Winds	Hurricane force winds over north and northeast
Windstorm	1997	Stong Winds	Windstorm
Hurricane Charley	1986	Strong Winds	Strong Winds and Rain

Source: Met Eireann

HISTORIC CLIMATE EVENTS IN SLIGO

Fastnet Storm Aug 1976

Storm Jan 1976

Severe Storm Jan 1974

Prolonged Heavy Rainfall Nov 1980

Thunderstorms Jul 1985

Heavy Snowfall Jan 1987

Storm Force Winds Feb 1988

Storms / Heavy Rain Feb 1990

Flooding June 1993

Warmest Summer on Record / Drought Summer 1995

Hurricane Force Winds Dec 1998

Severe Flooding Nov 2000

Severe Flooding Nov 2002

Warmest Summer on Record Summer 2006

Heavy Rain and Flooding Summer 2008

Severe Cold Spell Nov/Dec 2010

Winter storms / storm surges Winter 2013/14

Wettest Jan in 20 years Jan 2016

Unseasonably Dry Weather Spring/Summer 2017

Storm Ophelia Oct 2017

Heatwave / Drought Summer 2018

1970 1980 1990 2000 2010 2020

Floods Nov 1973

Dry Period / Drought 1974-1976

Heavy Snowfall Jan 1982

Hurricane Charley Aug 1986

Flooding Oct 1987

Heavy Rainfall Oct 1989

Windstorm Jan 1991

Tornado Mar 1995

Windstorm Dec 1997

Flooding Dec 1998

Extensive Flooding Aug 1997

Storm surge / Coastal Flooding Feb 2002

Flooding / landslide Sep 2003

Regional Droughts 2007

Severe Flooding Nov 2009

Coldest winter in c. 50 years Winter 2009/10

Heavy Rainfall Oct 2011

Heavy Rainfall Summer 2012

Storm Darwin Feb 2014

Driest winter in 25 years Winter 2016/17

Heavy Rain Aug 2017

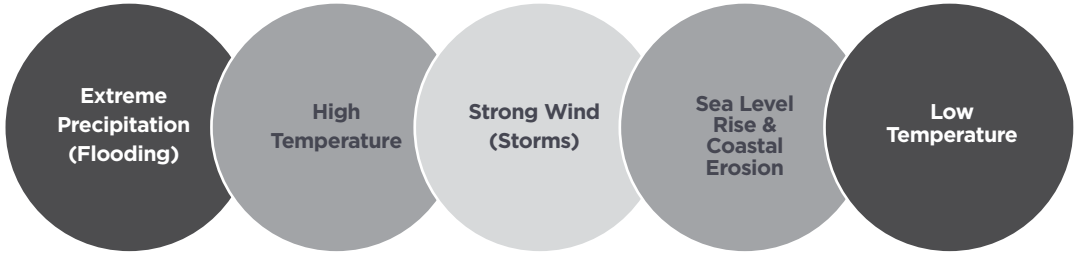
Storm Emma Mar 2018

Storm Ali Sept 2018

STEP 1: PREPARING THE GROUND | STEP 2: BASELINE ASSESSMENT | STEP 3: FUTURE CLIMATE RISKS | STEP 4: GOALS, OBJECTIVES & ACTIONS | STEP 5: IMPLEMENTATION

SLIGO ADAPTATION BASELINE

Through the identification and compilation of these events several event categories emerged. Some have occurred in combination.



Case Studies

To create a better understanding on how the climate trends and events have impacted County Sligo, the climate hazards were assessed through a series of case studies and data collated by the Climate Adaptation Team allowing for insight on local level of exposure and vulnerability to the impacts.

Case Study 1	**Extreme Rainfall** Geevagh August 2008. Severe impact on local community, as well as property losses.
Case Study 2	**High Temperature / Low Rainfall** Gorse fire - Ballintogher, May 2017. Required significant response from Emergency Services.
Case Study 3	**Strong Winds / Storm Surge** Flooding & Infrastructire damage, Raghly, November 2015. Local community practically cut off from mainland.
Case Study 4	**Costal Erosion** Loss of property and damage to infrastructure, Rosses Point 2008 onwards. Extensive damage to renowned golf course and extensive costal protection works undertaken
Case Study 5	**Low Temperature** Damage to road network - Ballymote, December 2009. Caused disruption to transport and required significant & costly repairs.

CASE STUDY 1:
EXTREME RAINFALL, AUGUST 2008

Location: Geevagh, Co. Sligo

Impact: Landslide/Bogflow resulting in damage to infrastructure & property/amenity

A significant landslide occurred as a result of very heavy rainfall for an extended period in August 2008. The material made its way down the mountain, flattening a number of trees on Coillte lands, before inundating a local sports field, and covering it with up to 1 metre of peat, mud & debris.

There was significant damage caused and the total costs to the Local Authority, Coillte and the local community in dealing with the aftermath were significant. The peatland on the slopes of the mountainside in this area has been examined by the Local Authority, and was found to be susceptible to landslides, but the increase in extreme rainfall events may lead to further similar incidents.

At the time, SCC said it would examine measures to minimise the worst effects of a recurrence of the landslide by maintaining watercourses, bridges and other infrastructure to try to alleviate the effects of any recurrence.

Lessons Learned:

It is important to learn form this type of incident in order to try to prevent a reoccurrence in future. And while it may have been very difficult to predict this type of event, we understand the conditions which may cause something similar to occur.

Therefore the use of signage and ensuring adequate maintenance of drainage channels may help to ameliorate the effects of any future landslides in this area.

CASE STUDY 2:
EXTENDED WARM & DRY PERIOD MAY 2017

Location: Killery Mountain, Ballintogher, Co. Sligo

Impact: Large Gorse Fire resulting in damage to property

During an extended warm & dry period in May 2017, there was a large gorse fire in the Killery mountain area, near Ballintogher, Co. Sligo.

It took more than 30 hours for over 50 Fire Service Personal to bring the fire under control. Over 4000 acres of land in an area of outstanding natural beauty was affected by this event.

Given the time of year, there would have been serious loss to the wildlife populations, including birds & small mammals. The fire also had a significant impact on residents in the local area, with some roads being closed and air quality being affected for people living nearby. There were also concerns about damage to property.

Lessons Learned:

Events of this type can require a lot of resources, both equipment & personnel. So it is important to have adequate numbers of staff trained & available, as well as ensuring that the necessary equipment & plant is available to deal with any contingency.

CASE STUDY 3:
EXTREME RAINFALL/HIGH TIDES, NOVEMBER 2015

Location: Raghly, Co. Sligo

Impact: Coastal Flooding/Damage to Coastal Defences

Yellow rainfall warning from Met Eireann at the time. High Tide combined with heavy prolonged rainfall resulted in damage to the sea wall in the area along the access road connecting Raghly to Ballymulderry. The storm beach (which resembles a stony dune) in the area was also impacted by this event, with a significant breach being made during the storm at the narrowest section. This meant that the townland of Raghly was almost cut off entirely from the mainland. Subsequent to the event the storm beach was rebuilt and reinforced using large boulders and the the material that had originally made up the storm beach, and repairs were carried out to the sea wall. But future events may have the same impact again.

Lessons Learned:

This area is at very high risk if the frequency of similar events is increasing. As it stands, the link between Raghly and the mainland is about as minimal as it can get.

Without further engineering interventions and significant maintenance, coupled with rising sea levels, this area could potentially be cut off for longer periods as time goes by, with major consequences for those living in the area.

CASE STUDY 4:
EXTREME STORM EVENTS 2008 ONWARDS

Location: Rosses Point, Co. Sligo

Impact: Coastal Erosion and loss of amenity

Area known as the second beach in Rosses Point has been understood to be in a state of constant retreat as a result of coastal erosion for some time. After extreme storm in 2008, 310M of armour rock revetment was installed at significant cost.

In 2014, another extreme storm caused significant damage to the coastal revetment, and it has been observed that damage is still occurring outside of where the rock armour was provided. Maintenance to the rock armour was carried out in late 2018/early 2019, but how effective this will continue to be remains to be seen.

Consultant report recommends a program of managed realignment for this section of coast. This could have a significant economic cost for the golf course as they are losing ground as a result of the erosion. But the damage being caused to the rock armour revetment as time goes by is also presenting H&S issues, as once damaged it can present a hazard to beach users on this Blue Flag beach. RPS Report 2016.

Lessons Learned:

While the use of rock armour and other engineered solutions can sometimes help in limiting the damage caused by coastal erosion, there may be times that some areas are allowed to be eroded without intervention. However the potential impacts on the property owners can make this a very difficult decision to make. But even with adequate planning & design, the impact of the attempted defences could potentially lead to unintended consequences.

CASE STUDY 5:
EXTENDED COLD PERIOD WINTER 2009

Location: Ballymote, Co. Sligo

Impact: Damage to Road Network

During an extended period of extreme cold weather, with severe frosts that lasted for several weeks, there was extensive damage caused to the local road network around the town of Ballymote.

This appeared to be caused by repeated freezing & thawing that occurred along several stretches of road around the town. Large potholes formed and in places, the entire road surface disintegrated and had to be completely replaced at significant cost. It also caused severe disruption for local residents.

Lessons Learned:

Maintenance of drainage infrastructure on local roads is important to try to ensure that water is allowed to move away from the structure of the road.

Use of alternative road building methods (i.e. Hotmix) could potentially avoid similar problems in future.

SLIGO ADAPTATION BASELINE

Climate change is a major challenge that poses major risks to our communities, businesses, environment, and way of life. Observations show that temperatures are increasing, precipitation patterns are changing, and sea level is rising. Severe weather events that we have experienced over the past decade clearly illustrate the impacts that Sligo is likely to experience under climate change. These impacts are expected to intensify over the coming decades no matter how much we reduce our greenhouse gas emission.

Our own analysis in developing this baseline assessment seems to indicate that that strong wind events have emerged as an increasing issue in the region but the impacts are generally short lived and the clean up relatively quick.

Flooding is the largest source of climate-related impact and losses around the county, particularly around the Carraroe and Ballytivnan areas of Sligo town, as well some other areas are exposed to fluvial flooding, such as Raghly and Easkey. Rosses Point and other areas along the coast have experienced significant losses due to erosion.

During warmer periods of weather, and because of the risks associated with casual bathing at Strandhill and other beaches in Co. Sligo, the increased numbers of visitors there may lead to increased risks and a requirement for enhanced water safety measures to be implemented.

Our analysis also indicates that that other impacts on our environment, economic and social activities are starting to emerge more slowly over time, as a result of incremental changes in the climate also having impacts. These include changes in the timing of seasonal life-cycle events for animals and plants, agricultural shifts affecting food production processes, and longer term impacts of precipitation, temperature change and extreme events on infrastructure, clean water and human well-being.

The economic and social costs associated with both slow and rapid weather events was also perceived to be rising.

STEP 3: IDENTIFICATION OF CLIMATE RISKS & OPPORTUNITIES

RISKS & OPPORTUNITIES

In preparing for climate change, Sligo County Council is faced with the challenge of responding to a broad range of uncertain risks. Although some services and activities may not currently be impacted by climate change, they may be sensitive to projected changes and may experience impacts in the future.

Climate change is creating new risks and exacerbating existing ones. Ecosystems will shift, food production will be placed under increasing pressure and some types of extreme weather events will increase in frequency and severity.

In developing an understanding of the levels of exposure to climate hazards, the Adaptation working group looked at the climate impacts that are of current significance, climate projections, and the consequences for the delivery of services by Sligo County Council. It also took account of non-climatic factors e.g. our aging population, which may result in a higher level of sensitivity to climate hazards such as heat waves.

Opportunities

Projected changes in climate may also result in additional benefits and opportunities for Sligo. Adaptation measures can reduce costs of disruption to business operations and help to realise new business opportunities arising from climate change.

Climate Risk & Opportunities Register

The Climate Risk and Opportunities Register provides a list of Risk and Opportunity Statements, developed from the baseline and future vulnerability assessments, with associated timeframes and projections of future changes.

IDENTIFICATION OF CLIMATE RISKS & OPPORTUNITIES

Assessing the baseline allows us to understand the potential impacts that climate change will have on County Sligo in the future. The following pages outline the risks & opportunities on various sectors including: Critical Infrastructure & Buildings; Coastal & Marine Environment; Biodiversity; Agriculture; Culture & Heritage; Water & waste water services; Water quality; Flood management; Community & Business support services; Tourism; Emergency services; and Corporate Governance.

CLIMATE CHANGE IMPACTS

Increased incidence of heavy rainfall events, flooding and more severe cyclones with direct, and indirect, impacts on property, infrastructure, wildlife, community and economic function.

Increased temperatures with impacts on human wellbeing, including heat stress and expanded vectors for mosquito-borne and other diseases.

Changes to our natural ecosystems, including the distribution and abundance of pest plants and animals, and loss of climate-sensitive native species.

Ocean warming and acidification, with impacts on the health of our marine ecosystems, including our fisheries resources.

Sea-level rise and inundation of low-lying communities and habitats.

RISKS TO CRITICAL INFRASTRUCTURE & BUILDINGS

Flooding already accounts for significant losses in infrastructure services and property damage, where damage caused by flooding tends to last longer than other weather-related hazards. The main flooding risks in Sligo are river (fluvial), coastal (tidal), local intense rainfall (pluvial), groundwater in some areas of the county, as well as combinations of these flooding types.

The risk of river and surface water flooding is expected to rise, as patterns of rainfall become more intense. The projected increased rainfall intensity will also lead to overloading of surface water networks, therefore to more road and street flooding, overland flows and property flooding. The water network and wastewater treatment facilities will need to be adapted for increased flows.

Sligo also has significant infrastructure and properties located in coastal areas which are exposed to both coastal flooding and erosion. Projected rises in mean sea level could increase the rate of erosion and the number of vulnerable areas.

High winds emerged as having an impact, with 'risk to life' highlighted by the number of related fatalities around the country. Given the significant rural context of County Sligo extreme wind events can cause disruption to road travel in the county. Issues regarding the safety of infrastructure and buildings adjacent to hazards (e.g. trees) should be informed by structural appraisals and surveys. The cascading impact of power outages due to wind related damage to the electricity network can have an effect on most of the operational areas of the local authority.

Increased summer temperatures may affect conditions in buildings leading to heat related damage and/or disruption to energy and transport networks. Milder winters may reduce demand for heating, reducing costs for business and the public, as well as reducing carbon emissions. They may also reduce cold weather-related damage, delays, disruption and associated costs for infrastructure, business and the public (although extreme events may still occur).

Importantly there may be further opportunities for innovative, sustainable building services, materials and urban planning.

Risks & Opportunities

- Increased flooding (and sewer surcharging) may affect a significant proportion of buildings and infrastructure.
- Increased risk to coastal infrastructure from sea level rise, increased surge and coastal erosion.
- Increased costs and resources for maintenance and repairs due to climate change and climate events.
- Drier weather conditions in the summer could improve construction progress.
- Increased summer temperatures may affect conditions in buildings and may lead to heat related damage and/or disruption to energy and transport networks.
- Milder winters may reduce cold weather-related damage, winter maintenance costs and building heating requirements.

STEP 1: PREPARING THE GROUND | STEP 2: BASELINE ASSESSMENT | STEP 3: FUTURE CLIMATE RISKS | STEP 4: GOALS, OBJECTIVES & ACTIONS | STEP 5: IMPLEMENTATION

COASTAL & MARINE ENVIRONMENT

The Sligo coast is a dynamic system that is sensitive to environmental and climate changes, undergoing continual modification in response to the varying forces acting upon it. The beach at Strandhill is a good example of this, in that year to year the beach changes significantly. The impact of climate change on our coastline is already evident, and further increases in relative sea level will mean that coastal areas will be increasingly susceptible to permanent inundation and erosion. The risk of exposure of landforms which are currently sheltered from the effects of wind driven waves has also been identified.

Direct impacts from sea level rise and increased wave energy include flooding and displacement of wetlands, coastal erosion, increased salinity in estuaries, coastal aquifers and blocked drainage. Potential indirect impacts include changes in the distribution of sediment, changes in the functions of coastal ecosystems, and impacts on coastal heritage and human activities. These impacts are likely to be further exacerbated due to 'non-climate' pressure arising from increasing population and development within the coastal zone.

Important coastal habitats, such as salt-marsh and sand dunes that provide valuable natural buffering from wave energy, as well as importance for wildlife, are being impacted by both sea level rise and human activity. The widespread loss of these habitats, as they become squeezed between rising sea levels and man-made defence structures, will have implications for the long-term viability of coastal defences and the communities they protect.

Sea level rise and increase in wave energy ultimately determines coastal morphology and the impact on the coastal processes will have the most dramatic effects in low-lying vulnerable environments along the coast. Temporary changes in extreme water levels resulting from storm surge events, particularly if coupled with high tides, are likely to also present additional potential for damage through overtopping of coastal defences. If model projections of storm intensity are realised, these storm surge events may have significant and lasting impact on the coastal morphology.

This increase in frequency and intensity of storms will present a problem for infrastructure built along the coast, particularly in soft coastal areas, rising sea levels could inundate areas like Ballymulderry and potentially lead to Raghly becoming an island.

Risks & Opportunities

- Climate change threatens coastal areas, which are already stressed by human activity, pollution, invasive species and storms.
- Sea level rise threatens to erode and inundate coastal ecosystems including unique ecosystems such as wetlands and machair (sand dunes).
- Warmer and more acidic oceans are likely to disrupt coastal and marine ecosystems on native species, algal blooms.
- Drier and warmer weather will see an increased in beach tourism and marine activities enhancing the blue economy.

RISKS TO COASTAL & MARINE ENVIRONMENT

The traditional local interventions of 'hard' and/or 'soft' engineering solutions to reduce vulnerability and preserve the present-day shoreline are unlikely to represent an optimum long-term management strategy for the coastal zone. More effective options will need to be developed that seek to manage change in the coastal system and allow it to adjust to climate change and the associated impacts. This will require a high level of understanding of the coastal system supported by effective monitoring of vulnerable locations, identifying where and when remedial action is necessary.

Planning and Development of the coastal zone may need to adopt 'set back' lines, seaward of which no development should be allowed. A precautionary approach should be used to determine these buffer zones taking account of future sea levels, erosion and landward migration of coastal landforms. Implementing an approach of shoreline realignment, or 'managed retreat', is likely to be contentious where economic losses are possible or where coastal archaeology or tourist sites exist. Nevertheless," the extreme of abandonment may represent the most economic strategy where the cost of implementing coastal defences exceed the value of the structure(s) being protected". (Bird, 1993).

BIODIVERSITY

On a global scale, it has been predicted that temperature elevation above 1.5 ºC- 2.5ºC could result in the extinction of 20-30% of species (IPCC AR5). An extinction of this magnitude would have far reaching consequences for ecosystem structure and function.

Wildlife in Co. Sligo, including all the plants and animals living in water or on land, thrive precisely because the climate suits them. They have adapted to the county's current patterns of temperature and rainfall. As these patterns change, some of these plants and animals may not be able to adapt or move or may become so stressed they become extinct.

These new climatic conditions may be more favourable to species of plants or animals that currently do not live here, but which may in time become invasive at the expense of existing species. This is already occurring e.g. Japanese Knotweed & Giant Hogweed on our inland waterways and the spread of Zebra Mussels.

Shifts in spatial range and changes in phenology will have implications for the ecological compositions of communities and habitats, with both winners and losers.

"Most plant species cannot naturally shift their geographical ranges sufficiently fast to keep up with current and high projected rates of climate change in most landscape". [IPCC AR5]

The residual impact of climate change on habitats and biodiversity is a very complex one, as climate change affects organisms along many ecological axes simultaneously and includes secondary effects that result from altered species interactions.

Action is needed to firstly better understand the impacts of climate change on our biodiversity and then to bring climate and environmental change into conservation planning at site level and on a wider scale.

Risks & Opportunities

- Changes in the timings of seasonal events (phenological mismatch) may lead to disruption of food species and put species, as well as ecosystem services, at risk.
- New conditions may favour generalist species, pests, diseases and invasive non-native species, leading to a reduction in biodiversity and disrupting ecosystem services.
- Better conditions occurring for some flora and fauna.
- Increased productivity in forests and woodlands due to increased temperatures where drought, pests, pathogens and other pressures are not limiting factors.
- Changes in species range may present threats, but also some opportunities, for wider biodiversity and ecosystem services.

BIODIVERSITY

Two of our most productive ecosystems i.e. peatlands and coastal habitats, may shrink significantly as a result of climate change.

Peatlands

Peatlands account for a significant amount of land cover in Sligo. Climatic conditions that affect water availability will significantly influence the nature and function of specific peatlands and will impact the plant and animal species within them.

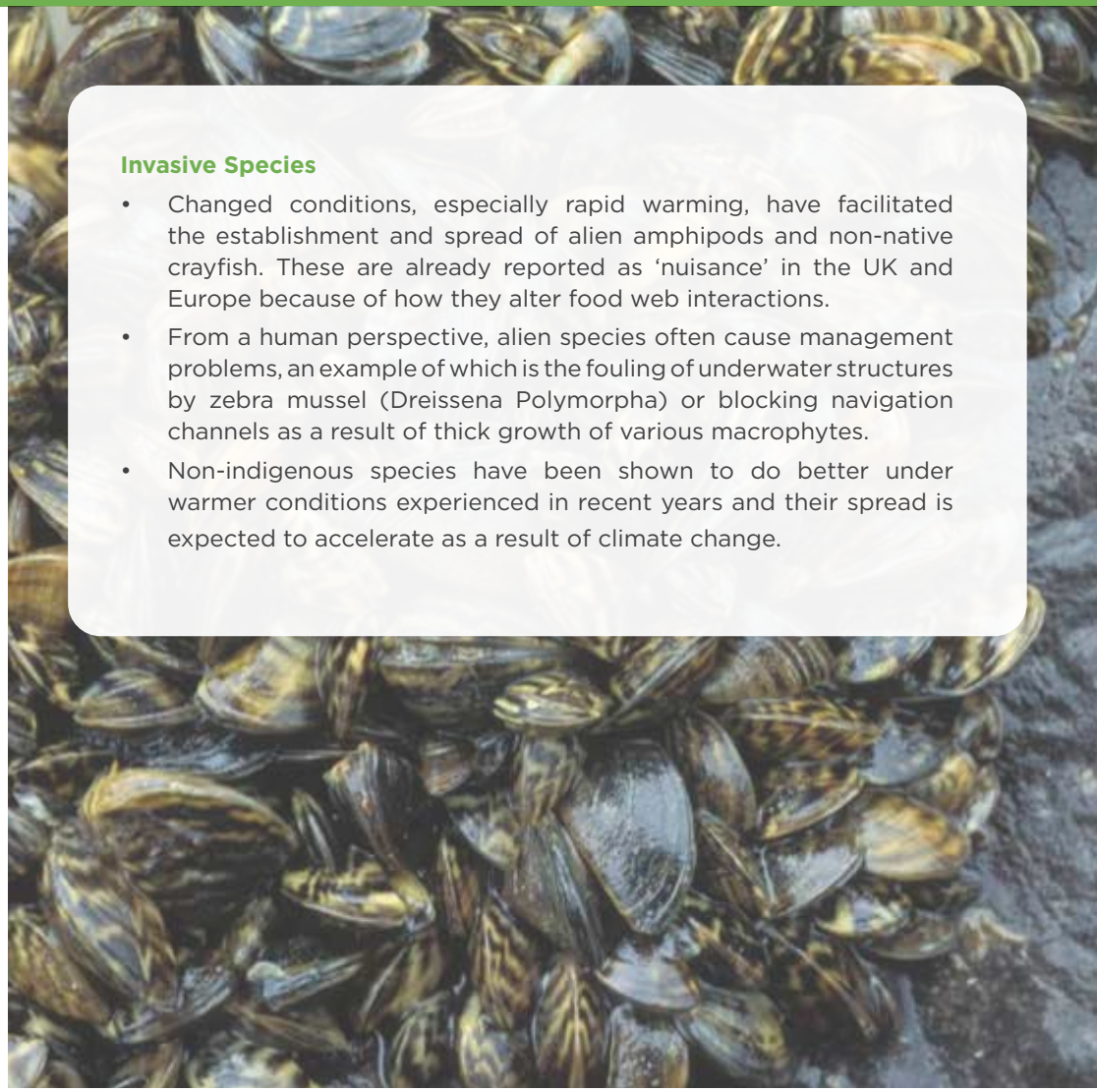
The distribution and functions of peatlands will be significantly impacted by a rise in temperatures and altered precipitation patterns, including more frequent droughts. Careful management of peatland systems is required in order to prevent such natural intact ecosystems becoming carbon sources as opposed to carbon sinks.

Climate change will make meeting existing conservation objectives increasingly challenging and potentially have implications for the provision of ecosystem services in the long-term, such as carbon storage, clean water provision and pollination. Shrinking of wetland habitats can impact some of our rare protected species, including Annex II listed species.

Coastal Habitats

Coastal areas are of concern through the combined effect of sea level rise and increase in storm surges; eroding coastal habitats. Some habitat shift landwards is possible but may be inhibited in some places by man-made barriers i.e. urban development and infrastructure. In addition increasing sea temperatures and chemistry can lead to issues such as algal blooms.

Additional pressure on the freshwater wetlands in coastal areas is also expected due to predicted seawater inundation as a result of elevated sea water levels and increased storm surge. This could result in their conversion into salt marshes in affected areas.



Invasive Species

- Changed conditions, especially rapid warming, have facilitated the establishment and spread of alien amphipods and non-native crayfish. These are already reported as ‘nuisance’ in the UK and Europe because of how they alter food web interactions.
- From a human perspective, alien species often cause management problems, an example of which is the fouling of underwater structures by zebra mussel (Dreissena Polymorpha) or blocking navigation channels as a result of thick growth of various macrophytes.
- Non-indigenous species have been shown to do better under warmer conditions experienced in recent years and their spread is expected to accelerate as a result of climate change.

Ecosystems and biodiversity can also play a significant role in influencing climate change. Trees and plants remove carbon dioxide from the atmosphere, regulate air temperatures and catch rainfall. Wetlands act as significant carbon sinks, store large volumes of water and slow down its flow.

RISKS TO AGRICULTURE

The changes in temperature and rainfall and increase in extreme weather events will have a significant effect on agriculture, putting global food supply at increasing risk. Integrated farming systems and integrated cropping systems can vastly increase our adaptive capacity through protecting soil, water and other resources. These issues need to be addressed in the policy processes at national level, in consultation with relevant parties at national and local level.

Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world (high confidence). [IPCC AR5]

The projected warmer drier summers and increased mean winter temperatures may be beneficial for agriculture. Warmer temperatures will undoubtedly be of benefit for grassland productivity, and the extended growing season may provide opportunities for longer outdoor grazing. At the same time this could be counteracted through increased and changing precipitation patterns in the winter, with increased problems with slurry storage and spreading in the wetter parts of the county. The drier summers could lead to water shortages, heat stress, and the drying out and deterioration of soil quality.

'The Impact of Climate Change on Irish Farming' report published by Teagasc in 2010, identified that cereal production in all regions would be negatively affected by changes in precipitation, air and soil temperature and extreme weather events. Food Wise 2025's guiding principal is to seek to embed, at all levels of the agri-food industry, that environmental protection and economic competitiveness are equal and complementary i.e. one will not be achieved at the expense of another.

Risks & Opportunities

- Crop losses and other impacts on high quality agricultural land due to flooding, soil erosion and extreme temperatures.
- Higher summer soil moisture deficits, increasing demand for irrigation to maintain crop yields and quality.
- Potential for increased potency in existing, or introduction of new pests and diseases.
- Increased yields for current crops (e.g. wheat and sugar beet, potatoes) due to warmer conditions and/or CO2 effects.
- Increased grass yields benefiting livestock production.
- New crops and tree species may be able to enter production, due to warmer conditions.
- Opportunities to grow a wider range of non-food crops for energy.

RISKS TO CULTURE & HERITAGE

It is the wealth and diversity of our natural, built and cultural heritage that gives Sligo its unique identity and character and contributes to the economic and cultural well-being of the county.

Sligo is defined by it's striking landscape, which has been moulded by nature, and by human hands for thousands of years. And the landscape will inevitably continue to change, in response to the effects of climate and continued human activity. This change will be gradual and slow, and much will depend on how we plan development within the county. But it will also depend on how we react to the threats associated with climate change and how much effort we put in to dealing with them now.

Climate change is predicted to exacerbate existing processes of decay and damage, but the greater frequency of extreme events e.g. wind storms, may also result in abrupt intensification of these processes or irreparable damage to some features. Major impacts on coastal cultural heritage are likely to occur from projected sea level rise, increased coastal erosion and coastal flooding, more frequent storm events and greater wave energy. Coastal erosion will be one of the most widespread and demanding impacts of climate change, posing challenges across all sectors, including cultural and heritage.

It is anticipated that there will be a direct impact on cultural heritage, from changes to our current climate, and indirect impacts, including ones arising from cultural reactions and changes to natural habitats and landscapes. Indirect effects may arise from mitigation and adaptive responses e.g. the construction of windfarms and flood alleviation schemes. As a first step to improving our capacity for the management of our cultural heritage (in light of climate change) we need to gather baseline data on our cultural heritage resources, develop vulnerability maps and a hierarchy of priorities for allocating resources..

Risks & Opportunities

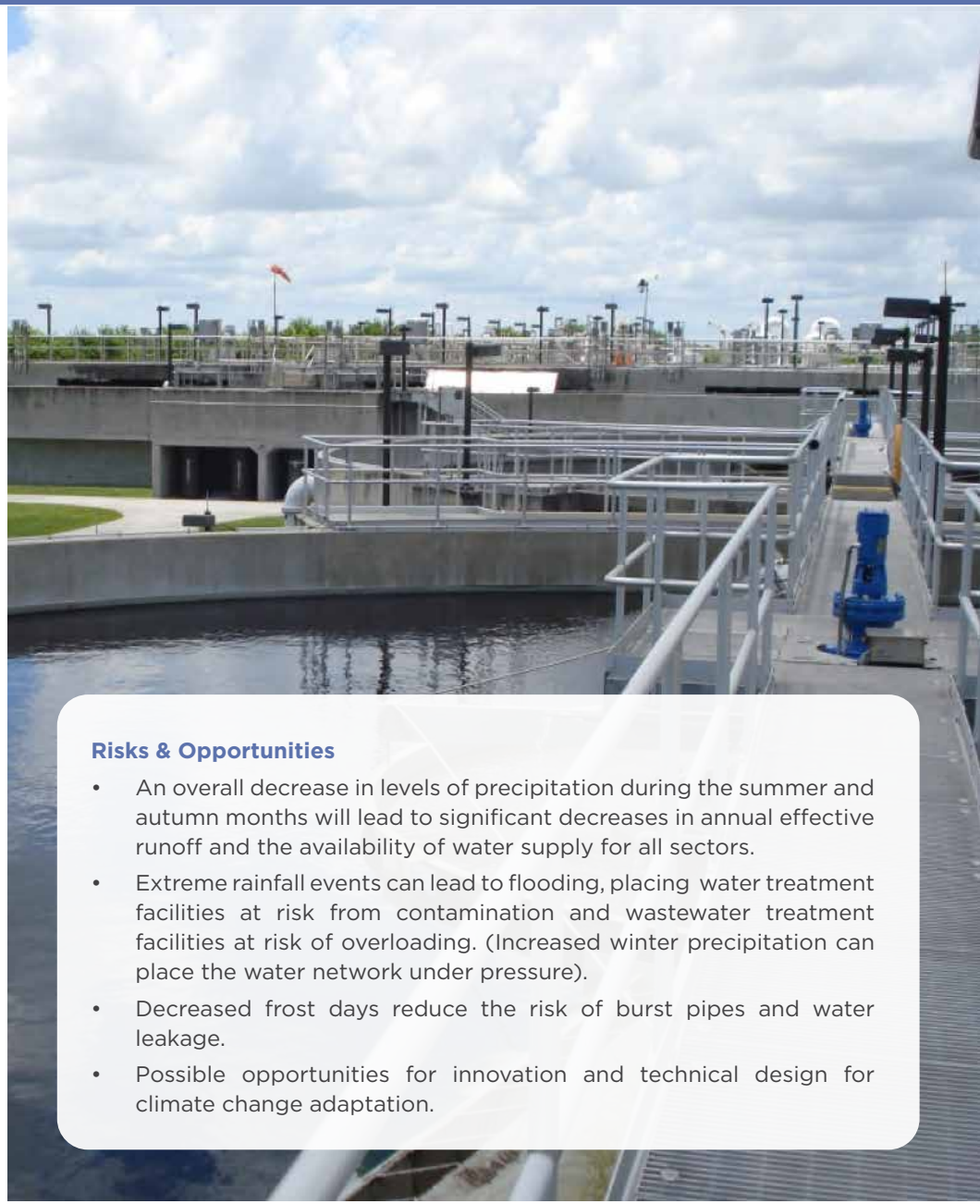
- Soil erosion and increase in weathering of buildings and monuments may lead to the loss of archaeological sites.
- Increased costs of maintaining built heritage and archaeological sites.
- Some coastal, intertidal and submerged archaeological sites may be completely lost due to sea level rise, storm surge, flooding.
- Rising soil temperatures accelerate microbiological and chemical processes which preserve buried archaeological heritage.
- New sites may be discovered or exposed from severe weather events e.g. high temperatures, coastal storms.

RISKS TO WATER & WASTEWATER SERVICES

Substantial reductions in summer and autumn flow could have potentially serious implications for water supply and water resource management. It is likely that there will be a lot more pressure on drinking water in Sligo due to more droughts in the summer and an increase in global temperatures. Conservation of water i.e. water usage and water delivery will become increasingly important. The review of water supply vulnerability to climate change also identified that pressure will not just come from the domestic sector, but other sectors such as agricultural are particularly sensitive to climate change. Water supply interruptions can also be caused by flooding and cold weather, although the probability of cold events that cause problems with water supply is likely to decline in the long-term, as winters become warmer.

Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure and agricultural incomes, including shifts in the production areas of food and non-food crops around the world (high confidence). [IPCC AR5]

Soil moisture and groundwater will also be affected by climate change, which will impact supplies sourced from groundwater. This may have an impact on private Group Water Schemes.Rising average temperatures are also expected to increase the temperature of surface water sources of water supply, which can change the water chemistry. This may have implications on the ability of current water treatment infrastructure to treat raw water and may require upgrading of facilities. More regular flood events will put increasing pressure on sewage treatment and collection systems that integrate rainwater runoff. Water supply and wastewater treatment calculations will also need to be reviewed, especially in urban areas dependent on surface water collection.



Risks & Opportunities

- An overall decrease in levels of precipitation during the summer and autumn months will lead to significant decreases in annual effective runoff and the availability of water supply for all sectors.
- Extreme rainfall events can lead to flooding, placing water treatment facilities at risk from contamination and wastewater treatment facilities at risk of overloading. (Increased winter precipitation can place the water network under pressure).
- Decreased frost days reduce the risk of burst pipes and water leakage.
- Possible opportunities for innovation and technical design for climate change adaptation.

RISKS TO WATER QUALITY

The effects of extreme events, such as storms and flooding and slow onset changes such as temperature rise, changes in precipitation regimes and sea level rise, will have a transformative effect on water quality in the county. This has potentially serious implications for water supply, water resource management and the successful implementation of the Water Framework Directive.

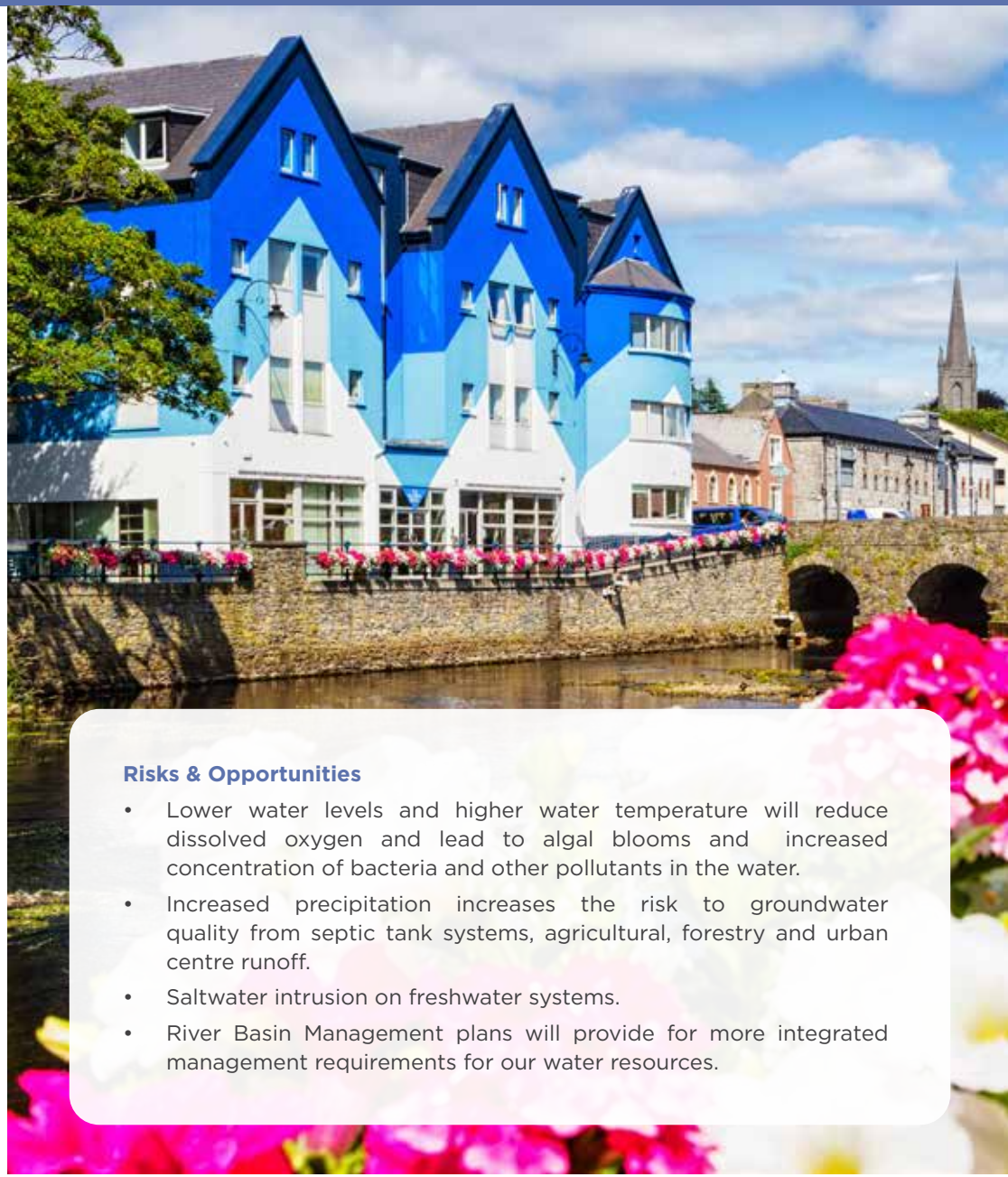
While increasing temperatures in Ireland are projected to occur in all seasons and time periods, it is likely that projected changes in the seasonal and spatial distribution of rain will present a much greater challenge for water quality.

An increase in the occurrence of river flooding is expected during winter months. In turn, the summer is likely to see more droughts resulting in low water flow.

Changes in seasonal water levels and the occurrence of extreme high and low flow events will have direct impacts on rivers, lake and coastal water quality. More regular flood events and intense rainfall patterns are expected to result in increased runoff and an increase in discharge of untreated material directly into waterways.

This will carry increased sediment and nutrient loads into waterways, resulting in increased water turbidity and altered nutrient balance. Altered nutrient input is of concern when it occurs alongside a rise in temperature. Climate change could exacerbate the effects of nutrient enrichment, which is by far the most significant impact of human activity on the freshwater environment and is likely to remain so for the foreseeable future.

Reduced water quality may have a profound impact on the drinking water supply in certain areas. It may also render some of the waterbodies unsuitable for certain recreational purposes, including angling and Blue Flag amenities. It will be important to assess and manage these risks and ensure emergency and resilience plans minimise the risk of pollution on and off site.



Risks & Opportunities

- Lower water levels and higher water temperature will reduce dissolved oxygen and lead to algal blooms and increased concentration of bacteria and other pollutants in the water.
- Increased precipitation increases the risk to groundwater quality from septic tank systems, agricultural, forestry and urban centre runoff.
- Saltwater intrusion on freshwater systems.
- River Basin Management plans will provide for more integrated management requirements for our water resources.

RISKS TO FLOOD MANAGEMENT

Due to rising sea levels and more intense rainfall projections, Mayo will face a greater risk of flooding, particularly from extreme and currently rare events. Risks from flooding and coastal changes have been identified across all operational areas as posing the greatest long-term risk from climate change to infrastructure and Sligo County Council's operations, and to local communities and business. Damages and impacts from flooding are already high and current levels of adaptation are projected to be insufficient to avoid flooding and coastal erosion risk increasing with further warming.

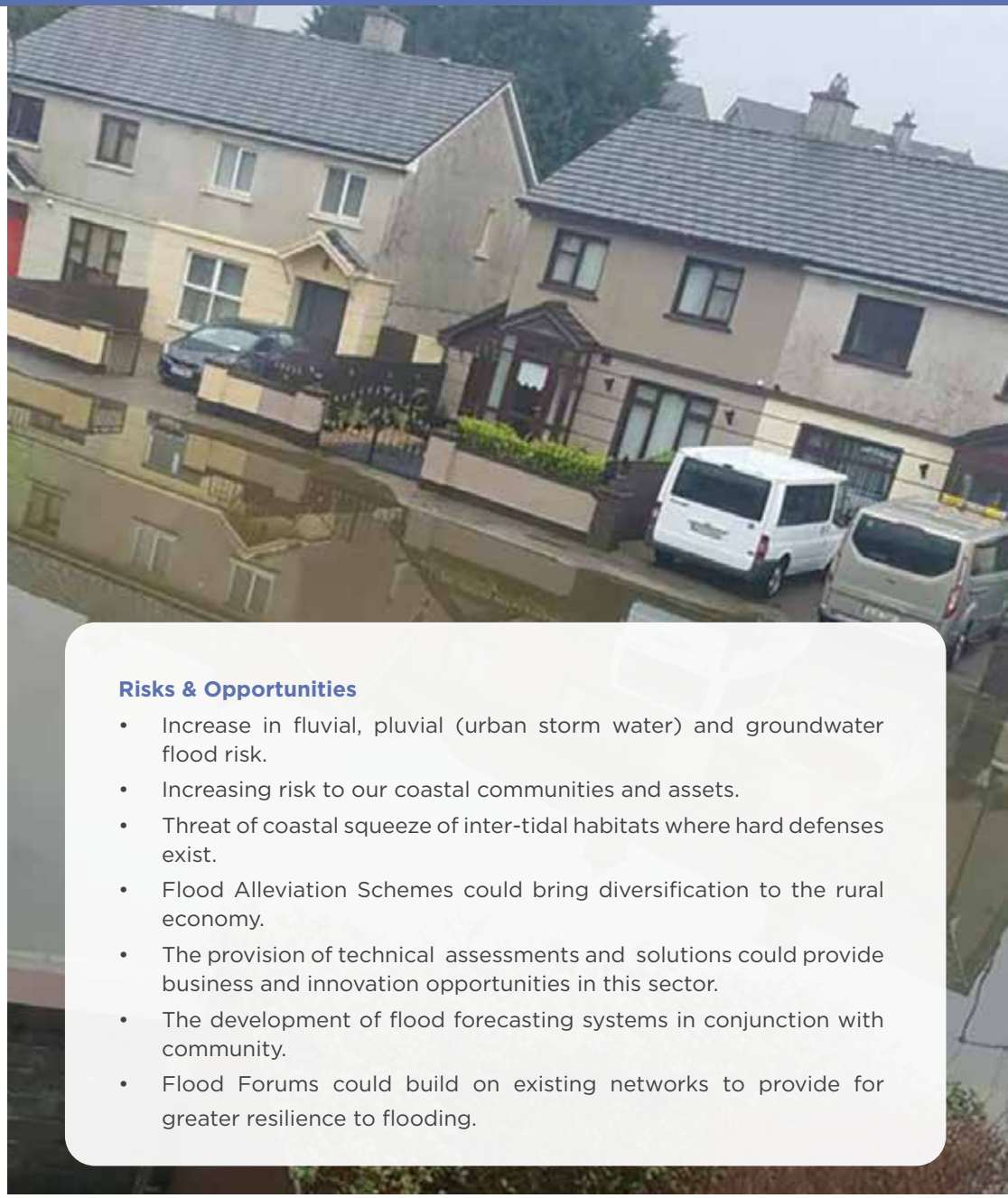
The projected changes raise concerns regarding the integrity of flood defences, the capacity of urban storm drainage systems, the need for better planning and development in vulnerable areas, as well emergency response planning and resourcing. Additional adaptation may be able to counter the increase in flood damage anticipated with the 2°C of global warming, at least in some parts of the county, but in others increasing flood risks appear inevitable, especially with 4°C or more of global warming.

Communities and business operating in flood risk areas, are exposed to direct damage to buildings and assets, and indirect impacts on wellbeing, sales, supply chains and reputations. A better understanding of future flood risk and local impacts is needed for Sligo County Council to develop appropriate adaptation measures, as well as capacity building at community level.

New Approach

The Water Framework Directive has resulted in a shift in our approach; away from site specific hard engineering solutions, towards an integrated assessment of water resources and flood management at the catchment scale.

The capacity to adapt to greater extremes in hydrological conditions will depend on our ability to apply integrated decision making, together with technology and systems that are appropriate and sustainable.



Risks & Opportunities

- Increase in fluvial, pluvial (urban storm water) and groundwater flood risk.
- Increasing risk to our coastal communities and assets.
- Threat of coastal squeeze of inter-tidal habitats where hard defenses exist.
- Flood Alleviation Schemes could bring diversification to the rural economy.
- The provision of technical assessments and solutions could provide business and innovation opportunities in this sector.
- The development of flood forecasting systems in conjunction with community.
- Flood Forums could build on existing networks to provide for greater resilience to flooding.

RISKS TO COMMUNITY & BUSINESS SUPPORT SERVICES

Community Engagement & Sports Partnership

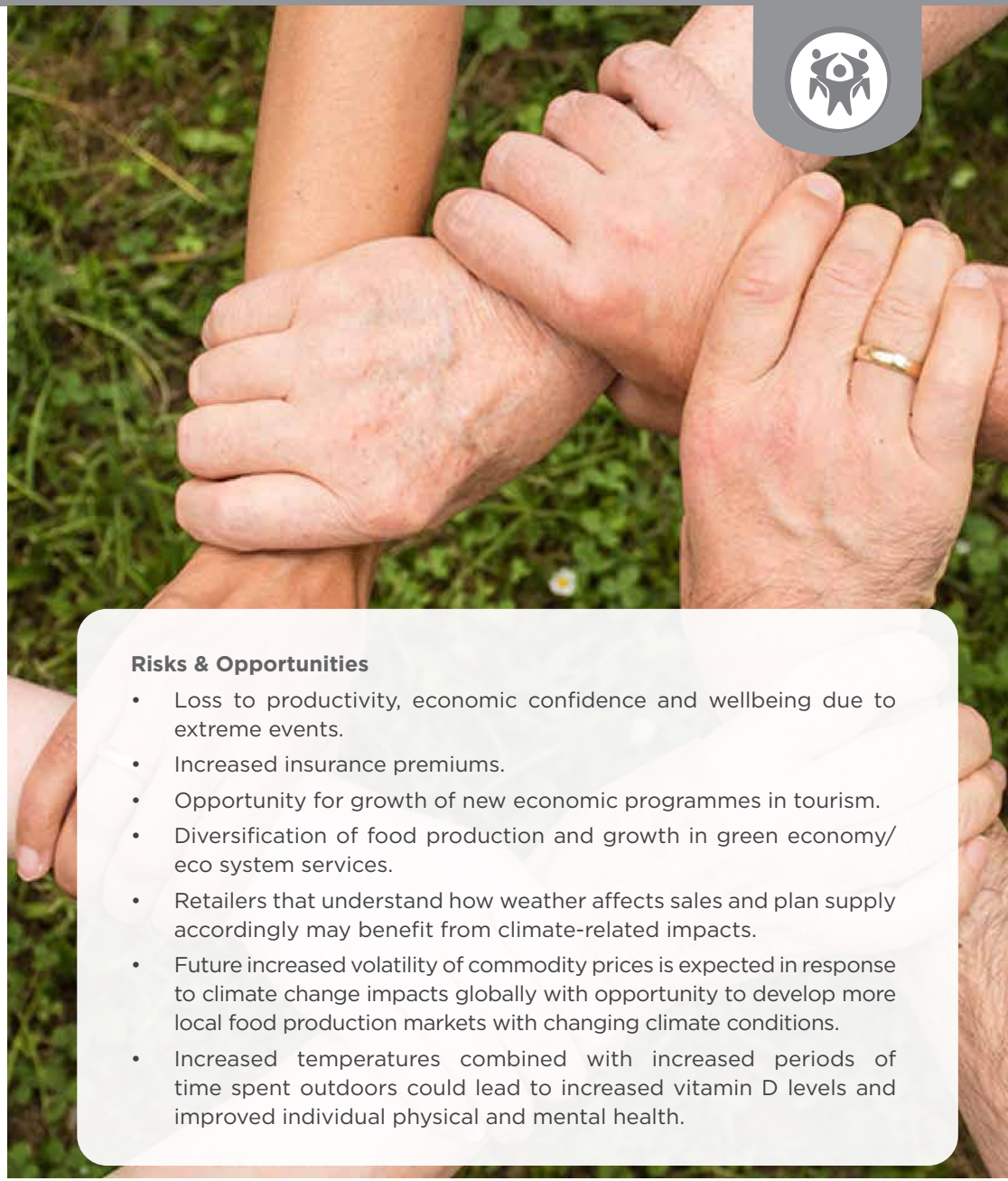
Many of Sligo's communities, and their sporting organisations, are vulnerable to climate change impacts and are already dealing with the consequences. Some have experience of adapting to these changes. The impact of the landslide in Geevagh in 2008 is an example of how community resources can be devastated by climate related events.

Sligo County Council has a key role to play in developing and supporting community and sport initiatives. Raising awareness of the risks and opportunities likely with climate change will help increase community resilience to the risks and inform our approach to how communities and sport should adapt in the future.

Local Enterprise Office

Some of the impacts on business are indirect e.g. how insurance firms assess flooding risk, while others are clearly direct, such as impacts on water quality, resources and services. These more immediate physical impacts are leading companies to invest in new processes and technologies to mitigate risks, and avail of opportunities. There are also less intuitive impacts related to the transition to a carbon-free economy, as well as new trends in how customers, investors, business partners, and regulators make decisions

Sligo's Local Enterprise Office acts as a "First Stop Shop" for anyone seeking information and support on starting or growing a business in the County. Building awareness of climate change will form part of this ongoing brief to help business understand climate change risks, but also the opportunities it may bring in some sectors.



Risks & Opportunities

- Loss to productivity, economic confidence and wellbeing due to extreme events.
- Increased insurance premiums.
- Opportunity for growth of new economic programmes in tourism.
- Diversification of food production and growth in green economy/ eco system services.
- Retailers that understand how weather affects sales and plan supply accordingly may benefit from climate-related impacts.
- Future increased volatility of commodity prices is expected in response to climate change impacts globally with opportunity to develop more local food production markets with changing climate conditions.
- Increased temperatures combined with increased periods of time spent outdoors could lead to increased vitamin D levels and improved individual physical and mental health.

RISKS TO TOURISM

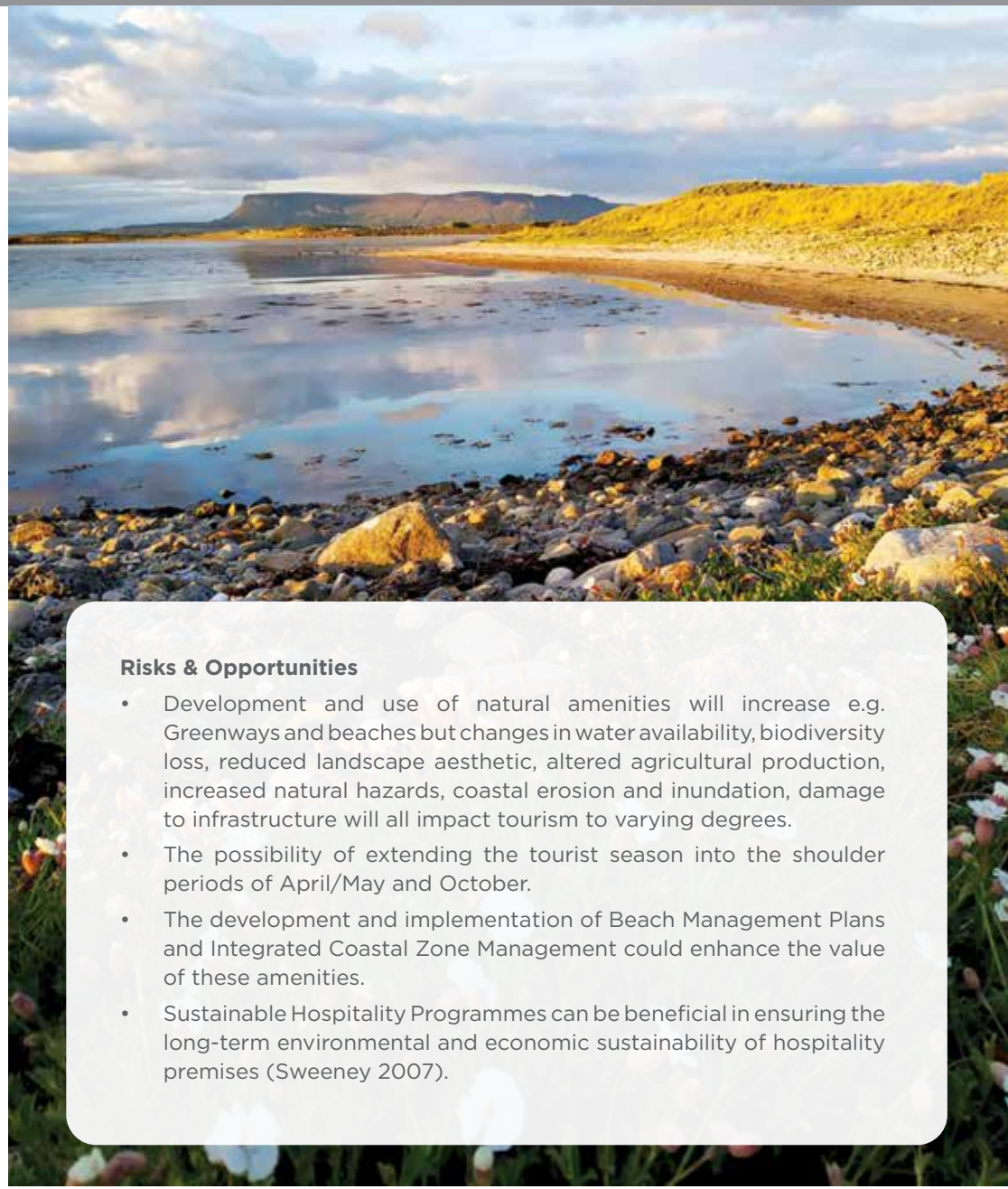
Visitors to Sligo choose to visit for many reasons, among them being the richness of our cultural and natural heritage. As changes to the climate affect our natural heritage, this will have implications for the tourism industry. We need to build an understanding of the likely effects on tourism and what, if anything, we can do about it.

As changes to the climate affect our heritage, then they will also have implications for Ireland's tourism industry.[Fáilte Ireland]

While there are many issues relating to tourism and climate change that are difficult to predict in an Irish context, we can be certain that we will not be as adversely affected as other destinations around the world. Ireland's temperate climate should be capable of absorbing the predicted changes in climate over the next one hundred years without resulting in unacceptable comfort levels for visitors or taking away from the reasons that people choose to come here i.e. people, culture, landscape, sports tourism etc.

It is also likely that some of the predicted outcomes of climate change will have positive impacts on tourism in Sligo. For example, warmer drier summers e.g. 2018, will increase the appeal of many of Sligo's beaches, as well as the appeal of our walkways, surfing conditions and other outdoor activities. This will bring its own pressures on amenities, services and resources and it will be necessary to prepare for this. The concerns about degradation of the cairn on Knocknarea is an example of this.

Overall, while there may be gains to tourism from climate change, there are also several significant risks, and it is important to build an understanding and adapt to climate change risks and opportunities to ensure that our tourism offerings are of a consistently high quality, and that sustainable management policies and practices are put in place.



Risks & Opportunities

- Development and use of natural amenities will increase e.g. Greenways and beaches but changes in water availability, biodiversity loss, reduced landscape aesthetic, altered agricultural production, increased natural hazards, coastal erosion and inundation, damage to infrastructure will all impact tourism to varying degrees.
- The possibility of extending the tourist season into the shoulder periods of April/May and October.
- The development and implementation of Beach Management Plans and Integrated Coastal Zone Management could enhance the value of these amenities.
- Sustainable Hospitality Programmes can be beneficial in ensuring the long-term environmental and economic sustainability of hospitality premises (Sweeney 2007).

RISKS TO EMERGENCY SERVICES

The role of emergency management in reducing current and future losses from floods is widely recognised however current resources and procedures may not be enough to address the climate events projected for the county.

The projected increases in frequency and severity of extreme weather events will increase the likelihood of Emergency Response personnel being exposed to these greater risks. The severity of these risks needs to be part of the assessment of the appropriate response and the implementation of suitable controls and procedures to prevent risk of injury/death. Flooding, for example, can cause site contamination and increase the risk of illness from pollution or infection.

Incidents like those outlined in Case Study 2 required emergency service personnel, and the required equipment, to be on-duty for extended periods of time. This can lead to over work and tiredness, as well as damage to equipment, so adequate contingency arrangements should be put in place to deal with these challenges.

A review of plans and resources is required to plan and prepare for localised incidents and catastrophic emergencies, to identify potential risks and produce emergency plans to either prevent or mitigate the impact of any incident on their local communities. Therefore when the EMP is being reviewed, it will be important that Climate Change and the increased frequency of related events be accounted for.

Risks & Opportunities

- Increased risk to emergency staff in relation to climate related incidences e.g. high winds, flooding, forest and peatland/gorse fires.
- Increasing temperature places pressure on water supply and increases the risk of wild fires.
- Increased demand on staff and equipment due to weather related events.
- Opportunities to incorporate climate change resilience into emergency management plans.

RISKS TO CORPORATE GOVERNANCE

The effects of climate change are usually discussed in terms of impact on the natural environment and general human population. However, impacts of climate change on the occupational health and safety of the Council's workforce have also been identified. Workers in specific areas are more vulnerable to the health impacts of climate change because they may experience longer and more intense exposures to climate change related hazards i.e. Outdoor workers & emergency service personnel. These changes have the potential to both directly and indirectly affect the health and well-being of workers.

Increased Temperatures

Higher temperatures combined with longer and more frequent exposure to heat, will increase the risk of heat stress, air pollution and UV exposure, particularly among outdoor staff. This may lead to more cases of heat-related illnesses such as dehydration or sun burn, but can also have indirect impacts on injury caused by fatigue or negligence e.g. changes in the worker's emotional state, such as irritability. Overheating in buildings has also been identified as an issue during sunny and warm weather, as experienced in 2018. The inability to provide reasonably comfortable or safe temperatures may cause reduced working efficiencies and the closure of workplaces in the future.

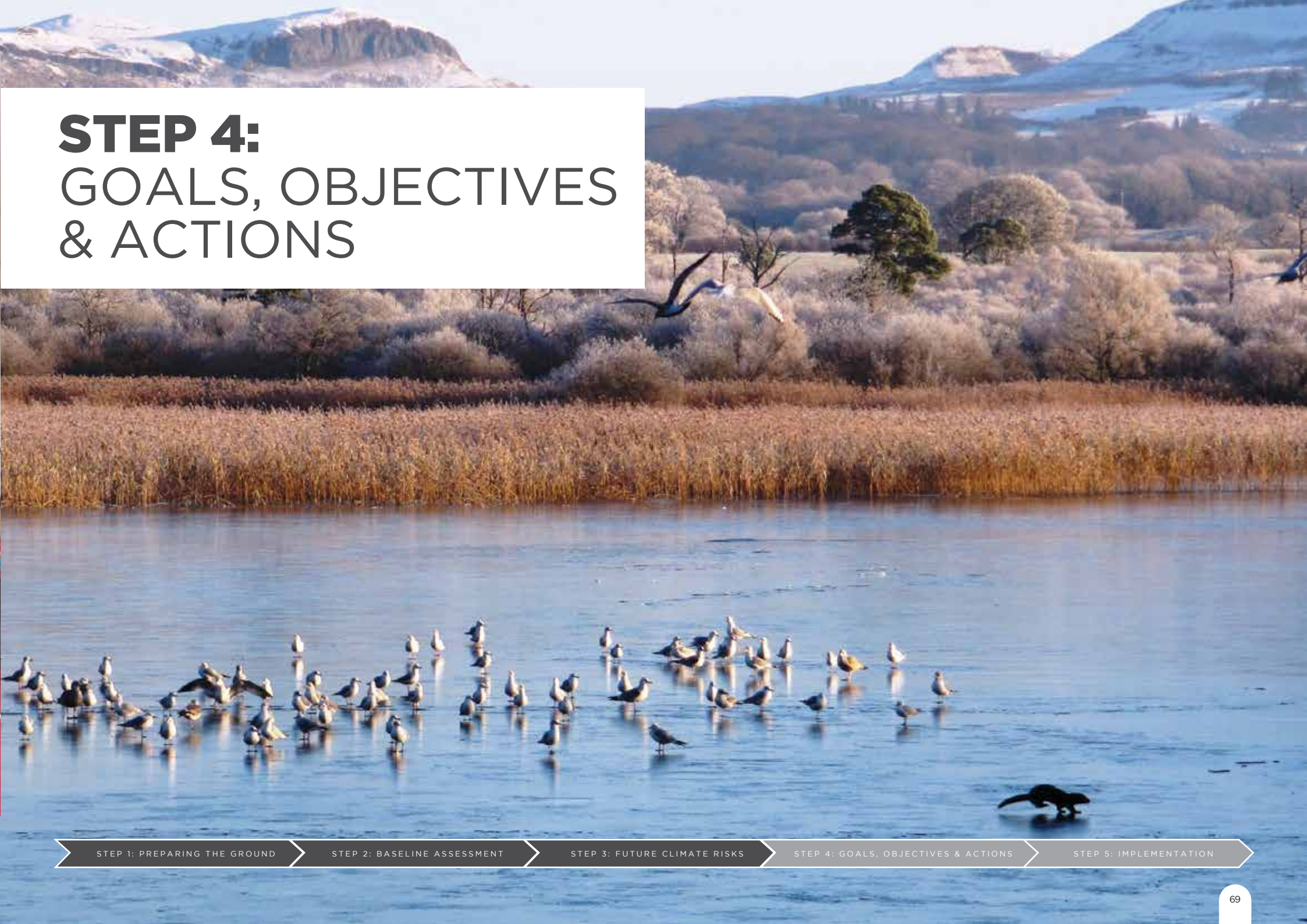
Extreme Weather Events

Extreme weather events including flooding and storms, such as Storm Ophelia, which are projected to become more frequent and intense, can have multiple effects on occupational health and safety. These extreme events affect staff involved in emergency, rescue and clean-up efforts delivered in high risk situations due to more frequent floods, landslides, storms, droughts, and wildfires. These issues are likely to increasingly affect outdoor staff whose welfare will need to be considered through regular review of their activities. Policies to promote that awareness of the effects of climate change need to be developed and Health and Safety Plans need to integrate climate change risks into their assessments.

Risks & Opportunities

- Failure to implement appropriate adaptation plans will lead to increased demand on resources e.g. staff and finance.
- Climate change also presents opportunities for capacity building within Sligo County Council and for the wider green/blue economies in the county.
- Increased risk of health and safety issues for staff dealing with emergency situations.
- Greater adaptive capacity within the local governance sector will enhance operations and communities in County Sligo.

STEP 4:
GOALS, OBJECTIVES & ACTIONS



OUR VISION FOR A CLIMATE READY SLIGO

Ireland's climate is changing and the impacts are already being felt. Sea levels are rising, and extreme rainfall and storm events are becoming more frequent. Sligo County Council is already taking steps to promote sustainable development, improve our energy efficiency and reduce our carbon emissions, as part of the global fight against climate change.

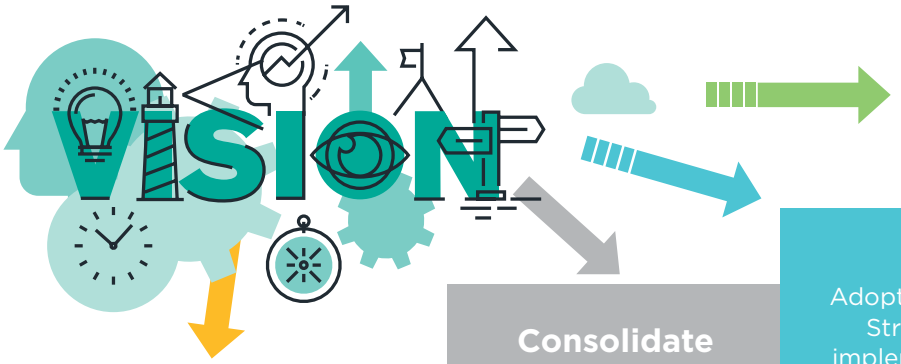
While working to reduce our GHG emissions, our county must also prepare for the unavoidable impacts of climate change. The decisions and actions we take over the coming years to adapt will determine how we live with climate change in years to come.

The overall mission of Sligo County Council, as per the Corporate Plan, is "to improve the quality of life for people living in Sligo and enhance the attractiveness of the County as a place to live in, work, enjoy and invest" and in order to do this, we must consider Climate Change on every step of our mission.

The Corporate Plan will be reviewed considering the Goals, Objectives and Actions of the Climate Adaptation Strategy and progress on implementation of the Strategy will form part of the Chief Executive's annual progress report to the Council.

"To plan for the impacts of climate change, increasing resilience through appropriate adaption and embracing opportunities for sustainable development"

Sligo County Development Plan 2017-2023



Communicate
Develop the Climate Adaptation Strategy

Consolidate
Consolidate Climate related policies & objectives from other Corporate Plans

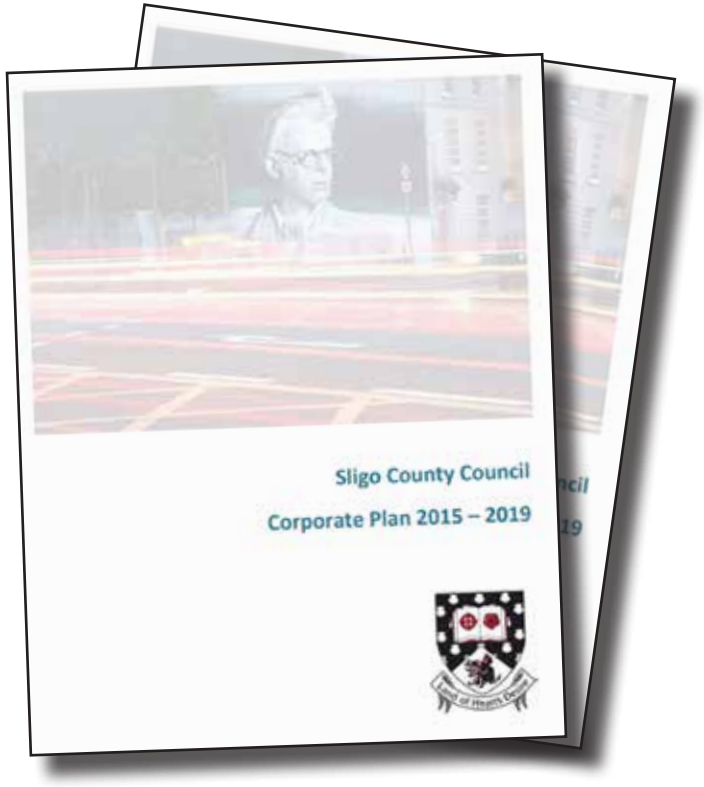
Adopt
Adopt the Adaptation Strategy & draft implementation plans for each action.

Implement
Implement actions and monitor progress towards the Objectives of the Strategy

Review
Review the effectiveness of the actions taken and assess if the Goals have been achieved.

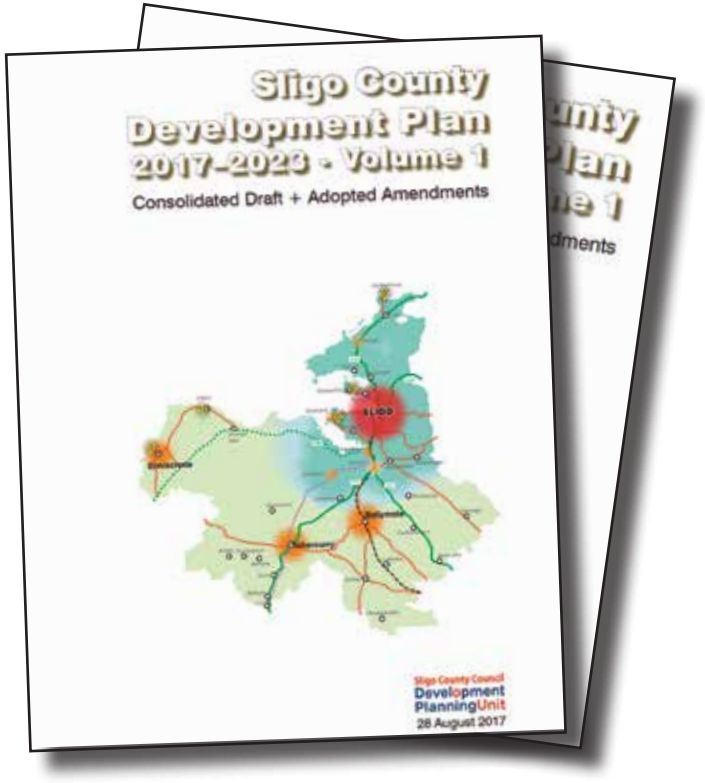
THE WORK HAS ALREADY STARTED...

Sligo County Council has already started the process of Climate Adaptation by considering issues such as sustainability and enhanced environmental protection, in the policies, goals & objectives of other Corporate Plans including the Corporate Plan, County Development Plan and the Local Economic Community Plan.



CORPORATE GOAL NO. 4: CLIMATE CHANGE & ENVIRONMENT	
Reference	
	Roads & Transportation
2	To continue to encourage, facilitate and develop the use of more sustainable modes of transport for commuting, business and leisure purposes including walking, cycling and public transport including bus and rail. In particular develop and support specific schemes with significant tourism potential.
2	**Piers, Harbours & Coastal Protection** Monitor, maintain and strengthen Sligo's existing network of coastal erosion defences especially to protect locations with significant economic, tourism and public leisure facilities.
3	Continue to indentify locations which are at risk of coastal erosion and flooding
4	Maintain and enhance sustainable public access to public beaches in County Sligo especially Blue Flag beaches
5	Continue to coordinate the CFRAMs project in County Sligo.
	Environmental Services:
1	The protection and improvement of water quality in County Sligo.
2	To promote the conservation of areas of natural environmental value and enhance tourism in County Sligo.
3	Adhere to Connaught Waste Management Plan.
4	Provision of a clean living environment for the citizens of Sligo
5	Protection and improvement of air quality in County Sligo
10	To promote Sligo County Council's compliance with efficiency obligations under the EU (Energy Efficiency) SI. 426 of 2014.

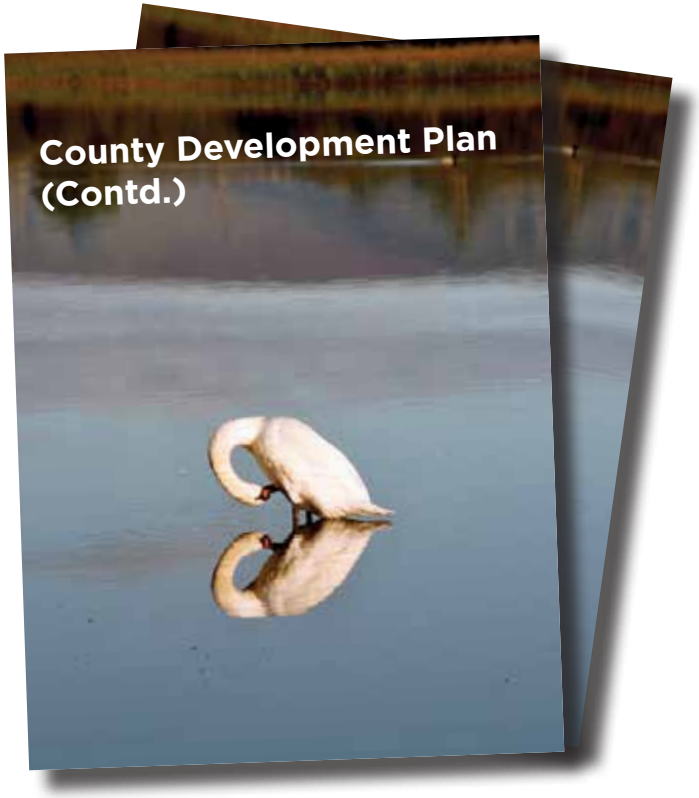
THE WORK HAS ALREADY STARTED...



CLIMATE ADAPTATION AND MITIGATION POLICIES:

Reference	Policy Details
P-CAM-1	Support the implementation of the National Climate Change Adaptation Framework 2012, by including relevant measures in any forthcoming adaptation plans. Such plans shall be in accordance with national guidance issued by the DoECLG and EPA and undertaken in collaboration with the Northern and Western Regional Assembly, Mayo County Council, Roscommon County Council, Leitrim County Council and Donegal County Council.
P-CAM-2	Prepare a climate change adaptation strategy for County Sligo in compliance with national guidance and in consultation with all relevant stakeholders.
P-CAM-3	Raise public awareness and build local resilience in relation to climate adaptation.
P-CAM-4	Facilitate and assist County Sligo's transition to a low-carbon economy and society.
P-CAM-5	Promote, support and implement measures that reduce man-made GHGs, including energy management, energy efficiency, compact development patterns, low-carbon buildings and sustainable transport.
P-CAM-6	Consult and encourage partnerships with stakeholders when addressing climate change matters, particularly through the development plan process.
P-CAM-7	Promote and support the research and development of local renewable energy sources.
P-CAM-8	Promote and support the use of renewable energy in all sectors.
P-CAM-9	Support community participation in, and benefit from, renewable energy and energy efficiency projects.
P-CAM-10	Support local innovation, economic activity and job creation in the "green "economy by encouraging investment in products, services and technologies needed in a low carbon future.
P-CAM-11	Support the repair of old structures where possible, in particular the repair of the stone arch bridge stock, in preference to replacement with high carbon materials.
P-A-1	Facilitate the development of allotments at suitable locations throughout the County. Any such facility should be located within or close to an existing settlement and should be easily accessible.

THE WORK HAS ALREADY STARTED...



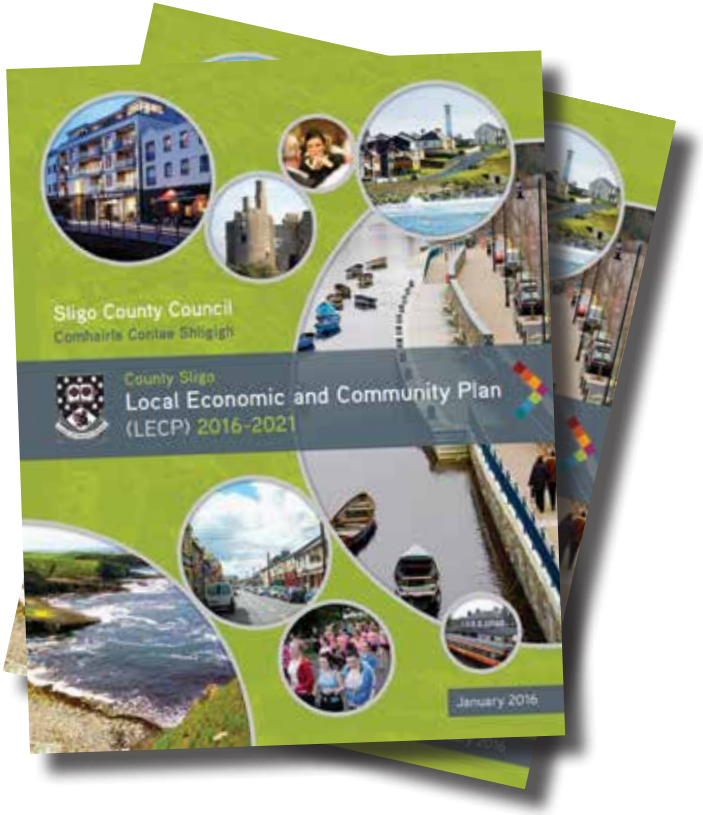
FLOOD RISK MANAGEMENT POLICIES	
Reference	**Policy Details**
P-FRM-1	Protect and enhance the County's floodplains, wetlands and coastal areas subject to flooding and ensure that no removal of sand dunes, beach sand or gravel is undertaken. These areas represent a vital green infrastructure, which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future
P-FRM-2	Direct strategically significant growth, projects and infrastructure to areas with a low risk of flooding
P-FRM-3	Zone land for development in areas with a high or moderate risk of flooding only where it can be clearly demonstrated, on a solid evidence base, that the zoning will satisfy the justification test set out in chapter 4 of the Planning System and Flood Risk Management Guidelines.
P-FRM-4	Maintain a 20-metre-wide flood protection zone around lakes and along both sides of all rivers, and a 100-metre-wide flood protection zone from soft shorelines. Development proposals will be required to maintain these flood protection zones free from development. (See further detail in CDP)
P-FRM-5	Restrict development in areas at risk of flooding unless: – it is demonstrated that there are wider sustainability grounds for appropriate development; – the flood risk can be managed to an acceptable level without increasing flood risk elsewhere; – the overall flood risk is reduced, where possible (See further detail in CDP)
P-FRM-6	Require development proposals, where appropriate, to be accompanied by a detailed flood risk assessment in accordance with the provisions of the DoEHLG's Planning System and Flood Risk Management Guidelines for Planning Authorities and to address flood risk management in the detailed design of development, as set out in Appendix B of the Guidelines
P-FRM-7	Assess flood risk in Local Area Plans in accordance with the DoEHLG's Planning System and Flood Risk Management Guidelines for Planning Authorities in a manner that is appropriate to the scale and circumstances of each area and having regard to the priorities set out in the SFRA that accompanies this Plan.

THE WORK HAS ALREADY STARTED...

CLIMATE ADAPTATION AND MITIGATION POLICIES:

Reference	Policy Details
P-OR-3	Reserve land for new parks and other recreational green spaces as part of the preparation of local area plans for Sligo City, Key Support Towns and village mini-plans.
P-OR-6	Where feasible, develop walkways and cycleways between green spaces or green corridors in built-up areas and recreational areas located outside settlements, including coastal, upland, lakeland and forestry sites and subject to compliance with the requirements of the Habitats Directive.
P-OR-20	Protect existing local greenways and consider designating them as public rights of way
P-OR-24	Support local communities that wish to apply for grants under the Forest Service's Neighbourwood Scheme (DAFM) or any other initiative aiming to establish or enhance woodlands for recreation
P-AQ-1	Support the ban on bituminous coal in Sligo City and Environs and encourage the use of smokeless fuel throughout the County.
P-AQ-2	2 In conjunction with the EPA, ensure that all existing and new developments are operated in a manner that does not contribute to deterioration in air quality.
P-AQ-4	Promote the retention of trees, hedgerows and other vegetation, and encourage tree planting as a means of air purification and filtering of suspended particles
P-CP-1	Ensure that visual and environmental considerations are considered in the design of coastal defence works including compliance with the Habitats Directive.
P-CP-2	Require that any development within the coastal zone is appropriately sited and designed, having regard to coastal flooding, future shoreline erosion, predicted sea-level rise and OPW flood mapping.
P-CP-3	Require that detailed flood risk assessment is carried out in relation to development proposals within the coastal zone and particularly on all low-lying areas, where appropriate
P-CP-4	Establish natural buffers at the coast, particularly in conjunction with the preparation of local area plans and mini-plans.

SLIGO LOCAL ECONOMIC COMMUNITY PLAN 2016-2021



Goal 5: We will safeguard our environment for future generations by supporting sustainable economic and community development which ensures that the receiving environment is adequately protected. Target: Improve environmental sustainability indicators

INDICATORS:
- Reduce the proportion of household and commercial waste going to landfill
- Increase the proportion of household and commercial waste recycled or composted
- Increase number of green economy enterprises
- Increase take-up of energy efficiency and conservation initiatives
- Increase number of Blue Flag beaches to five
- Increase in number of funded environmental projects in the county
- Increase in number of environmental interest groups in the county (registered with Sligo PPN)
- 100% school participation in Green School Programme

THE FOUR OBJECTIVES UNDER GOAL 5 (ABOVE) ARE:	
Reference	**Objective**
5.1	Promote awareness of and policies supporting environmental sustainability and energy efficiency across all sectors
5.2	Enact policies that position Sligo as a leader in sustainable tourism while safeguarding our unique environmental infrastructure, landscape and built and natural heritage (linked to objective 1.7)
5.3	Increase the local environmentally sustainable production, supply and use of alternative sources of energy
5.4	Support community involvement and participation in sustainable environmental initiatives

GOALS FOR A CLIMATE READY SLIGO

This first Climate Adaptation Strategy for the County is a starting point on our adaption journey towards a Climate Ready Sligo. To achieve a Climate Ready Sligo, three Goals have been identified under this first Strategy, which are high level long-term statements.

A Climate Ready Sligo

A Climate Ready Sligo is a County that plans for the impacts of climate change, increases resilience through appropriate adaption measures and embraces opportunities for sustainable development

Goal 1
Engage

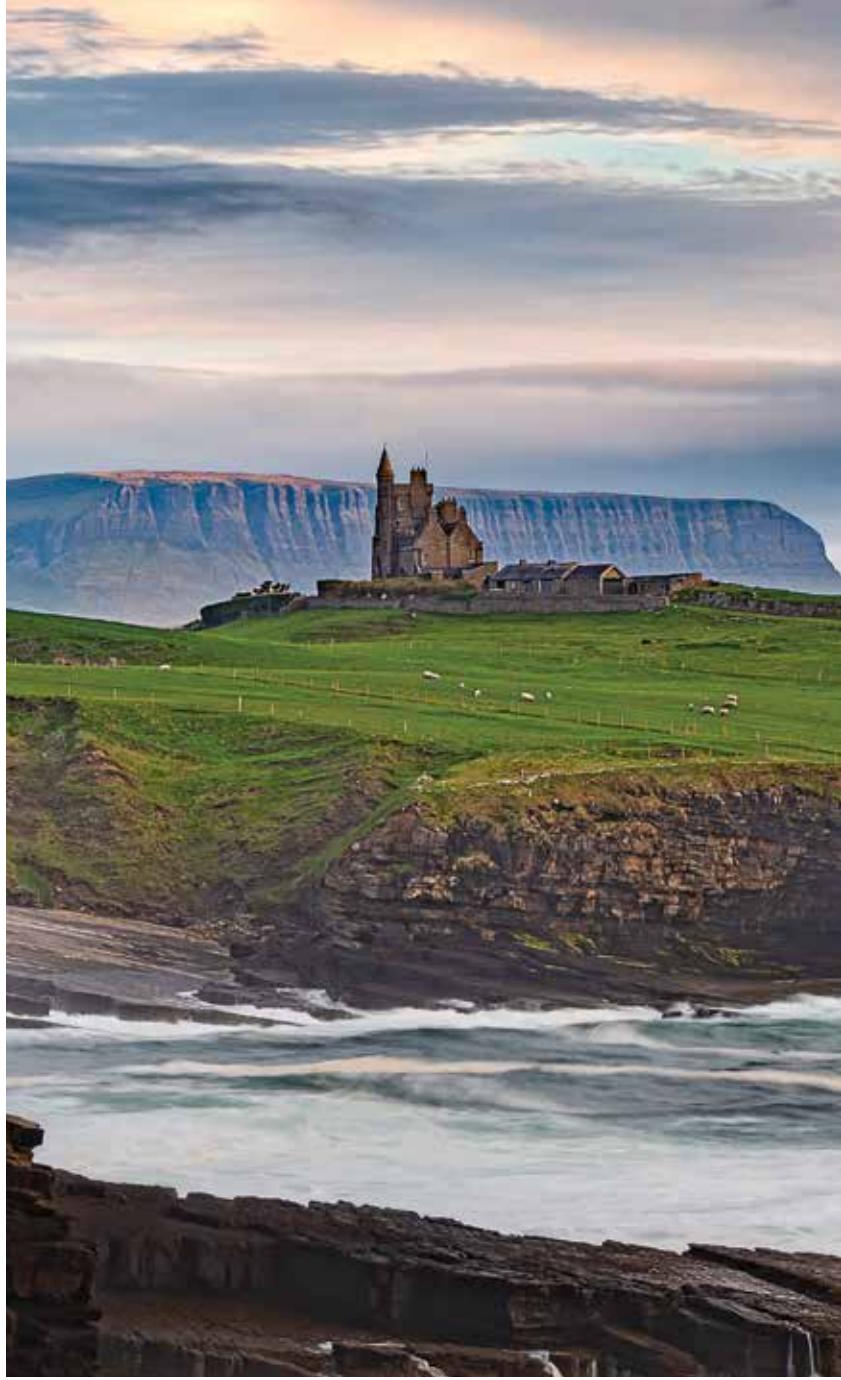
Ensure adequate relevant information on Climate Change & Sustainability is made available for anyone who has concerns about related issues

Goal 2
Plan

Increase the resilience of the Built and Natural Environment to Climate Change by planning and implementing appropriate adaptation measures

Goal 3
Adapt

To ensure that Sligo County Council is adequately prepared for the projected impacts of Climate Change in the future.



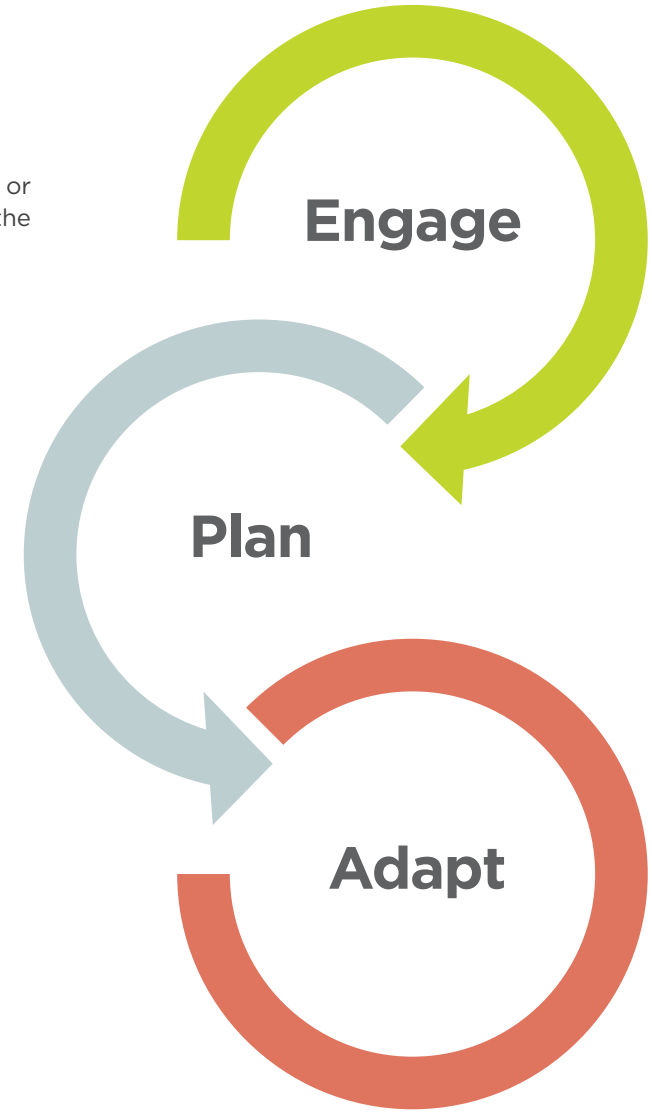
OBJECTIVES FOR MEETING THE ADAPTATION GOALS

The three Goals are high-level long-term statements, while the associated Objectives define strategies or implementation steps to attain the identified Goals. There is a goal associated with each of the three element of the Strategy – Engagement-Planning-Adaptation

ENGAGE
Develop in-house expertise & understanding about the impacts of Climate Change locally and to make sure that this information is made available

PLAN
- Identify areas/communities that may be affected by future climate related events & consider possible pre-emptive actions which could reduce impacts by reviewing existing documents/policies and ensuring that Climate Action is included in any future plans & policies
- Use Climate Adaptation Planning to promote Health & Well Being .
- Increase awareness of private house owners & LA tenants on potential impacts on housing from climate change events and how best to look after their home to avoid or reduce impacts.
- Improve resilience of existing Housing stock against future climate related events.
- Protect water & waste water infrastructure/services against future Climate Related events
- Protect critical infrastructure, natural & cultural capital against future Climate Related events
- Reduce the potential future impact of flooding throughout the County
- Reduce the potential future impact of extended periods of cold/warm weather on the Roads Network

ADAPT
Incorporate Climate Change & Sustainability in to the everyday operations of the Local Authority.



ADAPTATION ACTIONS

The Goals and Objectives of the Adaptation Strategy provide an overarching framework for climate adaptation planning in Sligo. The next step calls for the development of specific Actions under each of the Goals and Objectives of this current 5-year Strategy, that collectively will begin the journey to a Climate Ready Sligo. The Actions have been divided across the 3 Goals, with each also being associated with particular objectives.

Specifics for each Action

Responsibility: This is the section responsible for implementation of the action

Budget: This indicates whether there is a budget available at this stage or not. If no budget required, then is marked Yes.

Timescale: We intend to implement each Adaptation Action within the timeframe given.

Other Bodies: Lists the other bodies & organisations that should be involved in this action.

Themes: Indicates which of the Theme(s) within the National Adaptation Framework that the action concerns.

GOAL: ENGAGEMENT

ENSURE ADEQUATE RELEVANT INFORMATION ON CLIMATE CHANGE & SUSTAINABILITY IS MADE AVAILABLE FOR ANYONE WHO HAS CONCERNS ABOUT RELATED ISSUES

OBJECTIVE: DEVELOP IN-HOUSE EXPERTISE & UNDERSTANDING ABOUT THE IMPACTS OF CLIMATE CHANGE LOCALLY AND TO MAKE SURE THAT THIS INFORMATION IS MADE AVAILABLE

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
E1	Actively seek engagement during public consultation process for the LAP, and ensure that any relevant observations or amendments are included in final draft.	Climate Action Energy Sustainability Team (CAEST)	✓	Within 6 months	Public & all other interested bodies	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E2	Engage with relevant agencies or groups to identify areas/communities potentially at risk from Climate Change, and ascertain what the best ways to provide information & training are.	CAEST, PPN	✓	Ongoing	PPN, EPA, Dept., LAWCO, CARO etc.	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E3	Identify providers of relevant information and facilitate community awareness programs & workshops.	CAEST, PPN	✓	Ongoing	PPN, EPA, Dept., LAWCO, CARO etc.	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E4	Form an internal Energy Management Team which will facilitate engagement with staff, and identify areas in which energy efficiency improvements can be achieved.	EPO, CAEST	✓	Ongoing	SEAI, CARO	Critical Infrastructure and Buildings Community Services

ENSURE ADEQUATE RELEVANT INFORMATION ON CLIMATE CHANGE & SUSTAINABILITY IS MADE AVAILABLE FOR ANYONE WHO HAS CONCERNS ABOUT RELATED ISSUES

OBJECTIVE: DEVELOP IN-HOUSE EXPERTISE & UNDERSTANDING ABOUT THE IMPACTS OF CLIMATE CHANGE LOCALLY AND TO MAKE SURE THAT THIS INFORMATION IS MADE AVAILABLE

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
E5	Build and strengthen partnerships and promote cross-sectoral communication and cooperation in the implementation of Local Authority and Sectoral Adaptation Plans.	CAEST, Various other bodies	✓	Ongoing	All other Public Bodies	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E6	Provide web based resource to maintain the provision of up to date and relevant information on climate related issues.	CAEST, ICT	✓	Within 1 year	Climate Ireland, Met Eireann, Dept.	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E7	Develop formal links with IT Sligo CRU in relation to Climate Change (including energy & sustainability) matters. Utilise the academic resources available locally to maintain & update information resources that are made available to the public.	CAEST, Corporate	✓	Within 1 year and ongoing	IT Sligo	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
E8	Liaise with Marine Institute/Dept of Marine about the installation/maintenance of a sea level monitor in Sligo Bay.	CAEST, Harbour Office	✗	Within 3 years	Marine Institute, Dept of Marine	Flood Risk Management and Water Resources
E9	Establish contact with Teagasc and Coillte in relation to how the LA can work with each Organisation on Climate Related issues.	CAEST	✓	Within 1 year and ongoing	Teagasc, Coillte	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services

GOAL: PLANNING

INCREASE THE RESILIENCE OF THE BUILT AND NATURAL ENVIRONMENT TO CLIMATE CHANGE BY PLANNING AND IMPLEMENTING APPROPRIATE ADAPTATION MEASURES

OBJECTIVE: IDENTIFY AREAS/COMMUNITIES THAT MAY BE AFFECTED BY FUTURE CLIMATE RELATED EVENTS & CONSIDER POSSIBLE PRE-EMPTIVE ACTIONS WHICH COULD REDUCE IMPACTS BY REVIEWING EXISTING DOCUMENTS/POLICIES AND ENSURING THAT CLIMATE ACTION IS INCLUDED IN ANY FUTURE PLANS & POLICIES

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P1	Ensure that prominence of Climate Change is maintained within the CDP and ensure all CC related actions in CDP are followed through and achieved	Planning,Relevant Sections	✓	Immediate & ongoing	Public & all other interested bodies	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
P2	Monitor climate related events & create/update risk register (Register of weather warnings provided etc.)	CAEST, Corporate	✓	Immediate & ongoing	Climate Ireland, CARO, Met Eireann	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
P3	Compile relevant local Climate Impact maps	CAEST, GIS Officer, Planning	✓	Within 2 years	CARO, Climate Ireland	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services

INCREASE THE RESILIENCE OF THE BUILT AND NATURAL ENVIRONMENT TO CLIMATE CHANGE BY PLANNING AND IMPLEMENTING APPROPRIATE ADAPTATION MEASURES

OBJECTIVE: USE CLIMATE ADAPTATION PLANNING TO PROMOTE HEALTH & WELL BEING

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P4	Develop a Sustainable Transport Policy for Co. Sligo (which should include provision for staff welfare facilities and bicycle maintenance program)	Roads Section, CAEST	✓	Within 1 year	CARO, PPN, Sligo Chamber, TII, Bus Eireann, Iarnrod Eireann	Critical Infrastructure and Buildings Flood Risk Management and Water Resources
P5	Identify LA owned properties that may be suitable for 'greening' activities, such as community gardens or allotments, Pollinator sites, tree planting or other activities which would support Climate Awareness initiatives. Ensure that any suitable locations are assessed and where possible engage with local communities with regard to development of these resources.	CAEST, Area Offices, GIS	✓	Within 2 years	SEN, PPN, CARO	Community Services
P6	Install four water bottle refilling stations in strategic locations as an initial phase of developing a program to re-introduce taps for public use throughout the County.	CAEST, EAO, IW	✓	Phase 1: Within 1 year. Phase 2: Within 3 years	Irish Water, LAPN, EPA	Community Services
P7	Install an Air Quality Monitoring station in Sligo Town, and use data obtained to improve awareness about air quality.	CAEST, Roads Section	✓	Within 1 year & ongoing	EPA, DCCAE	Community Services

INCREASE THE RESILIENCE OF THE BUILT AND NATURAL ENVIRONMENT TO CLIMATE CHANGE BY PLANNING AND IMPLEMENTING APPROPRIATE ADAPTATION MEASURES

OBJECTIVE: INCREASE AWARENESS OF PRIVATE HOUSE OWNERS & LA TENANTS ON POTENTIAL IMPACTS ON HOUSING FROM CLIMATE CHANGE EVENTS AND HOW BEST TO LOOK AFTER THEIR HOME TO AVOID OR REDUCE IMPACTS.

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P8	Update the tenants handbook and the online communication and social media plan to provide the necessary climate change resilience information. (Should include information/case studies from tenants who have moved from traditional heating methods (open fire) to more modern accommodation & heating systems)	Housing, CAEST	✓	Within 2 years	DHPLG	Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
P9	Identify old and derelict buildings that may cause a risk to public safety during extreme weather events, and take appropriate action	Planning Enforcement	✓	Within 1 year	An Taisce	Natural and Cultural Capital Community Services

OBJECTIVE: IMPROVE RESILIENCE OF EXISTING HOUSING STOCK AGAINST FUTURE CLIMATE RELATED EVENTS.

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P10	Where possible, work with Sligo SEC to identify funding opportunities for retrofit programs for LA housing.	CAEST, Housing	✓	Ongoing	SEAI, SEC	Community Services
P11	Complete existing pilot project concerning new building methods ensuring compliance with modern energy standards	Housing, CAEST	✓	Within 1 year	SEAI	Community Services

OBJECTIVE: PROTECT WATER & WASTE WATER INFRASTRUCTURE/SERVICES AGAINST FUTURE CLIMATE RELATED EVENTS.

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P12	Work with and support Irish Water in identifying vulnerable public drinking water supplies or waste water treatment infrastructure, and develop contingency plans in order to maintain access to water and waste water services.	Water Services, IW	✓	Ongoing	Irish Water	Critical Infrastructure and Buildings Flood Risk Management and Water Resources

INCREASE THE RESILIENCE OF THE BUILT AND NATURAL ENVIRONMENT TO CLIMATE CHANGE BY PLANNING AND IMPLEMENTING APPROPRIATE ADAPTATION MEASURES

OBJECTIVE: PROTECT CRITICAL INFRASTRUCTURE, NATURAL & CULTURAL CAPITAL AGAINST FUTURE CLIMATE RELATED EVENTS

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P13	Develop a register of critical equipment, systems and assets at risk from existing and project climate events	CAEST	✓	Within 1 year		Critical Infrastructure and Buildings
P14	Develop a Corporate Energy Policy which will ensure that internal energy usage by SCC is measured & monitored, and that improvements in energy efficiency are achieved on an ongoing basis. This Policy should also support additional mitigation measures both within and outside the Organisation.	CAEST, EPO	✓	Within 1 year	OPW, SEAI, SEC	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
P15	Ensure that impact of Climate related events on natural & cultural heritage is considered when reviewing the Heritage Plan. Include a review of the Biodiversity Action Plan, which is currently contained within the Heritage Plan	CAEST, Heritage Officer	✓	Due for review in 2020	An Taisce, NPWS	Natural and Cultural Capital
P16	Review & adopt Invasive Alien Species policy and consider the possibility of expanding this to a Biodiversity Policy. Include a review of the use of herbicides and consider alternative methods where possible and practical.	CAEST, Area Engineers	✓	Within 1.5 years	NPWS, DCCAE	Community Services

OBJECTIVE: REDUCE THE POTENTIAL FUTURE IMPACT OF FLOODING THROUGHOUT THE COUNTY

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P17	Ensure that the Flood Risk Management Policies outlined in the CDP, as well as the Strategic Flood Risk Assessment, are implemented in full. To include: Flood Protection; Flood Management; Flood Mapping; Register of Hard & Soft Flood Infrastructure	CAEST, Planning, Roads	✓	Ongoing	DAFM, EPA, OPW	Flood Risk Management and Water Resources

INCREASE THE RESILIENCE OF THE BUILT AND NATURAL ENVIRONMENT TO CLIMATE CHANGE BY PLANNING AND IMPLEMENTING APPROPRIATE ADAPTATION MEASURES

OBJECTIVE: REDUCE THE POTENTIAL FUTURE IMPACT OF EXTENDED PERIODS OF COLD/WARM WEATHER ON THE ROADS NETWORK

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
P18	Identify contractors and/or individuals who can grit roads that Council Staff are unable to reach	Roads, CAEST via PPN	✓	Within 1 year	Relevant local contractors	Critical Infrastructure and Buildings
P19	Increase use of 'hotmix' for improved quality roads (Lessens the impact of extended hot or cold periods on road surfaces)	Roads	✗	Within 3 years	DTTAS, TII	Critical Infrastructure and Buildings
P20	Provide grit/salt storage facilities in strategic local areas where the Local Authority may not be able to reach.	Roads, Area Offices	✗	Within 2 years	DTTAS, TII	R Critical Infrastructure and Buildings
P21	Extend the Winter Service Plan to include additional roads.	Roads	✓	Within 2 years		Critical Infrastructure and Buildings Flood Risk Management and Water Resources
P22	Provide adequate lifeguard & beach warden cover for beaches during extended periods of warm weather	CAEST, WSDO, HR	✓	Immediate & ongoing	IWS	Natural and Cultural Capital Community Services
P23	Ensure that adequate staff are available to deal with extreme events.	HR	✓	Immediate & ongoing	Gardai, HSE, Defence Forces	Governance Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
P24	Ensure that adequate plant is available to deal with extreme events.	Roads	✓	Within 2 years and ongoing		Governance Critical Infrastructure and Buildings Flood Risk Management and Water Resources

GOAL: ADAPTATION

TO ENSURE THAT SLIGO COUNTY COUNCIL IS ADEQUATELY PREPARED FOR THE PROJECTED IMPACTS OF CLIMATE CHANGE IN THE FUTURE.

OBJECTIVE: INCORPORATE CLIMATE CHANGE & SUSTAINABILITY IN TO THE EVERYDAY OPERATIONS OF THE LOCAL AUTHORITY

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
A1	Convene a Climate Action/Energy/Sustainability Team & assign responsibility for implementation (CAEST)	Senior Management Team	✓	Immediate & ongoing	CARO	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A2	Ensure that adequate internal resources are identified to progress the actions identified in the CAS	Senior Management Team	✓	Immediate & ongoing		Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A3	Include Climate Action & Sustainability on the agenda of all Section meetings	All Heads of Section	✓	Immediate		Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A4	Include Green Procurement when revising Corporate Procurement Policy. Include Energy reporting for all potential contractors and possible use of EPCs in future.	Procurement Officer	✓	Within 1 year	DHPLG	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services

TO ENSURE THAT SLIGO COUNTY COUNCIL IS ADEQUATELY PREPARED FOR THE PROJECTED IMPACTS OF CLIMATE CHANGE IN THE FUTURE.

OBJECTIVE: INCORPORATE CLIMATE CHANGE & SUSTAINABILITY IN TO THE EVERYDAY OPERATIONS OF THE LOCAL AUTHORITY

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
A5	Include the objective of being Climate Ready as a Strategic Goal of the Corporate Plan	Corporate Plan Staff	✓	Due for review 2019	CARO	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A6	Prepare an annual progress report on the LAP which will be submitted to the Council with the draft budget	CAEST	✓	After 1 year & ongoing	CARO, DCCAE	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A7	Develop Implementation Plans for each Adaptation Action and monitor and report on progress	CAEST	✓	Within 6 months	CARO	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A8	Review and update the Major Emergency Plan to take account of the changing climate, frequency and severity of climatic events.	Emergency Response Team	✓	Within 2 years	HSE, Gardai, Defence Forces, OPW	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services

TO ENSURE THAT SLIGO COUNTY COUNCIL IS ADEQUATELY PREPARED FOR THE PROJECTED IMPACTS OF CLIMATE CHANGE IN THE FUTURE.

OBJECTIVE: INCORPORATE CLIMATE CHANGE & SUSTAINABILITY IN TO THE EVERYDAY OPERATIONS OF THE LOCAL AUTHORITY

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
A9	Support staff with regard to the use of reusable coffee cups & water bottles, and consider the banning of single use plastics within Local Authority buildings to reduce the volume of single use plastic waste being produced and to raise awareness of the issue.	CAEST, SMT, Canteen	✓	Within 1 year	CARO	Gov Governance Critical Infrastructure and Buildings Community Services
A10	Review and update the Health & Safety Statements and Risk Assessments to take account of the changing climate, frequency and severity of climatic events.	Health & Safety	✓	Immediate & ongoing upon review	HSA, CARO	Governance Natural and Cultural Capital Critical Infrastructure and Buildings Flood Risk Management and Water Resources Community Services
A11	Encourage and promote projects/businesses that will contribute positively and grow the Circular and Bio-economy to promote sustainable rural and urban economic development as part of the overall aim of transiting to a low carbon economy	CAEST, LEO	✓	Immediate & ongoing	Sligo Chamber, PPN, SEAI, SEC	Governance Critical Infrastructure and Buildings Community Services
A12	Develop a Climate Change Awareness Programme for business and start-ups to inform them of climate action measures that can be integrated into business activities, and identify business supports and funding options to businesses seeking to become more resilient to climate change events.	CAEST, LEO	✓	Within 2 years	CARO, SEAI, SEC, Sligo IT	Governance Critical Infrastructure and Buildings Community Services
A13	Provide adequate teleconferencing infrastructure in meeting rooms and train staff in use of technologies which reduce the requirement for travel to meetings	IT	✓	Within 1 year		Governance Critical Infrastructure and Buildings

TO ENSURE THAT SLIGO COUNTY COUNCIL IS ADEQUATELY PREPARED FOR THE PROJECTED IMPACTS OF CLIMATE CHANGE IN THE FUTURE.

OBJECTIVE: INCORPORATE CLIMATE CHANGE & SUSTAINABILITY IN TO THE EVERYDAY OPERATIONS OF THE LOCAL AUTHORITY

No.	Actions	Responsible	Budgeted	Timescale	Relevant Partners	Theme
A14	Consider the Installation & maintenance of simple net filters on surface water discharge points to remove any plastic waste before it enters Sligo Bay. This will help to protect biodiversity & water quality, but also enhance awareness of plastic waste management issues, and the need to reduce the amount being produced.	Area Office, Water Services	✗	Within 2 years	Irish Water	Critical Infrastructure and Buildings Flood Risk Management and Water Resources
A15	During remediation works at the closed Finisklin landfill site, ensure that the most climate friendly approach is taken, and consider innovative solutions such as bio-filters. Use the remediation works as an opportunity for promoting awareness about waste management and its impact on climate.	CAEST, Environment section	✓	Within lifetime of CoA (2 years approx)	EPA, CURWMO, DCCAE	Critical Infrastructure and Buildings

STEP 5: IMPLEMENTATION

IMPLEMENTATION, MONITORING & REPORTING

The preparation of this Climate Adaptation Strategy is the start of an iterative process that will deliver a wide range of actions and measures to adapt County Sligo to the impacts of climate change. The Strategy is the start of an in-depth, long-term process to ensure Sligo evolves in to a County that is prepared for the challenges associated with Climate Change

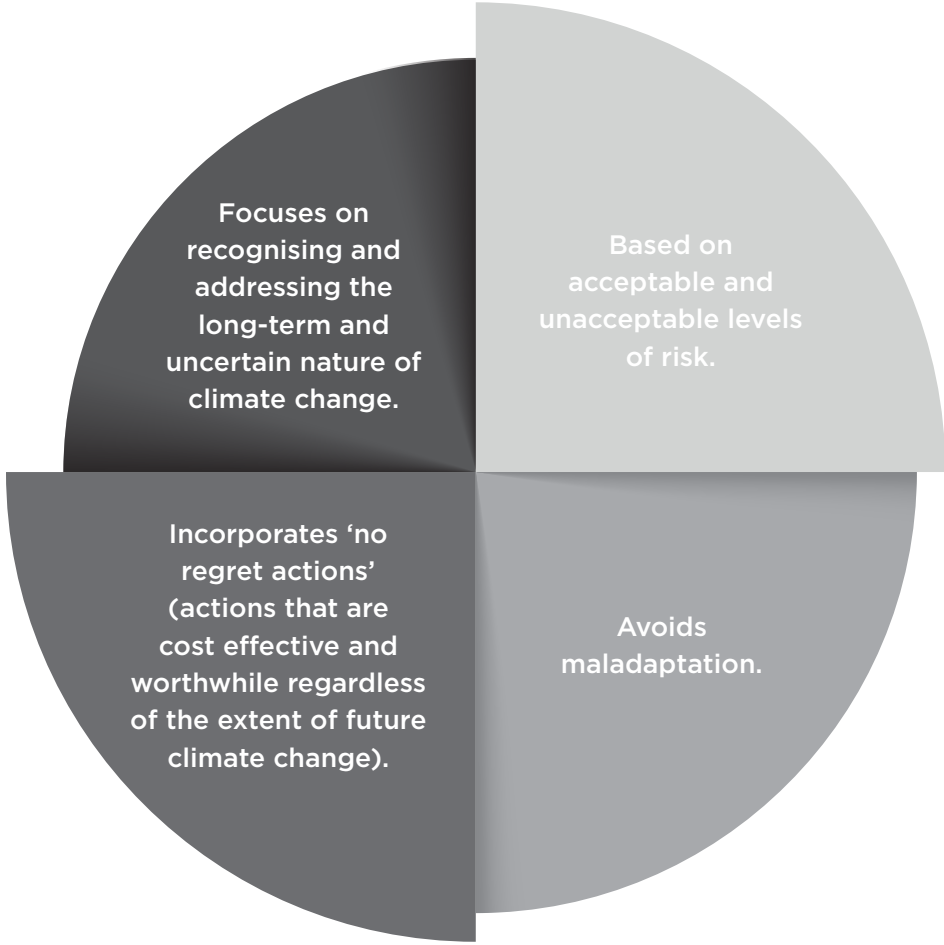
Our adaption journey is a flexible process and subject to regular reviews in terms of the appropriateness of projects, policies and programmes, as well as climate projections.

To ensure the integration of climate adaptation actions listed in this strategy, it is imperative that all strategic documents including the County Development Plan, Corporate Plan, Local Economic Community Plan, Operational Policies and Procedures be reviewed.

Action Implementation Plans

To assist in the delivery and progress around each of the Adaptation Actions listed in the Strategy, each action will require an 'Action Implementation Plan' to be prepared by the lead Department and submitted to the Climate Adaptation Steering Group for review.

The first Implementation Plan will be prepared within 3 months of adoption of the Strategy. Subsequent Plans will be prepared in July of each year to allow for associated budget submissions.



FLEXIBLE APPROACH

Our adaptation journey is one which is a flexible process and subjected to regular reviews in terms of the appropriateness of projects, policies and programmes, as well as climate projections.

CLIMATE ADAPTATION STEERING GROUP

To ensure that the Actions in the Strategy are delivered a dedicated Climate Adaptation Steering Group will be established to take forward the governance of adaptation in the county.

The Steering Group will be chaired by a Director of Services and be made up of the Head of each Department assigned with Adaptation Actions. The Climate Action Regional Office(CARO) will also be represented in the Group.

The Steering Group's role is to oversee the development and implementation of the Adaptation Actions. It will work with the CARO and encourage and facilitate partnership with other stakeholders to ensure efficient and effective delivery of the adaptation actions.

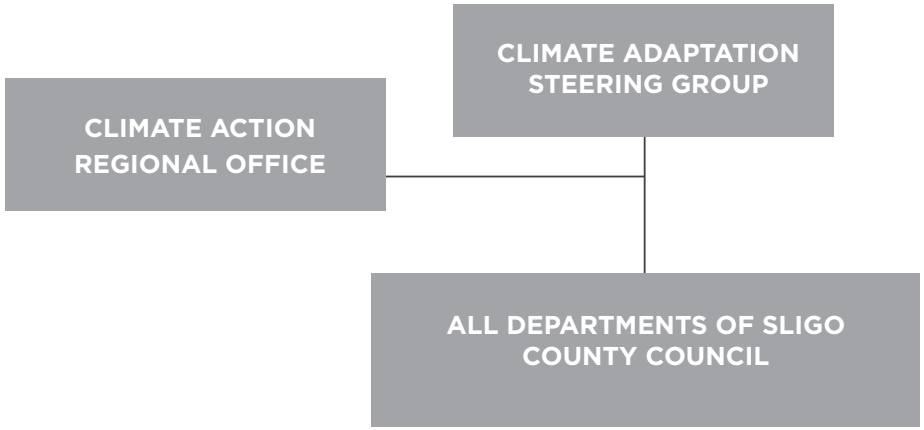
As well as providing a governance structure for adaptation in the county, the Steering Group will also ensure evidence is built up and kept updated on how the climate in Sligo is changing, and what the potential impacts of this will be. This will serve to aid mapping and identification of areas at risk, and to inform risk assessments, contingency planning and decision making.

It is also crucial that the Steering Group communicate and raise awareness of climate change and the effects this will have on the county. This will enable the sharing of best practice, help build partnerships and inform, engage and empower all sectors of the county.The Steering Group will meet quarterly and report on progress annually.

Several of the actions contained in this document have already been considered by staff in the various sections. Climate related events have affected the operations of Roads, Housing and the Fire Services in particular, and already steps are being taken to deal with the effects.

However the challenge is to ensure any adaptation measures implemented complement one another in order to maximise efficiency. And it is in this respect that the Steering Group will endeavour to ensure that this is the case.

SENIOR MANAGEMENT TEAM



MONITORING

The Adaptation Strategy will be monitored to keep a record of progress made in implementing specific adaptation actions in relation to their objectives and inputs, including financial resources.

Monitoring will be undertaken with the help of indicators which may evolve over time as the adaptation process matures and is mainstreamed. Indicators will provide a basis for 'before' and 'after' analysis and describe the positive and negative, anticipated and unanticipated, intended and unintended effects of adaptation actions.

Adaptation indicators will

- Monitor the implementation of adaptation policies, measures and actions.
- Target, justify and monitor funding for adaptation programmes.
- Mainstream adaptation through links between sectors (e.g. infrastructure and the built environment) and related indicators (e.g. climate change impact indicators).
- Communicate adaptation to policy and decision-makers, and other stakeholders.
- Compare adaptation achievements across sectors, regions and countries.
- Inform and report climate change adaptation progress to central government.

Evaluation of the Adaptation Strategy will be a systematic and objective process to determine the effectiveness of adaptation actions. Given the complexity and long-term nature of climate change it is essential that adaptation is designed as a continuous and flexible process and subjected to periodic review, both in terms of the validity of the underlying scientific assumptions and the appropriateness of projects, policies and programmes. Lessons learned and good practices identified during the monitoring and evaluation of ongoing and completed projects, policies and programmes should inform future actions, creating an iterative and evolutionary adaptation process.

REPORTING

As part of the Implementation Plans each lead Department will prepare an annual Progress Report for their assigned Actions. These will inform an Annual Progress Report on the Climate Adaptation Strategy itself, with reviews on good practices identified during the implementation of actions plans, policies and programmes.

The review of the Adaptation Strategy will be a systematic and objective process to determine the effectiveness of the adaptation actions with items such as appropriateness of allocated timeframes, financial, social and environmental effects of actions.

In general, the following measures will provide insight into the progress of the Climate Adaptation Strategy:

- The development of Action Implementation Plans and indicators for the Climate Adaptation Strategy to show active progress.
- The extent to which climate change considerations are increasingly incorporated into high level policies, plans and practical programmes in priority impact areas.
- Growing evidence that implemented adaptation strategies are increasing resilience to extreme weather events.
- Growing evidence of engagement between the Council and its partners, communities, non-governmental organisations and other levels of government on addressing climate change issues.
- Level of technical capacity increases across the county to assess and respond to the risks of climate change.
- Level of public, staff and stakeholder awareness about climate change and its impacts increases as well as support for actions to protect against climate change.

The annual reports will be submitted to the Climate Action Regional Office to support the integration of actions and increase resilience to climate change across local governance, economic and community sectors.

COMMUNICATING

Stakeholder participation is stipulated under the National Adaptation Framework, principally to;

• Promote the integration of a range of knowledge and values in adaptation.

• Build support for the adaptation process through embedding it in local interests and concerns.

• Ensure that adaptation processes at the local scale are aligned with similar processes that are under way in neighbouring authorities and relevant sectors.

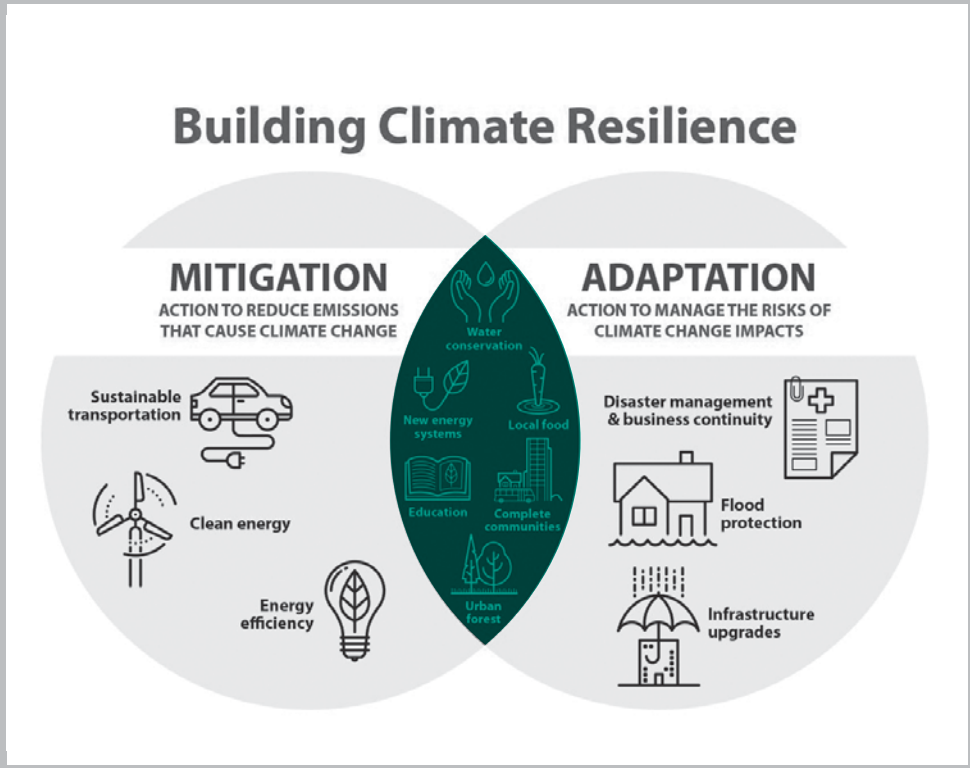
The Action Implementation Plans will therefore include a structured and substantive programme for the engagement of stakeholders from the elected members, within the local authority, the local community, relevant non-governmental organisations and state sector bodies, and particularly those who will be expected to play a role in the implementation of Actions of the Adaptation Strategy.

It will also be important that completed local adaptation strategies align with sectoral plans being completed under the NAF. For the purposes of the NAF, 12 key 'sectors' under the remit of seven Government Ministers have been identified which must prepare adaptation plans of their own. These adaptation processes will carry several critical implications for adaptation planning at local authority level (and vice versa). To ensure that any necessary sectoral input is obtained as efficiently as possible coordination between sectoral and local scale adaptation efforts will be facilitated via each CARO.

MITIGATION

Adaptation will be required to reduce the effects of a changing climate already 'locked in' by past and current emissions and this strategy focuses on the adaptation actions which will be implemented by Sligo County Council. We recognise that to build climate resilience and reduce global warming both Adaptation and Mitigation measures are required.

Climate change mitigation and adaptation are not mutually exclusive but are key partners in any strategy to respond to climate change. Mitigation is required to reduce climate risks in the 21st century and beyond, increase prospects for effective adaptation, reduce the costs and challenges of mitigation in the longer term and contribute to climate-resilient pathways for sustainable development.



Sir David Attenborough speaking form the "People's Chair at COP24 said:

"Right now, we are facing a man-made disaster of global scale. Our greatest threat in thousands of years. Climate change. If we don't take action, the collapse of our civilizations and the extinction of much of the natural world is on the horizon."

The UN Intergovernmental Panel on Climate Change (IPCC) '1.5-degree report' shows it's not too late to reduce the worst effects of global warming – and confirms prompt actions now will minimise the economic costs.

Mitigation actions also bring a host of co-benefits that are desirable, even without the decarbonisation imperative. Broadly speaking, mitigation should improve energy efficiency and security, stimulate innovation and the creation of new industries and markets. Other positive impacts include improvement in human health because of less air pollution and increased activity. Whilst climate change is the biggest global health threat of the 21st Century, action to combat it is likely to be the greatest global health opportunity of the 21st Century.

MITIGATION

National Targets for Reduction in GHG Emissions

The EU's Effort Sharing Decision (Decision No 406/2009/EC) sets targets for the non-Emissions Trading Scheme sector for EU Members States including Ireland for 2020.

Ireland is required to deliver a 20% reduction in non-ETS greenhouse gas emissions by 2020 (relative to 2005 levels). The non-ETS sectors cover those that are outside the EU Emissions Trading Scheme and includes the Agriculture, Transport, Residential, Commercial, Waste and non-Energy Intensive Industry.

Ireland's National Policy position is to reduce CO2 emissions in 2050 by 80% on 1990 levels across the Energy generation, Built environment and Transport sectors, with a climate neutrality goal in the agriculture and land-use sector.

Ireland's greenhouse gas emissions increased by 3.6% or 2.1 million tonnes of carbon dioxide equivalent, from 59.4 million tonnes of carbon dioxide equivalent in 2015 to 61.5 million tonnes of carbon dioxide equivalent in 2016.

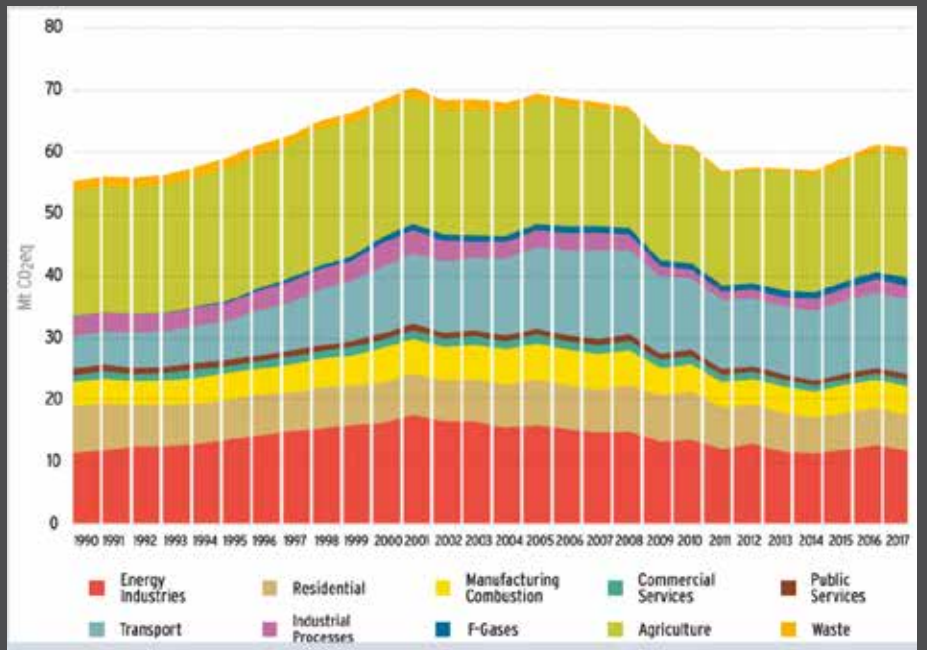
National Picture

Irish greenhouse gas emissions are rising rather than falling. Instead of achieving the required reduction of 1 million tonnes per year in carbon dioxide emissions, consistent with the National Policy Position, Ireland is currently increasing emissions at a rate of 2 million tonnes per year.

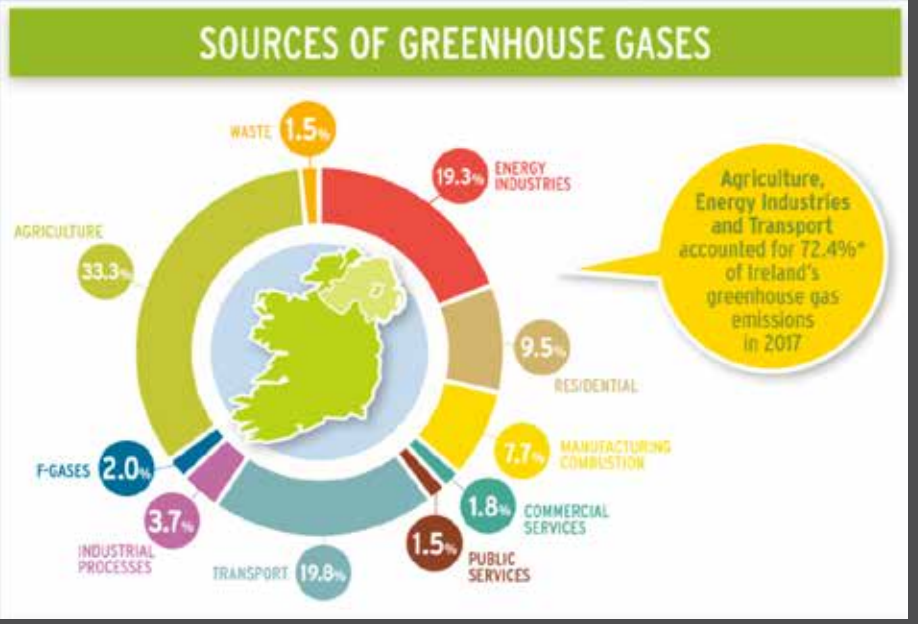
The EPA report on 'Irelands Provisional Greenhouse Gas Emissions 1990-2017' shows that emissions for Transport, Energy Industries and Residential sectors decreased, however, emission in the Agriculture, Commercial and Public Services sectors are heading in the wrong direction.

Projected emissions in the 'With Additional Measures' scenario indicate that Ireland remains off-target to achieving a 20% reduction on 2005 levels by 2020.

Greenhouse gas emissions from the Residential sector decreased in 2017 by 5.0% or 0.30 Mt CO2eq due to a milder winter



EPA: Ireland's Provisional Greenhouse Gas Emissions, 1990-2017



MITIGATION

Mitigation in Sligo County Council

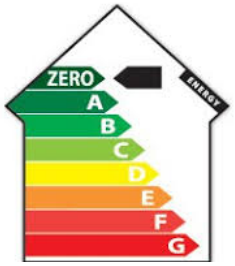
When a national target of improving our energy efficiency by 20% by 2020 was set in 2009, the public sector was given an even higher target of 33%. At the end of 2015, the sector was using 21% less energy than it had in 2009, resulting in avoided costs of €619m and emissions savings of 548,000 tonnes over that period.

The SEAI Annual Report on Public Sector Energy Efficiency Performance 2018 highlights that Sligo County Council has achieved energy efficiency improvements of 13.8% between 2009 and 2018. This means that significant effort will be required to meet the 33% energy reduction target by the end of 2020.

We are involved in a number of actions and projects that will increase efficiency and reduce greenhouse gas emissions such as the Public Lighting Project (Climate Action Fund) energy audits, participating in Sligo's Sustainable energy Community, the development of a Smarter Travel policy, switching to renewable energy supplies where feasible and improving energy efficiency across all sections within the Local Authority.

Optimising Power at Work is the OPW's staff energy awareness campaign, which runs in many large Civil Service, other public buildings and some Government agencies throughout the State. The initiative aims to change staff behaviour towards energy use and eliminating energy wastage within our buildings.

Sligo Co. Co. hope to work with the OPW in 2019 and to run their awareness campaign at County Hall, Riverside. This will assess current electricity usage and identify ways in which this can be reduced. Through monitoring how energy is used in various areas throughout the building, and implementing a range of staff awareness initiatives, we hope to improve our energy efficiency. The lessons learned at HQ can then be rolled out to other LA buildings where similar challenges are being faced.



Sligo County Council is currently involved in a Pilot Scheme concerning the construction of a 3 bedroom house as, which is designed to achieve the new incoming Nearly Zero Energy Building standard (NZEB). This new standard sees an energy performance improvement of 70% on the 2005 Building Regulations and will result in minimum of A2 rated buildings.

The Architect's Department have researched methods of achieving this standard. The proposed approach is designed to achieve the new standard while ensuring the method of construction is appropriate to the local coastal climate as well as the construction skill-set available in the region.

It is important that Local Authorities lead the way in terms of addressing Climate Change and when complete, the house will achieve an A Rating and will provide a comfortable and low energy home for its occupants with very low running costs.

National Public Lighting Replacement Project

Sligo County Council is responsible for nearly 10,000 public lights throughout the County, and this accounts for over 60% of our total electricity consumption. So therefore it is important to ensure that the most efficient equipment possible is being used.

So we are participating in a major National Public Light replacement program, being coordinated by Transport Infrastructure Ireland, which will see older sodium lamps being replaced by LED lamps. The work has started and the impact can already be seen on many of the primary roads in the County. And the cost of keeping the lights on will be reduced by over 50%.

MITIGATION

Mitigation in the Sligo County Council (Contd):

The three main areas in which Sligo County Council uses a significant amount of energy are Electricity, Transport & Heating.

In order to reduce usage in each area, current usage patterns will be examined and , and where possible, every effort will be made to reduce the amount of energy being used to a minimum. This will require input from each section and therefore an Energy Team consisting of members of staff from throughout the organisation will be formed and a Corporate Energy Policy will be devised.

Sligo County Council also has a large fleet of vehicles, and as well as promoting efficient practices, is starting to consider the purchase of electric vehicles as replacements for some of the smaller vans being used. Sligo Co. Co. will also participate in the national roll out of EV charging points.

The use of heating oil in our main buildings is also currently being reviewed, and steps will be taken to reduce the amount being used. This will be achieved through initiatives like the OPWs Optimising Power at Work Scheme which was recently initiated at the Council's headquarters at Riverside, Sligo.

Another area in which improvements can be made is in the management of energy being used at our leisure centres. This is a national issue, and Sligo County Council will ensure that the issues are examined and appropriate solutions are found and implemented as soon as practicable.

Mitigation in the Community:

In order to assist the wider community to reduce their energy usage and improve our collective footprint, Sligo County Council will work closely with organisations like SEAI to ensure that adequate information and support is provided to individual householders, communities and businesses. We will continue to work with the Sligo Sustainable Energy Community (SEC), and will encourage communities throughout the County to consider setting up SECs in their own localities, and provide as much assistance as possible.

Sligo County Council will also develop it's ability to facilitate the transfer of information regarding energy efficiency & other mitigation measures which is available from other bodies such as the SEAI. We will particularly encourage & support initiatives that come from within local communities and try to ensure that that funding from schemes like the Community Environment Fund, or other funding options which may become available in the future, is made available to mitigative projects.

MITIGATION

Issues Raised during the Public Consultation:

Mitigation: During the course of the public consultation, it was felt by many of those who participated that mitigation was a major issue and that steps should be taken to ensure all that can be done, is being done. Sligo Co. Co. is bound under the National Mitigation Plan to achieve certain efficiency targets and to improve it's energy performance across the board. We are currently working with the SEAI and the OPW to meet these requirements. As outlined on the previous page, the Local Authority is taking measures to reduce its energy usage and therefore its carbon footprint. And we will also work closely with other public sector bodies and local communities to ensure that energy & resource efficiency levels continue to improve.

Training/Education/Community Engagement: Many of those who made submissions or attended the public meetings said that education & training in climate related areas was essential. And it was also suggested that local communities, as well as Local Authority staff, should be provided with the information that they require. Therefore Sligo Co. Co. will continue to try to identify and provide resources where possible to provide training and education in this area on an ongoing basis, to both staff and community groups.

Biodiversity: During the course of the development of the CAS, in May 2019, the Government became the second country in the world to declare a Climate & Biodiversity Emergency. And it was felt that Biodiversity should become an area of focus for the Local Authority. There were many related suggestions, and these have been reflected in some of the actions in this document. The development of allotments and community gardens; a review of herbicide usage by the Local Authority; the management of Invasive Alien Species, and continued participation in the All Ireland Pollinator Plan were all topics that it was felt could be addressed in a Biodiversity Policy.

Agriculture/Forestry: These two areas will be significantly affected in the years to come, such is their importance with regard to the production of GHG, as well as the sequestration of carbon from the atmosphere. And while outside of the County Development Plan, the Local Authority has limited means with which to influence the future development of both of these areas, Sligo Co. Co. will engage with the relevant stakeholders where appropriate to ensure that Climate Change is taken into account. But it will be European & National policy which will have the greatest influence on these areas

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CLIMATE READY SLIGO

ENGAGE | PLAN | ADAPT

SLIGO COUNTY COUNCIL

Climate Adaptation Strategy

September 2019