



CLIMATE READY MAYO

ENGAGE | PLAN | ADAPT





ACKNOWLEDGEMENTS

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

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- The Department of Communications, Climate Action and Environment.
- The Regional Climate Action Steering Group and the Climate Adaptation Team Leaders from Donegal, Sligo County Council, Galway County Council and Galway City Council.



FOREWORD



Brendan Mulroy
CATHAOIRLEACH
Mayo County Council

The consequences of our changing climate have already been witnessed throughout County Mayo. Over the past century our climate has warmed, rainfall patterns have changed, sea levels have risen, and more extreme weather events are occurring. We have seen extreme rainfall damage infrastructure, severe droughts degrade the environment, along with wildfires and landslides. While these individual events cannot be directly attributed to climate change, evidence indicates that the frequency and intensity of these events can be attributed to climate change. Taking proactive action to adjust and prepare for a changing climate is critical to increase the resilience of our economy, environment and communities.



Peter Hynes
CHIEF EXECUTIVE
Mayo County Council

Climate change presents many challenges for society, but it can also present opportunities to advance the development of our region in a sustainable manner. The multiplicity of causes of climate change, as well as the uncertainty of timing and effects make climate adaptation a complex issue. However the underlying trends are evident and are projected to continue. We must adapt the way that we interact with our environment and improve the resilience of our County to sea level rise, river floods, storm surges and heat waves before they cause more material damage, loss of human life and impact on our way of life and economy.

Action on climate change requires two simultaneous approaches: mitigation and adaptation. Mitigation prevents future climate change from happening through actions that reduce greenhouse gas (GHG) emissions (for example improving the energy efficiency of your home). Mitigation is necessary to ensure that impacts do not become too severe, but adaptation is also necessary. Adaptation manages the consequences of climate change through actions that prepare for and respond to climate-related challenges (for example new flood defence infrastructure) but importantly it also takes advantage of potential benefits of climate change. No matter how focused we are on mitigation, greenhouse gases already in the atmosphere will result in climate change so adaptation is necessary to deal with the inevitable impacts.

This Strategy creates a framework for measures and policies that Mayo County Council will undertake in terms of climate adaptation planning for the County. Prior to this Strategy Mayo County Council have instigated change and provided leadership on several Climate Change programmes. Climate Action is a function under the Environment, Climate Action and Agriculture Department of Mayo County Council. In 2017 Mayo County Council was the first Local Authority in Ireland to appoint a Climate Action Officer with responsibility for improving climate action operations within the Council and engaging with local communities. The Council also successfully initiated an internal Climate Ambassador Programme, and is also driving energy reduction and efficiencies through the Public Sector Energy Efficiency Programme. The same ambition and leadership is now being applied to climate adaptation planning. In 2018 following a competitive process Mayo County Council was appointed the Climate Action Regional Office for the Atlantic Seaboard North Region.

The impacts and opportunities of climate change will not be defined by administrative boundaries and we recognise that the response to climate change requires a whole of society approach. The task of realising a transition to a more sustainable future represents one of the most pressing issues of our time. Addressing the challenging mix of economic, social, environmental and political issues necessitates new ways of thinking about and conceptualising change. Together we must prepare and take proactive action for the changes that lie ahead in order to protect our communities, environment and economy. This Strategy represents the start of our climate adaptation journey towards a “Climate Ready Mayo”.

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INTRODUCTION



Climate change is a critical challenge for Mayo. It will result in a range of impacts across a wide number of sectors that are likely to exacerbate existing vulnerabilities. Taking proactive action to adjust and prepare for anticipated changes will reduce losses, improve our environment and provide a host of community benefits.

Global momentum is building for national and local governments to take ambitious action that builds resilience to climate change within their organisations and functional areas via adaptation and mitigation measures. The Paris Agreement expresses an international commitment to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change. Developing a robust approach to adaptation is the first step on this journey.



Mayo County Council's Climate Change Adaptation Strategy 2019-2024 (the Adaptation Strategy) sets out our strategic priorities, measures and responses for adaptation in County Mayo 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 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 Strategy is based on five main themes: **Governance, Critical Buildings and Infrastructure, Natural and Cultural Capital, Water Resource and Flood Risk Management and Community Services** and provides 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 action 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 on the risks of a changing climate across the following areas: local government, business, 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 Mayo County Council progresses. The integration of climate action 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. Many adaptation actions are already underway at Mayo County Council and mainstreaming adaptation measures into all levels of operations and policies within Mayo County Council will be an important aspect of implementing climate action at local level. The Climate Adaptation team will document observed climatic changes and 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

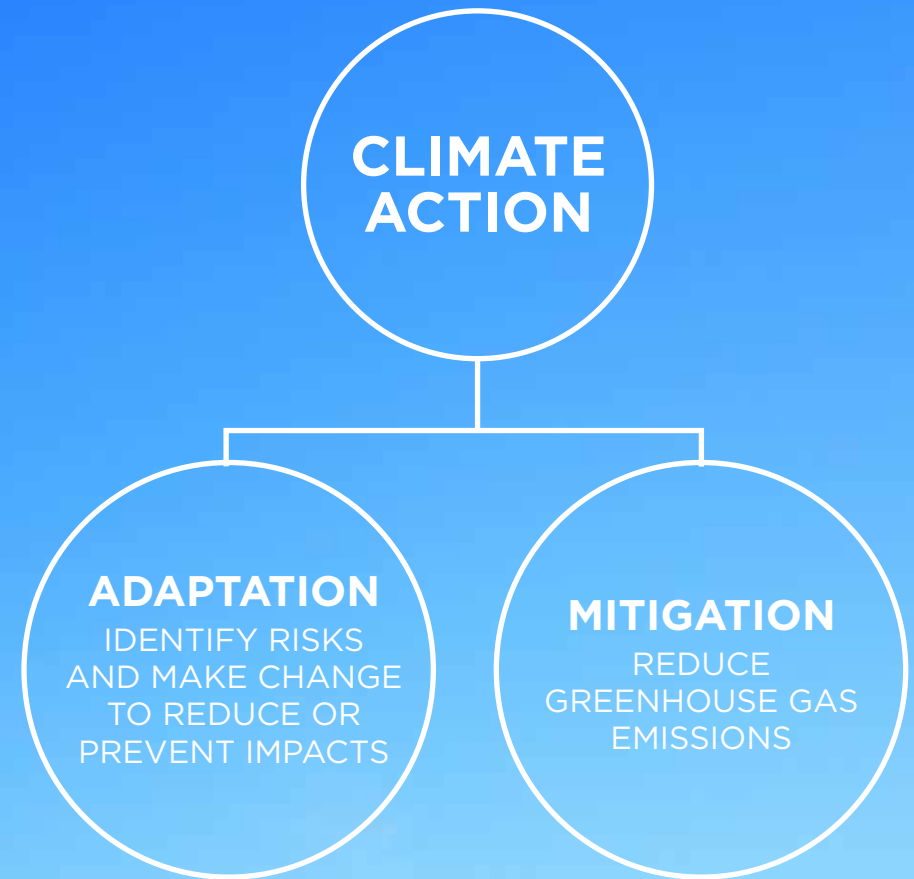
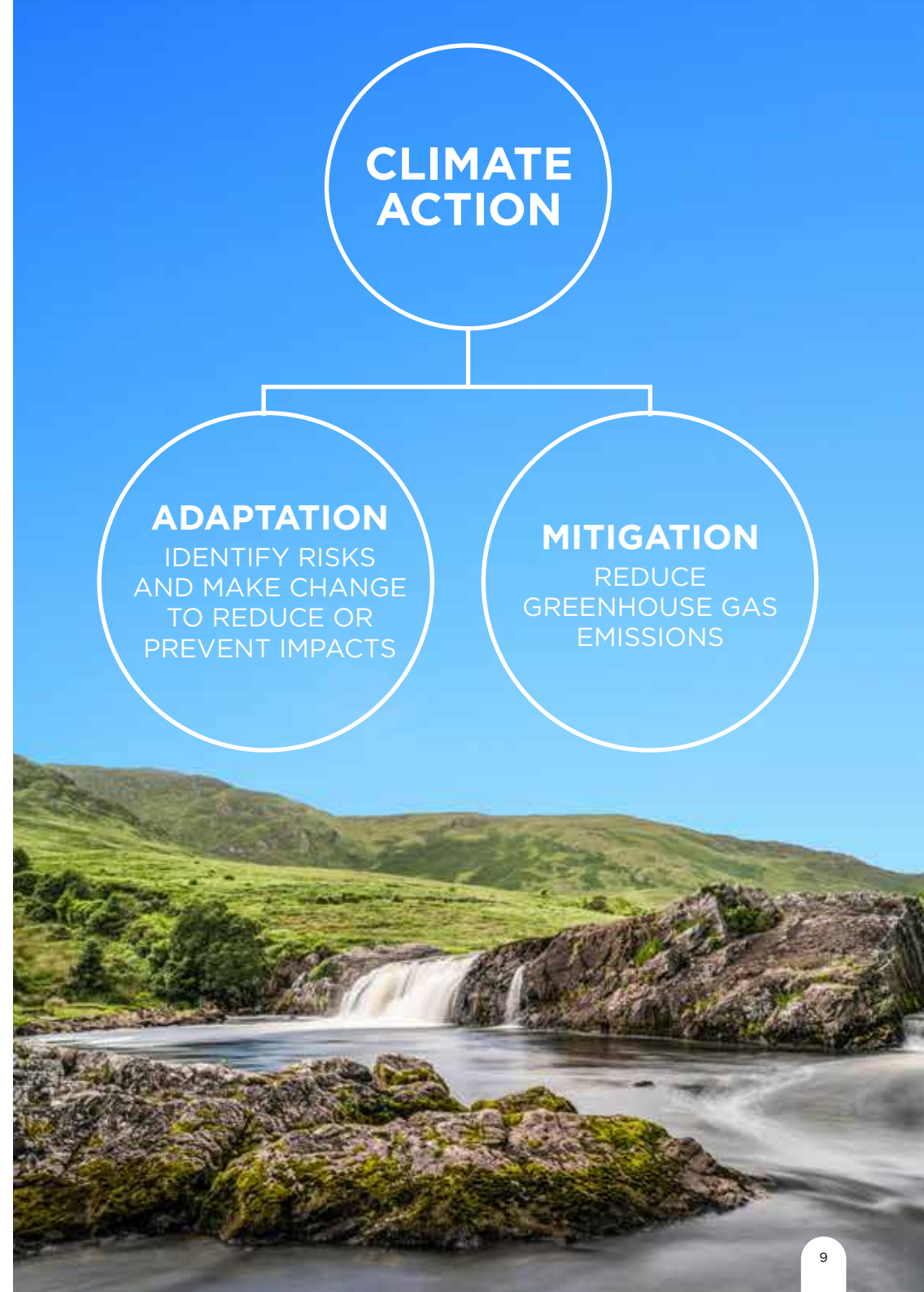
Climate change **Adaptation** and **Mitigation** are distinct but complementary activities.

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.

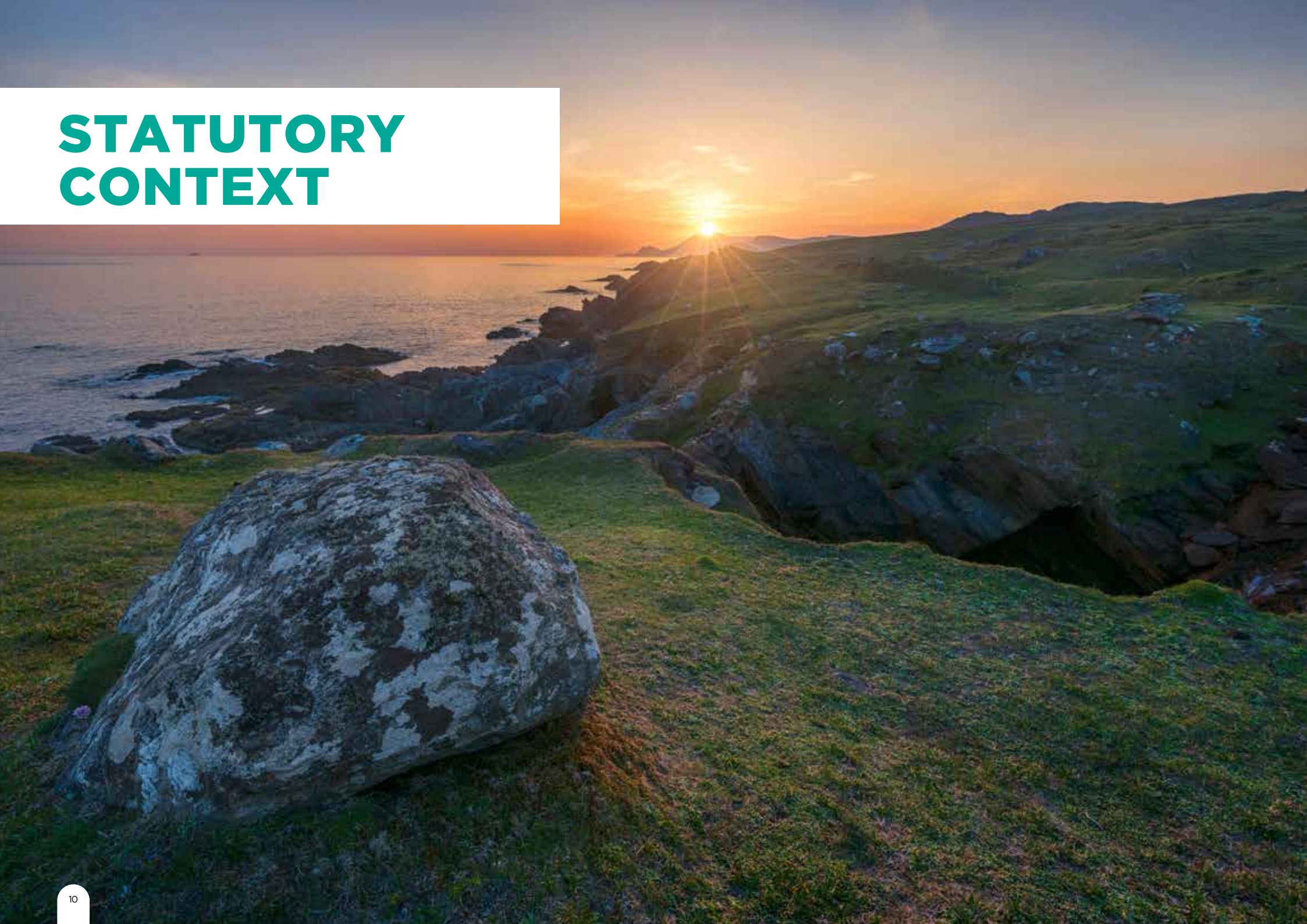
Mitigation is the process of reducing carbon pollution and greenhouse gas emissions to limit the extent to which our climate changes in the future. It involves improving energy efficiency, switching to more sustainable energy sources and trapping and storing carbon in vegetation and soils.

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 Mayo County Council and the communities within its functional areas as well as actively working to reduce our exposure to new and increased risks.



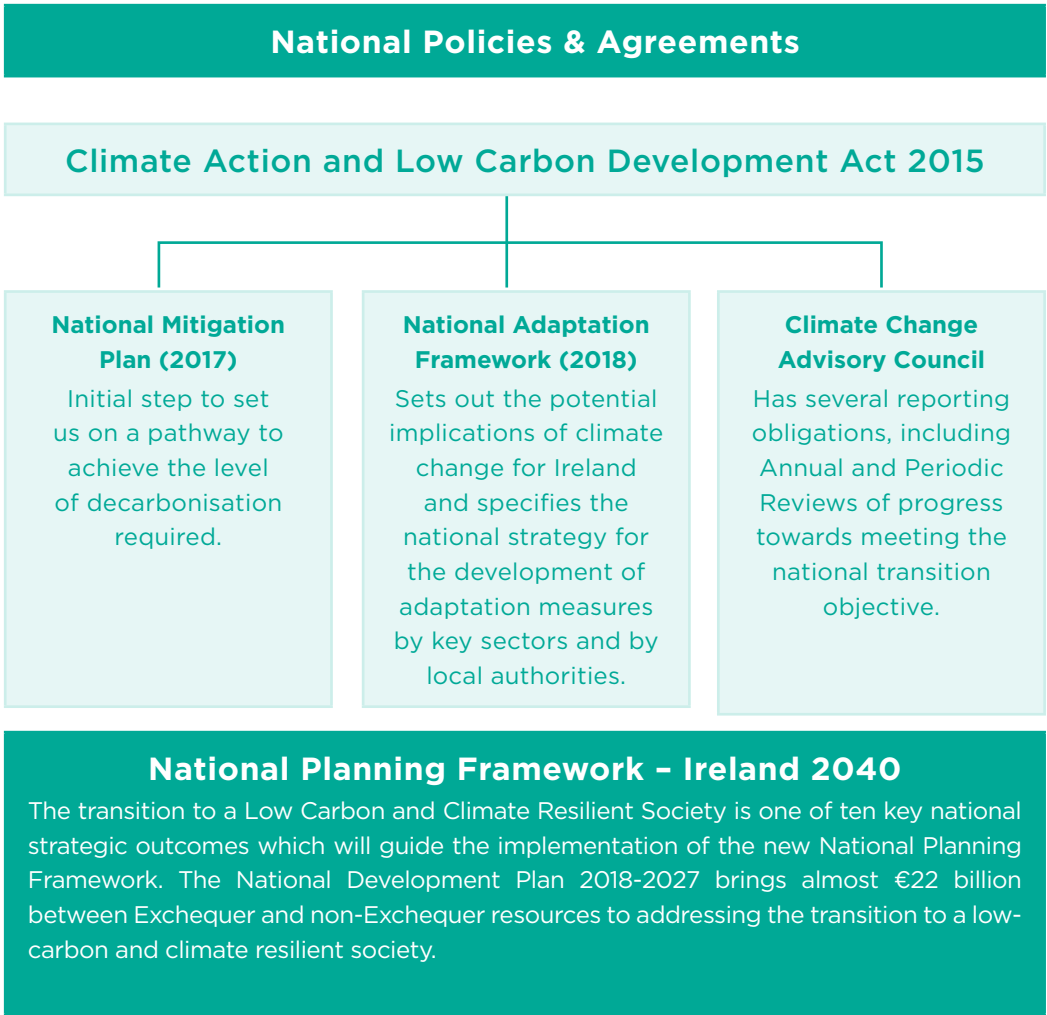
STATUTORY CONTEXT



STATUTORY CONTEXT

Key drivers for the development of Mayo County Council Climate Adaptation Strategy include International, European and National Climate Change 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
<p>United Nations Framework Convention on Climate Change - 1992</p> <p>The UNFCCC is an international environmental treaty adopted on 9 May 1992. It entered into force on 21 March 1994 with the objective of “<i>stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system</i>”</p>
<p>Kyoto Protocol - 1997</p> <p>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.</p>
<p>EU Adaptation Strategy -2013</p> <p>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.</p>
<p>Paris Agreement - 2015</p> <p>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.</p>



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 adopted these thematic areas to facilitate potential synergies and efficiencies that can be achieved in bringing forward coherence between sectoral adaptation policies and measures.

The Mayo 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	
	Biodiversity	Department of Culture, Heritage and the Gaeltacht
	Built & Archaeological Heritage	
Critical Infrastructure and Buildings	Transport infrastructure	Department of Transport, Tourism and Sport
	Electricity and Gas Networks	
	Communications networks	Department of Communications, Climate Action and Environment
Water Resources and Flood Risk management	Flood Risk Management	Office of Public Works
	Water Quality	
	Water Services Infrastructure	Department of Housing, Planning and Local Government
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.

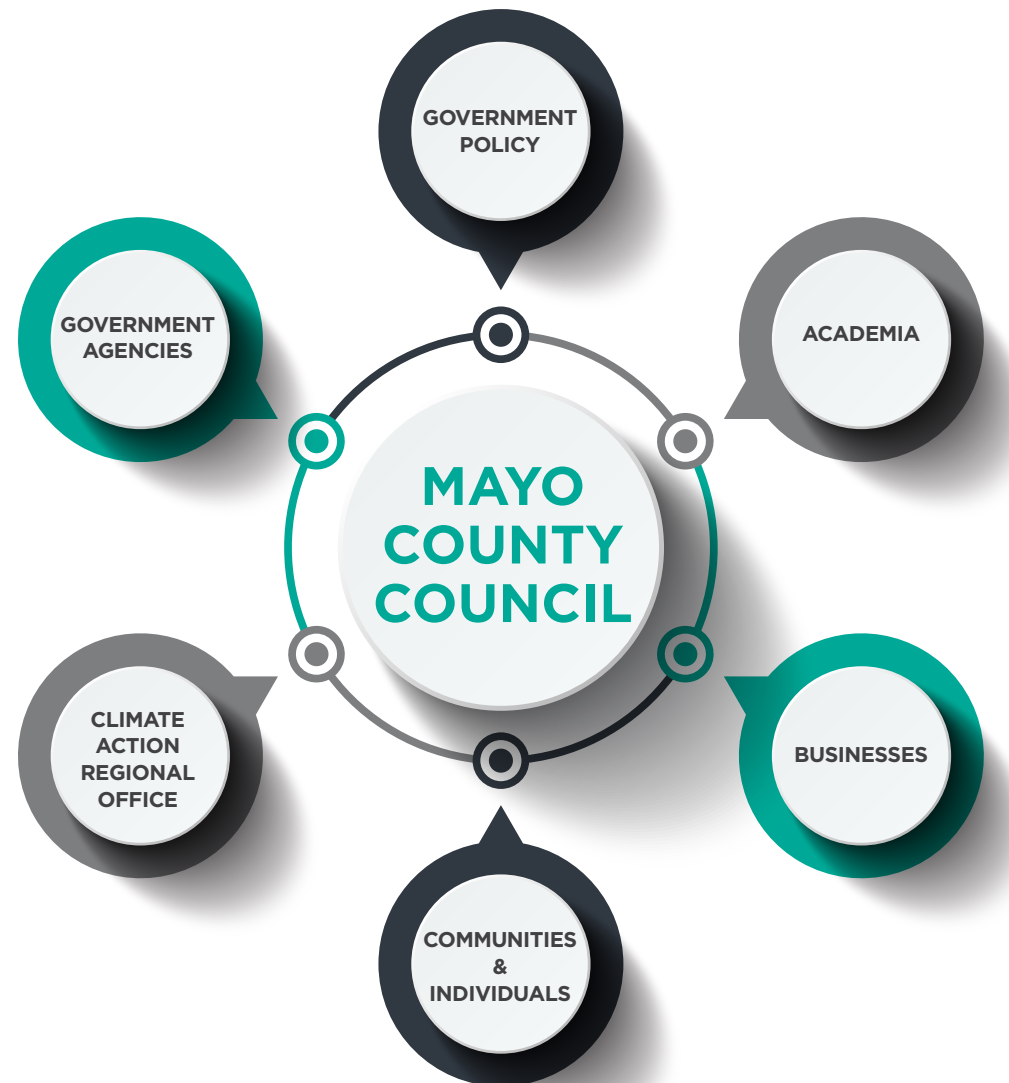
Climate change will impact both the services and assets that Mayo County Council manage and the local communities within our functional area. Local Authorities play an influential role in preparing communities for climate change through the services they deliver, such as planning and development, critical 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 Mayo'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. Mayo County Council recognises the importance of this type of community action and proposes to support these initiatives.

CLIMATE READY MAYO



ROLES & RESPONSIBILITIES

Governments at all levels, businesses, households and our communities 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.



Mayo County Council

Mayo 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 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 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

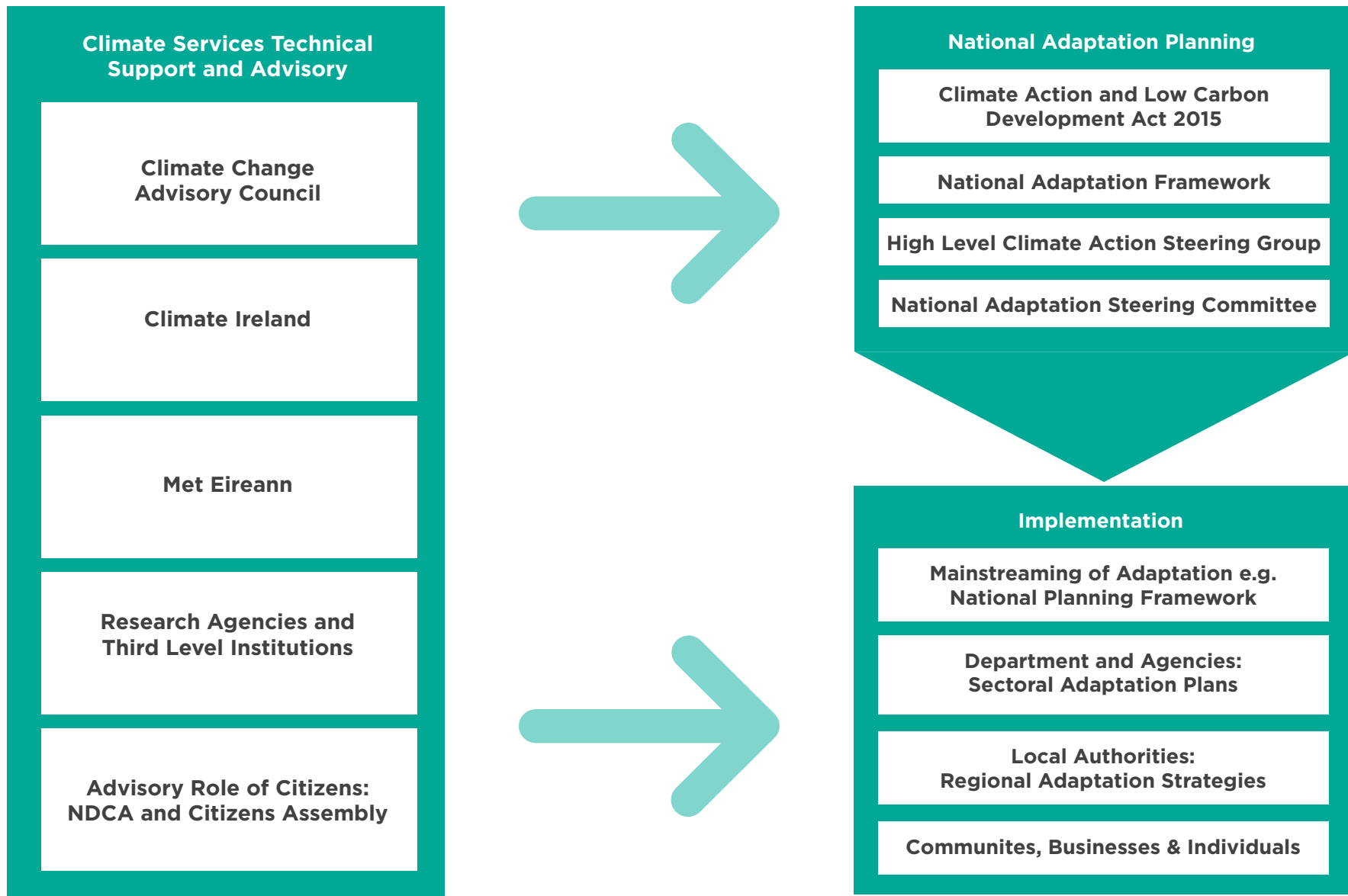
Academia have a critical role to play in preparing society to adapt to the impacts of climate disruption by providing research and education around adaptation strategies. Communicating and translating science and big data into information that policymakers, businesses and communities can apply to their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

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 Ros a Mheal perform specific roles

International Air Connectivity – Ireland West Airport Knock (770,000 passengers in 2018) and Donegal Airport

COUNTY MAYO

County Mayo currently has a population of 130,507 which is predominately rural, 71% living in rural areas and 29% in urban areas. The 'older' population fraction (those aged 65 years and over) in Mayo has increased by 17% since 2011, against a national average of 13.4%. 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.

Coastline

The county proudly boasts the longest coastline in Ireland with 1,168 km of shoreline or 21% of the country's total coastline. There are twelve Blue Flag beaches in Mayo and seven beaches with the Green Coast Award.

Archaeology

Mayo has almost 6,000 areas of archaeological importance included in the Record of Monuments and Places spanning over 7,000 years. The Céide Fields Archaeological Complex in north Mayo is proposed for designation as a UNESCO World Heritage Site.

Architectural Heritage

The architectural heritage of Mayo comprises fine buildings found in urban areas, large country houses and associated demesnes and the smaller vernacular structures.

Tourism

Significant tourist attractions in Mayo include the National Museum of Ireland - Country Life, Céide Fields, Westport House, Foxford Woollen Mills, Michael Davitt Museum, the Great Western Greenway and the Jackie Clarke Collection.

Economy

Significant manufacturing sector employers in Mayo include Allergan, Ballina Beverages, Hollister, and Baxter. Analysis carried out in 2014 by PMG identified several emerging economic sectors in Mayo with the potential for the greatest level of sustainable job creation. These included the tourism sector, food & agriculture, the renewable energy sector as well as the ICT and creative sector.

County Mayo County Profile

Area: 5,589 km²

Coastline Length: 1,168km

Highest mountain is Mweelrea (814m).

Total Population: 130,507, of which 71% live in rural areas.

Major Towns: Ballina, Ballinrobe, Ballyhaunis, Belmullet, Castlebar, Charlestown, Claremorris, Crossmolina, Foxford, Kiltimagh, Swinford, Westport.

Agriculture: 12,458 farms in Mayo, average farm size is 22 ha (CSO, 2010).

Natural & Cultural Capital

Natura 2000 sites: almost two-thirds of the county is designated for the protection of flora and fauna.

Ballycroy National Park: 11,000 hectares of Atlantic blanket bog, designated as a Special Protection Area and as a candidate for a Special Area of Conservation.

Statutory Nature Reserves: Owenboy, Knockmore Sheskin, and Old Head Woodland.

Designated Shellfish Waters: Achill Sound North, Achill Sound South, Blacksod Bay, Clew Bay, Killala Bay and Killary Harbour.

Waterbodies: The county's largest lakes are Lough Conn, Lough Carra, and Lough Mask.

Transport Infrastructure

Road Network: 6,490 km of roads (133 km of National Primary, 267 km National Secondary, 622 km Regional, and 5,468 km Local).

Ireland West Airport Knock, serving 23 international destinations

78 piers and harbours maintained by Mayo County Council

Rail Network

An aerial photograph of a large, powerful ocean wave. The water is a deep, vibrant blue, and the wave's crest is breaking into thick, white foam. The perspective is from above, looking down at the wave as it moves across the sea. The lighting is bright, highlighting the texture of the water and the spray of the foam.

OBSERVED & PROJECTED CLIMATE CHANGE

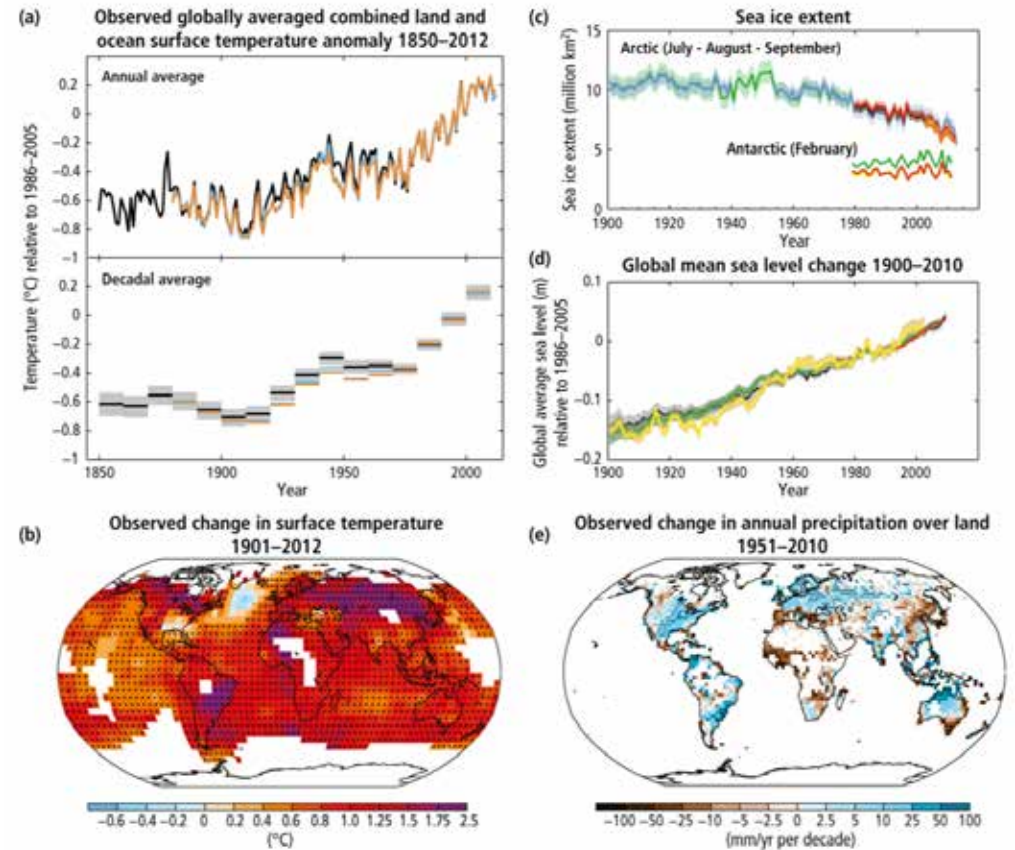
OBSERVED CLIMATE CHANGE

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

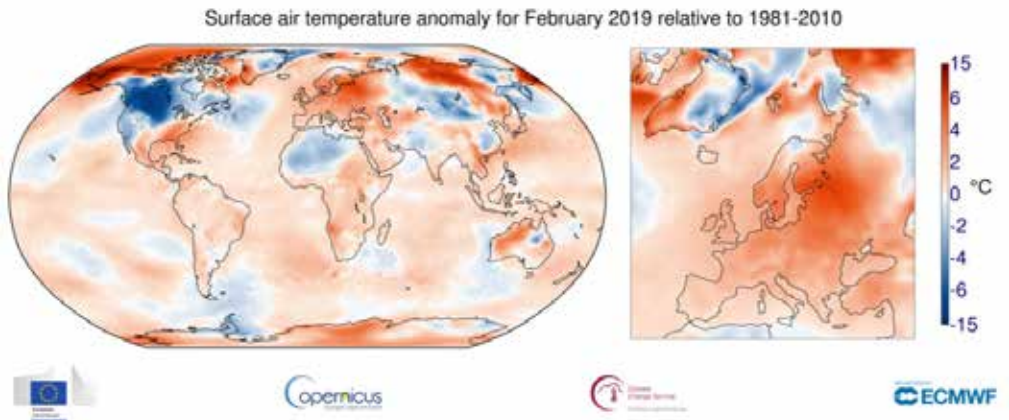
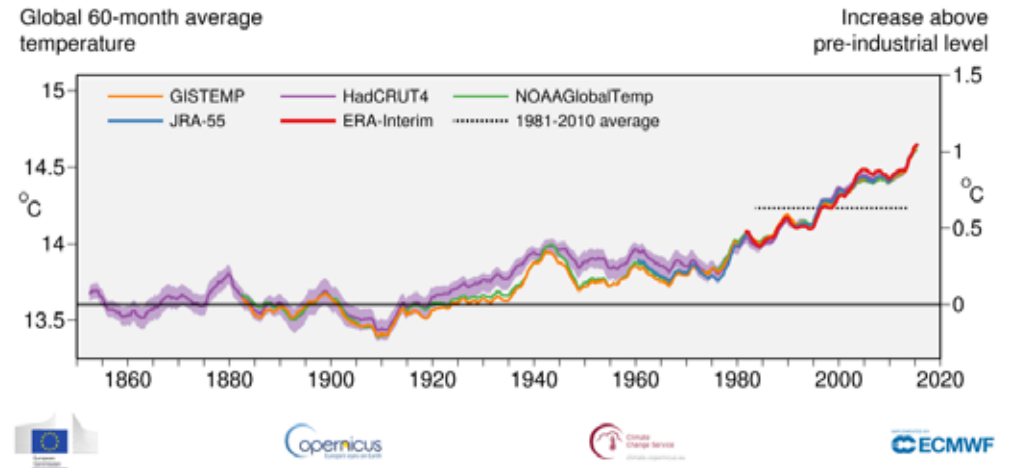
Data released by the Copernicus Climate Change Service (C3S) show that 2018 was the fourth in a series of exceptionally warm years and together with the Copernicus Atmosphere Monitoring Service (CAMS), C3S reports that atmospheric CO₂ concentrations have continued to rise.

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.



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 $1.1\text{ °C} \pm 0.1\text{ °C}$ 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.

PROJECTED CLIMATE CHANGE

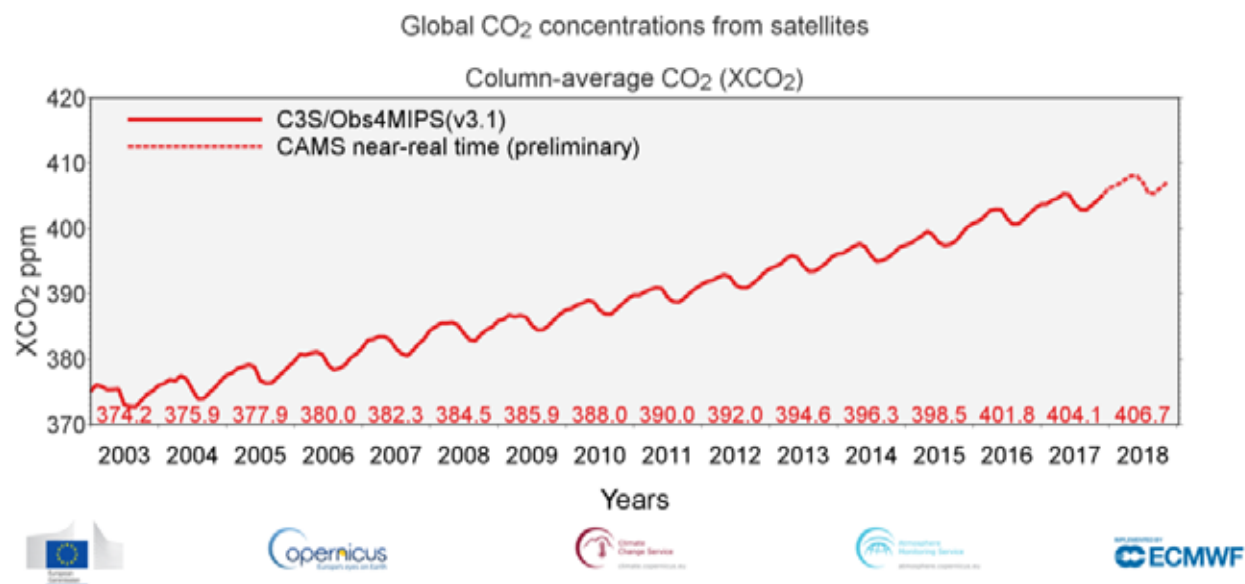
Projecting Climate Change

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.

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

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]



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

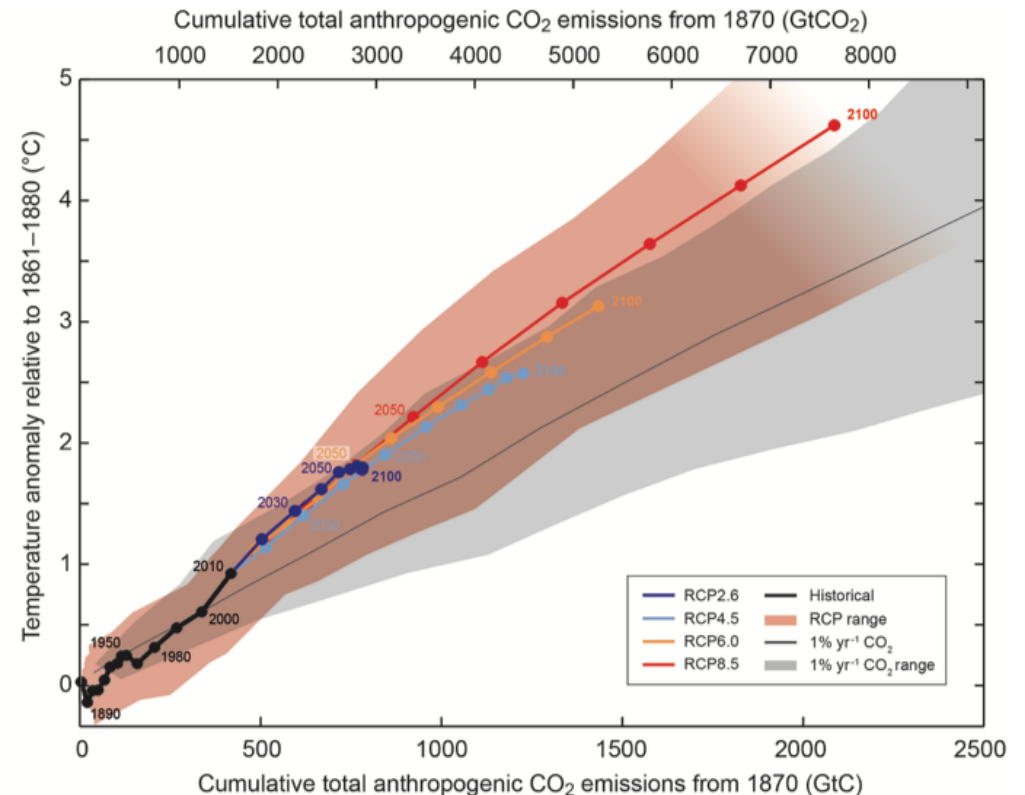
Emissions continue to increase rapidly through the early and mid-parts of the century. By 2100 annual emissions have stabilised at just under 30 giga tonnes of carbon compared to around 8 giga tonnes in 2000. Concentrations of CO₂ in the atmosphere accelerate and reach 950 ppm by 2100 and continue increasing 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 21st 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.



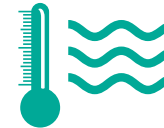
Higher Temperatures

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.

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.

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 °C nationally since 1900.



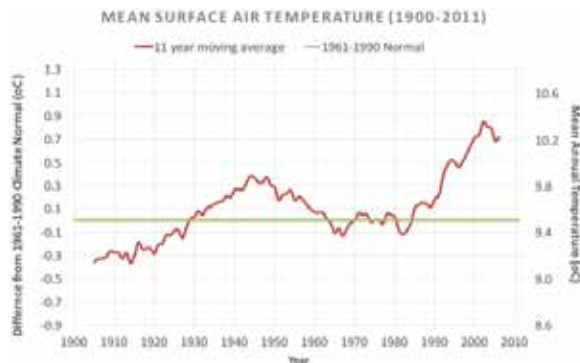
The number of warm days (>20 °C) has increased while the number of frost days (<0°C) has decreased.



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

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 0°C) and ice days (days when maximum temperatures are less than 0 °C) 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.



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)

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).

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-term change evident in number of gale gusts (a wind speed of >17.5m/sec).



Wind direction has remained stable



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



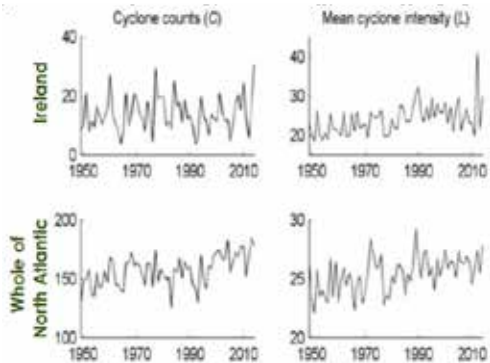
The number of storms (“cyclones”) in the North Atlantic has increased by approx. 3 storms per decade (1950-2012)



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)

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



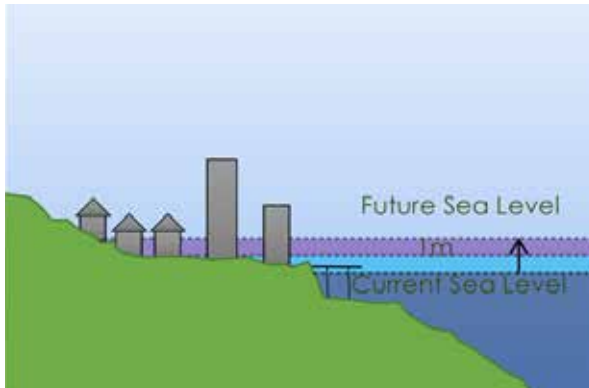
Sea levels are rising at around 3.5 cm per decade in the marine territories surrounding Ireland.



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

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.

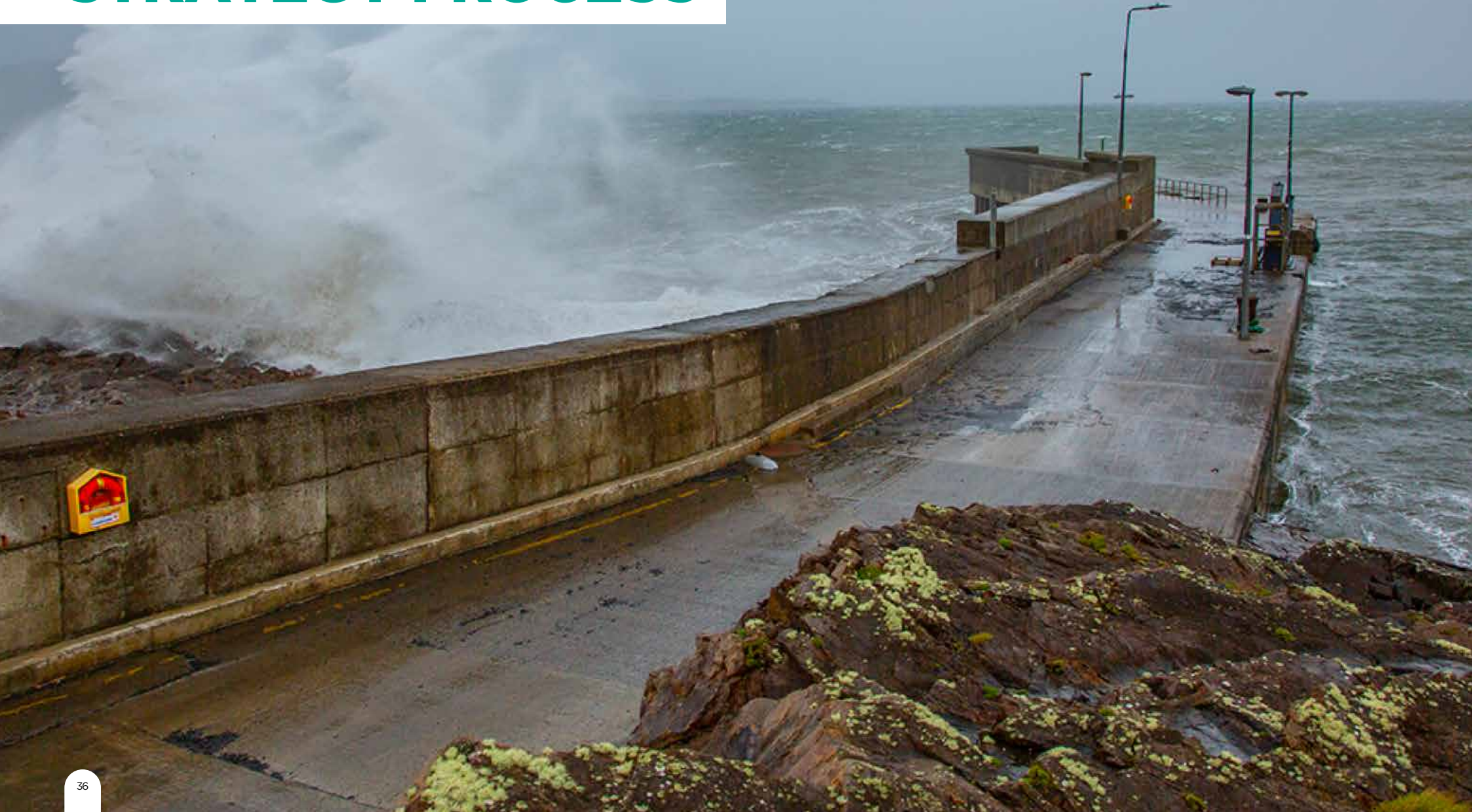
- The largest decreases are expected for summer (up to 15%), particularly off the south coast, and for winter (up to 10%), particularly off the west coast.
- Projected changes for autumn and spring are small and considered less robust than those for winter and summer so should be treated with caution.
- 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 Mayo 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 Team with a representative across all departments, in order to assess the current adaptation baseline for climate change.

Activities included some 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 Mayo County Council.






With this Strategy complete, we are now at 'Step 5' in the Implementation and Monitoring Phase of the Strategy.

Step 2 Assessing the Current Baseline on Past Events

-  Extreme Cold Weather & Low Temperatures
-  High Temperature & Low Rainfall
-  Sea Level Rise & Coastal Flooding
-  Strong Winds
-  Extreme Rainfall

Step 1 Preparing the Ground

Adaptation Team

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

Step 3 Identifying Future Climate Impacts, Vulnerabilities & Risk

Step 4 Identifying, Assessing and Prioritising Adaptation Actions

Step 5 Drafting, Implementing and Monitoring 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

STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS






STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

PREPARING THE GROUND

Climate Change has an impact on all functional areas of Mayo County Council. A Climate Adaptation Team was convened from a broad cross-section of operations, drawing on various skills and experience from the organisation.

The various departments within Mayo County Council were divided into the five operational themes, set out in the National Adaptation Framework;

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

* This theme is listed as 'Health' in the National Adaptation Framework, but 'Community Services' is more relevant to the Local Government sector.

ADAPTATION STRATEGY TEAM



STEP 2: ASSESSING CURRENT BASELINE

STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

MAYO ADAPTATION BASELINE

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

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

Past Climate Events & Trends

The characteristics of County Mayo present challenges and opportunities in terms of climate change which differ from urban areas due to; our extensive coastline, disperse settlement patterns, high level of natural heritage & conservation areas, as well as 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 Mayo 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 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	Strong Winds	Windstorm
Hurricane Charley	1986	Strong Winds	Strong Winds and Rain

STEP 1: PREPARING THE GROUND

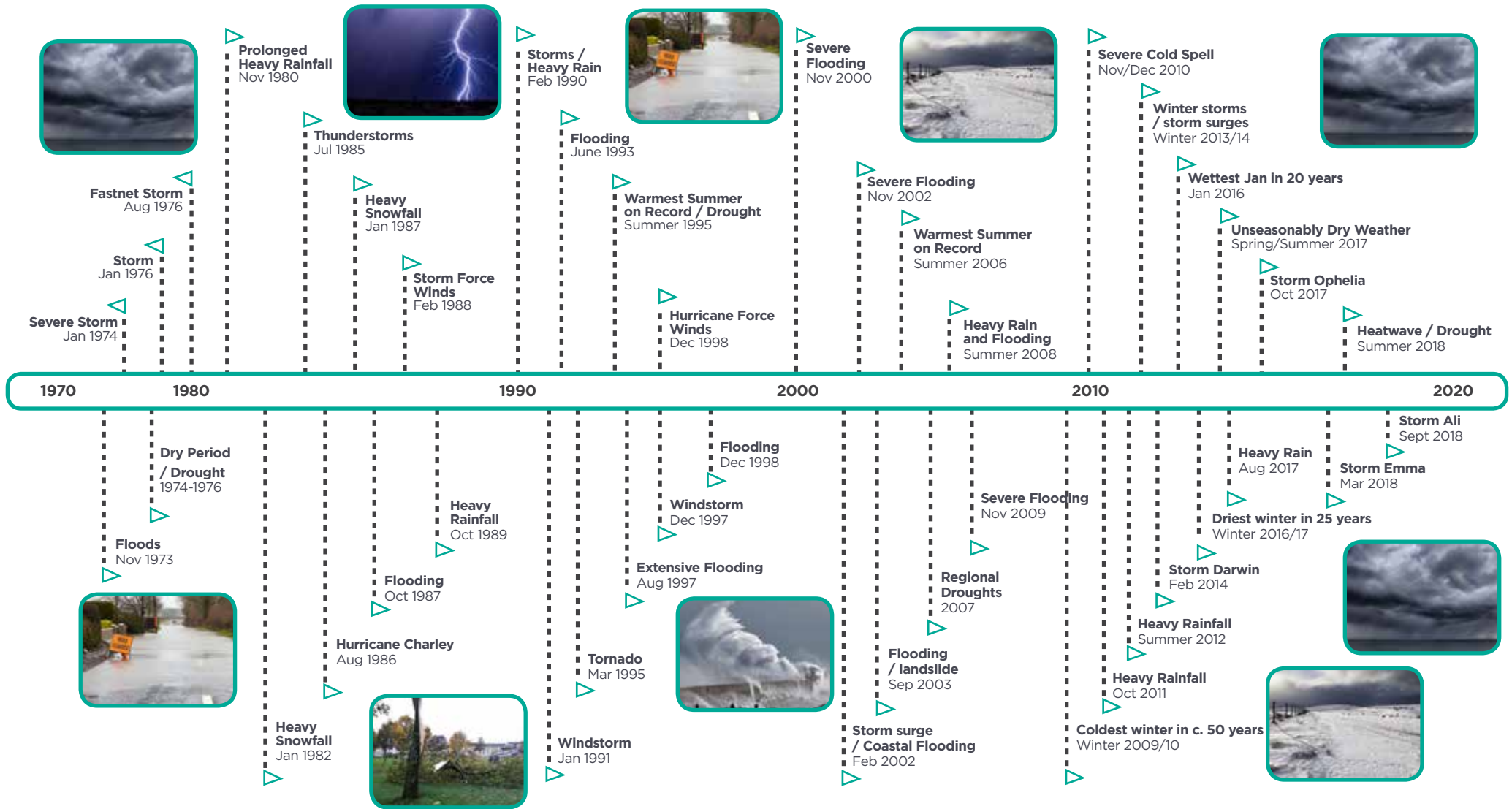
STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

HISTORIC CLIMATE EVENTS IN MAYO



MAYO ADAPTATION BASELINE

Through the identification and compilation of extreme weather events several event categories emerged, with some events occurring in combination.



Case Studies

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

Case Study 1

Extreme Precipitation, November 2009

November 2009 is notable for the high rainfall recorded and the consequent severe flooding experienced in many parts of the country

Case Study 2

High Temperature (and low Precipitation), Summer 2018

Heat and drought conditions in the summer of 2018 affected many parts of the country.

Case Study 3

Strong Winds (and Extreme Precipitation), December 2015

Strom Desmond, 5th December 2015, was an extra tropical cyclone bringing heavy rains and severe gales with gusts up to 81mph.

Case Study 4

Sea Level Rise & Storm Surge, Winter 2013/2014

The winter of 2013/14 was severely affected by a run of winter storms, culminating in serious coastal damage and widespread flooding.

Case Study 5

Low Temperature, February/March 2018

Storm Emma and "The Beast from the East" pushed continental polar air across Ireland, bringing freezing temperatures and snow.

STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

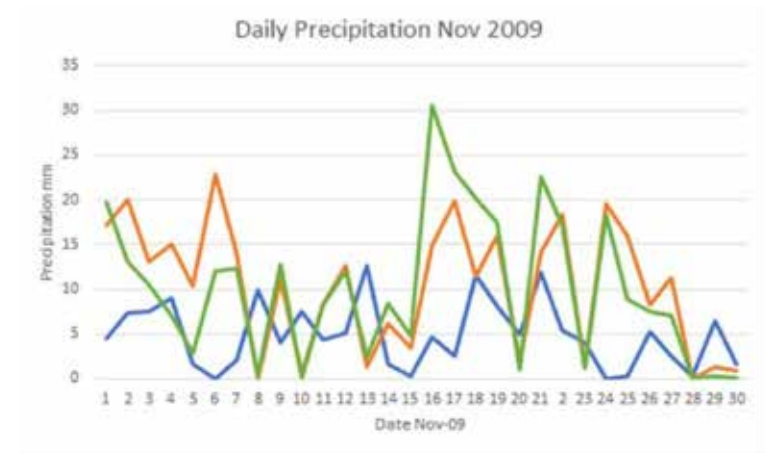
CASE STUDY 1: EXTREME RAINFALL, WINTER 2009

November 2009 is notable for the high rainfall recorded and the consequent severe flooding experienced in many parts of the country. Very unsettled weather began in the middle of October with rainfall totals for November the highest on record at most stations.

More than twice the average November amounts of rain were measured at almost all stations. The number of very wet days (>10mm rain) numbered 26 for both Knock and Newport. The rain between November 1st and 25th at Claremorris was 234% of the monthly normal with a rainfall of 284.5 millimetres during the month.

The extremity of the weather becomes apparent when contrasted with 2008 measurement of 102.5mm and the average for the station of 111.8mm. Belmullet station recorded the least rainfall but still had to deal with nearly twice their average.

Highest daily rainfall total recordings in the county were in Knock on the 16th of November, with 30.6mm of rainfall. Flood waters in the River Moy around the general Foxford area reached their highest level in years with several acres of ground under water on both sides of Foxford bridge. Waters in Lough Conn were also very high.



Source Data: Met Eireann

Impacts:

- There was prolonged flooding of private property as well as critical infrastructure including national and primary routes.
- Surface water systems were overwhelmed in many places leading to issues such as prolonged delays in groundworks for construction projects due to little or no drainage, increased capacity required for slurry storage and waste water treatment systems affected with high risk of pollution and effluent ponding.
- There were animal welfare issues due to flooded and inaccessible lands.
- There was disruption to the structure or geomorphology of river and coastal units due to flooding.
- Sand bagging was required for private and public infrastructure.
- Emergency services were required to assist with evacuation of flooded properties, assisting persons in stranded cars, providing access through flooded routes and the facilitation of emergency accommodation.

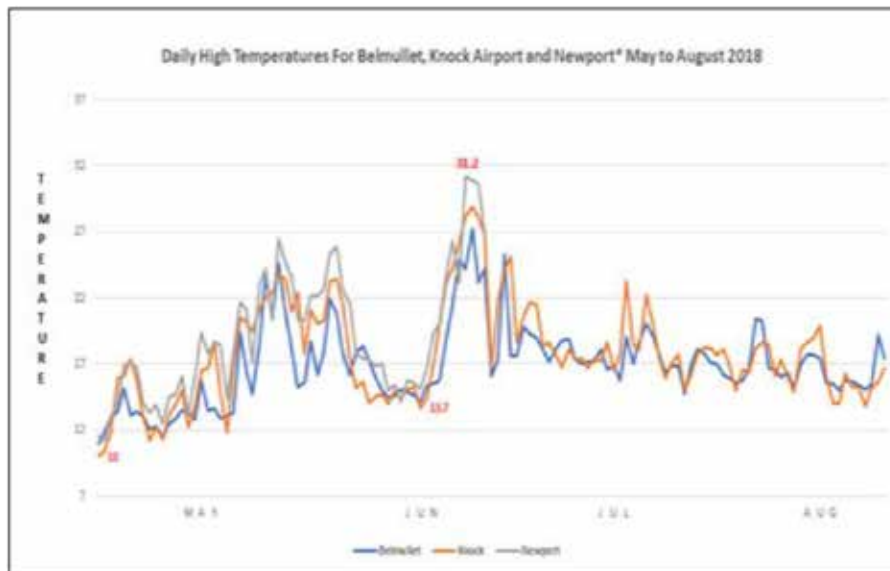
CASE STUDY 2: HIGH TEMPERATURES, SUMMER 2018

Heat and drought conditions affected many parts of the county.

Belmullet recorded the lowest rainfall with 22 consecutive days of zero rainfall and a total monthly rainfall for June of 40.1mm in Belmullet below the average of 72mm.

All monthly rainfall totals across the county were below their Long-Term Average (LTA) with drought conditions persisting until mid-July. Similarly, all mean air temperatures across the county were above their LTA.

The highest daily temperature was recorded in Newport at 31.2 degrees in June with the highest mean air temperature recorded at Knock Airport at 19.5 degrees.



Source Data: Met Eireann



Impacts:

- Water conservation measures were put in place with a small number of areas issued with water restrictions.
- Road surface melt.
- Increased demand for air conditioning.
- Loss within the agricultural sector.
- Increased usage of natural and built amenities contributing to congested roads and parking, increase in littering in public spaces and damage to heritage sites.
- High river temperature and low water levels severely impacted on fisheries.
- Severe algae blooms on some piers and slipways.
- Increase in tourist numbers.

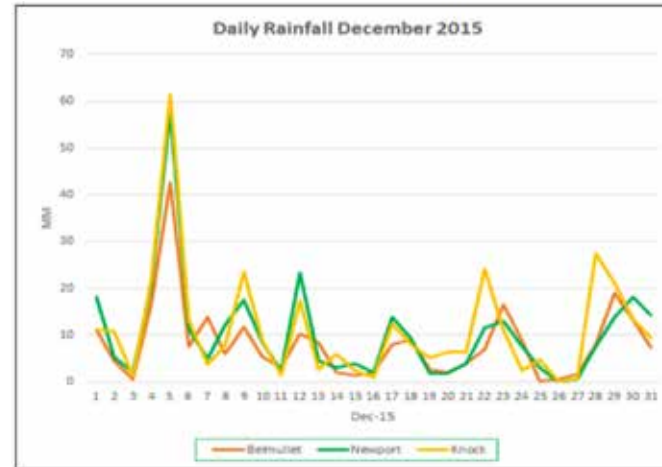
CASE STUDY 3: STORM DESMOND - STRONG WIND AND EXTREME PRECIPITATION

Storm Desmond, 5th December 2015 was an extra tropical cyclone bringing heavy rains and severe gales, with gusts up to 81 mph. It resulted in widespread flooding particularly along the Shannon river basin in the West and Midlands.

A level red rainfall and level orange wind warning was in place in Mayo.

Highest daily rainfall in Mayo was recorded in Knock Airport with 61.4mm representing almost 20% of December 2015's total rainfall. The total monthly rainfall for December 2015 was well above average with Knock airport recording 347.8mm rainfall which was over twice the average.

The Crossmolina, Westport and South Mayo areas were the worst affected by Storm Desmond.



Source Data: Met Eireann

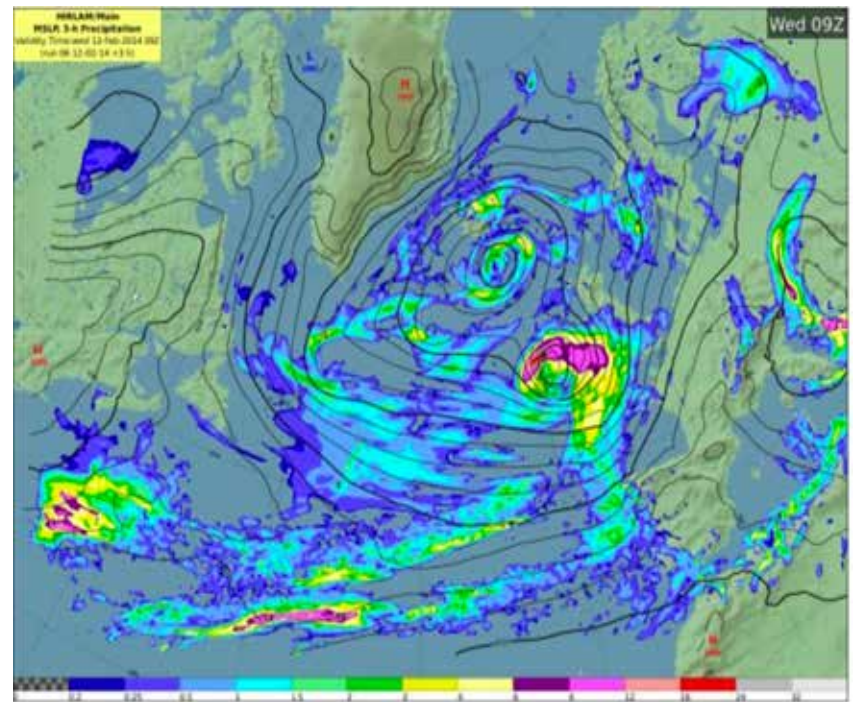
Impact of Event:
It's unprecedented
in terms of our
memory and
records - which
in some cases
go as far back as
100 years. Gerard
Fleming, Met
Eireann, 2015.

Impacts:

- Power outages were widespread.
- Surface water systems were overwhelmed in many places leading to issues such as prolonged delays in groundworks for construction projects and this was due to limited drainage.
- Increased capacity was required for slurry storage, waste water treatment systems were affected and there was a high risk of pollution and effluent ponding.
- There was prolonged flooding of private property as well as critical infrastructure including national and primary routes.
- There were animal welfare issues due to flooded and inaccessible lands.
- There was disruption to the structure or geomorphology of river and coastal units due to flooding.
- Sand bagging was required for private and public infrastructure.
- Emergency services were required to assist with evacuation of flooded properties, assisting persons in stranded cars, provide access through flooded routes and to facilitate emergency accommodation.

CASE STUDY 4: SEA LEVEL RISE & STORM SURGES, WINTER 2013/14

During the period from 13th December 2013 to 6th January 2014 there were storms in or around Ireland approximately once every three days. In addition to the very strong winds there were periods of extremely heavy rain (most short-lived) and a lot of thunderstorm activity. These storms coincided with high tides and created severe conditions in several coastal areas. After a respite period of around three weeks the country was subjected to a second series of severe storms commencing on 27th January. This second spell of severe weather persisted until 17th February and included the extreme and highly destructive storm event of 12th February 2014. There was a constant threat in several river catchments of severe flooding arising from the rainfall. This series of storms led to an increase in rainfall amounts of between one and a half and two times above normal and led to saturated or waterlogged ground throughout the county. Over 50% of stations across the country reported the wettest winter on record. A combination of strong winds, tidal surges, very high tides and high rainfall conspired to cause widespread damage and flooding along the west Mayo coastline causing significant disruption to individuals, business, infrastructure and habitats. The indicative estimated costs of repairs arising from severe weather of winter 2013-2014 for Mayo County Council was almost €7.5million.



Source: Met Eireann

Impacts:

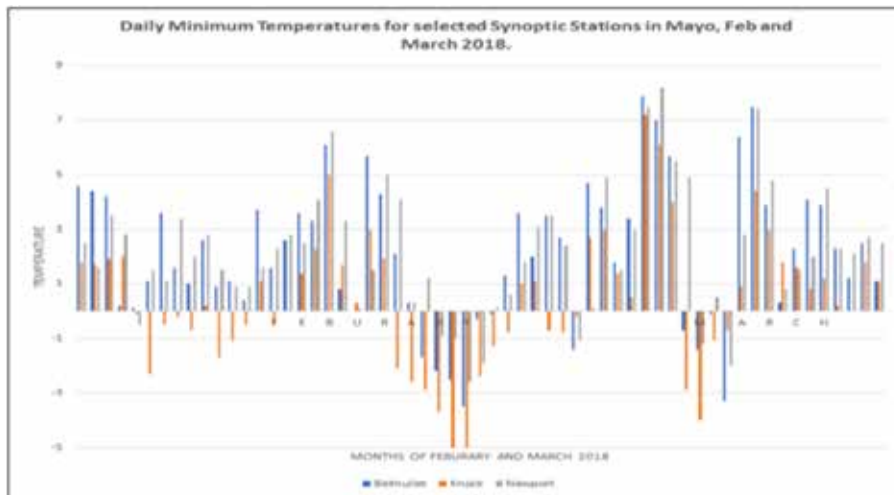
- Beaches damaged, coastal erosion accelerated, change to coastal geomorphology due to flooding and loss of coastal habitats.
- Damage to coastal infrastructure including piers, sea walls, navigational aids and carparks.
- Prolonged flooding of roads and consequently road diversions.
- Severe damage to road infrastructure including complete destruction of some bridges.
- Prolonged flooding of private and public infrastructure.
- Loss of beach infrastructure, blue flag status and tourist numbers.
- Emergency services and the Civil Defence were required to evacuate vulnerable and flooded properties.
- Resources allocated to remediation of flooding in urban and rural areas

CASE STUDY 5: LOW TEMPERATURE, FEBRUARY/MARCH 2018

Storm Emma & 'Beast from the East' took place in February/March 2018. During the third and fourth week of February easterly winds pushed continental polar air across Ireland. Snow showers affected the country on the 27th and led to significant accumulations particularly in eastern and southern counties on the last day of the month.

In March, an exceptionally cold polar easterly airstream (continental) covered Ireland. In addition, Storm Emma tracked northwards from the Bay of Biscay during the first week of March. It yielded widespread snow, ice and low temperatures. It was extremely cold with widespread air and ground frosts.

Source Data: Met Eireann



“The jet stream is currently disrupted so we are getting storms from different regions. “Precipitation at the north of the storm will be met with the Siberian winds sweeping in from the east - and this will create snow.” forecaster Joanna Donnelly 2018

Impacts:

- Transport disruption on all roads, Knock airport, Irish Rail and Bus Eireann. Snow Ploughs, Salt Gritters and extra resources were required.
- Water treatment plants were under pressure in many parts of County Mayo keeping up with water supply demands. Many taps were left running to avoid freezing pipes.
- Minor power outages occurred.
- The freezing temperatures and snow impacted the farming community.
- Civil Defence required to assist vulnerable populations.
- Communities worked closely to resolve issues during this event both locally and nationally.

STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

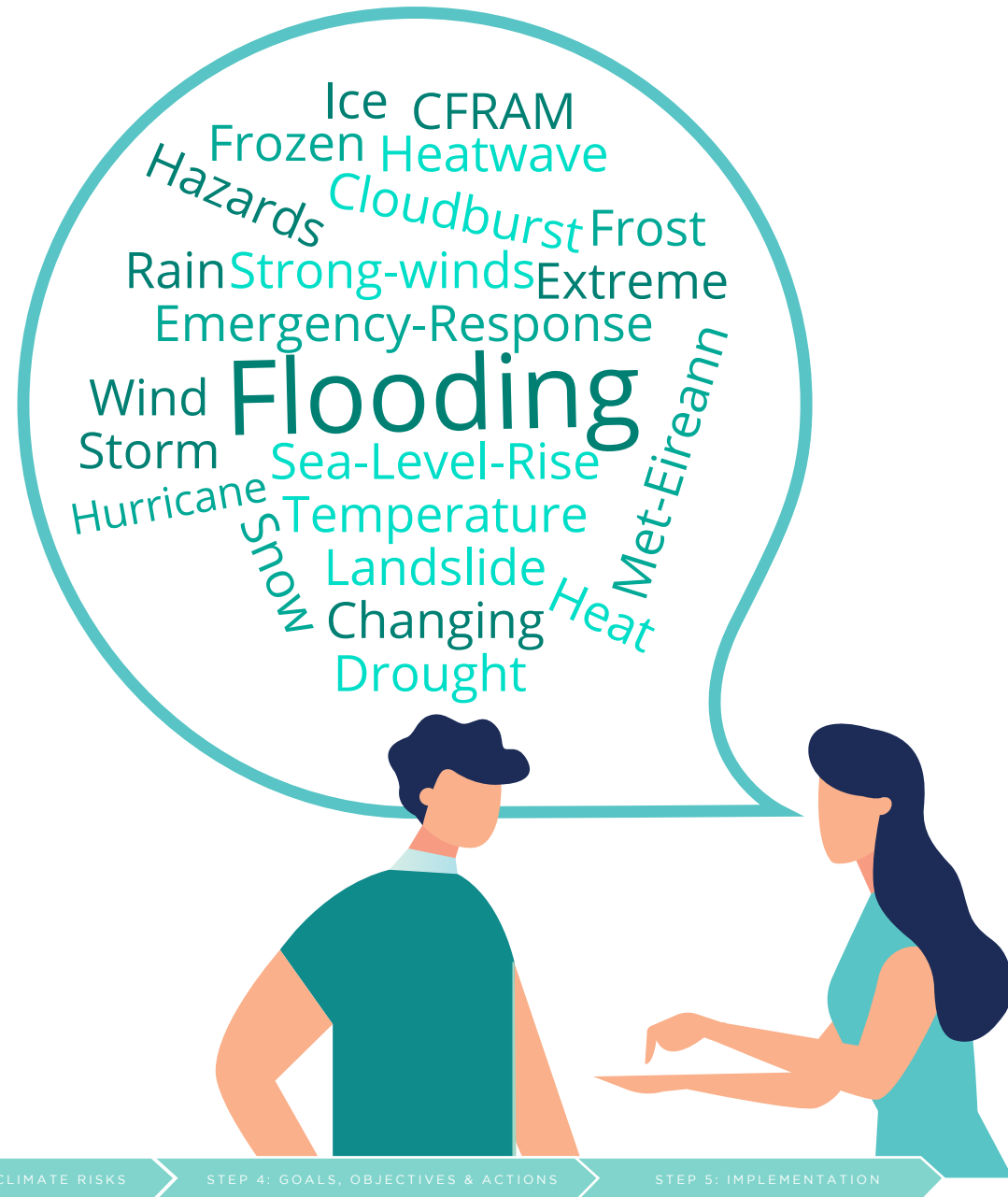
STEP 5: IMPLEMENTATION

MAYO ADAPTATION BASELINE

Climate change is a major challenge for County Mayo and poses a major risk to our communities, businesses, environment and way of life. Observations indicate that temperatures are increasing, precipitation patterns are changing and our sea levels are rising. The severe weather events that have occurred in County Mayo over the past decade clearly indicate the impacts that are likely to be experienced in the future. Extreme weather events are expected to intensify over the coming decades, regardless of how much we reduce our green house gas emissions.

Following analysis by the Climate Adaptation Team, the baseline assessment indicates that strong wind events have emerged as an increasing issue in County Mayo, but the impacts are generally short lived and the clean up relatively quick.

Flooding is a largest source of climate related impact and loss around the County, particularly in the towns of Crossmolina, Ballina, Foxford and Westport, which are exposed to fluvial flooding. Some coastal towns such as Belmullet, Westport and Louisburgh, as well the Islands off County Mayo have also been impacted by sea surge and coastal storms. The analysis also indicates that other impacts on our environment, economy and social activities are starting to emerge over a more gradual time frame as a result of incremental changes in our climate. These include changes in the timing of seasonal life cycle events for animals and plants, agricultural shifts effecting food production process, longer term impacts of precipitation, temperature change and extreme events in infrastructure, clean water and human well being. The economic and social costs associated with both gradual and extreme weather events was also perceived to be increasing during the baseline assessment.



STEP 3: IDENTIFICATION OF CLIMATE RISKS & OPPORTUNITIES



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

RISKS & OPPORTUNITIES

In preparing for climate change, Mayo 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 Team looked at the climate impacts that are of current significance, climate projections, and the consequences for the delivery of services by Mayo County Council. The assessment 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 heatwaves.

Opportunities

Projected changes in climate may also result in additional benefits and opportunities for Mayo. 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.



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 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.



OVERSIGHT

Adaptation to climate change raises important governance issues across the various functional areas of Mayo County Council. Proper oversight of the Adaptation Strategy will play a key role in promoting the transition from planning to implementation of adaptation and the mainstreaming of climate adaptation across the whole organisation.

The various departments of Mayo County Council operate within an existing hierarchy and reporting structure, but also to their own internal policies, regulations, objectives and priorities. A new supporting governance structure is required for the effective implementation of the Climate Adaptation Strategy, to ensure the horizontal coordination of different departments, and to assist in vertical coordination of various stakeholders from regional, national, to local actors.

The implementation of adaptation actions will be a dynamic iterative learning process, and Monitoring, Evaluation, Reporting, will play an important role in the Governance of the Adaptation Strategy.

- **Monitoring:** measuring whether the intended actions are undertaken, understanding whether progress is being made and whether it is suitable for reaching the desired results.
- **Reporting:** providing accountability and communicating information on progress towards adaptation or adaptation outcomes to key stakeholders.
- **Evaluation:** examining what has been achieved by a project or programme, whether it has been successful in delivering the desired outcomes and highlight lessons learned for future developments and plans.

Governance of the Adaptation Strategy will create the space and conditions to achieve the specific Goals and Objectives by aligning principles and norms for climate adaptation policy, decision-making procedures, and in providing overarching structure to address a challenge comprehensively across the organisation.



MAYO.IE

HEALTH & SAFETY

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 occupational health and safety of the Council's workforce has 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. 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 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.

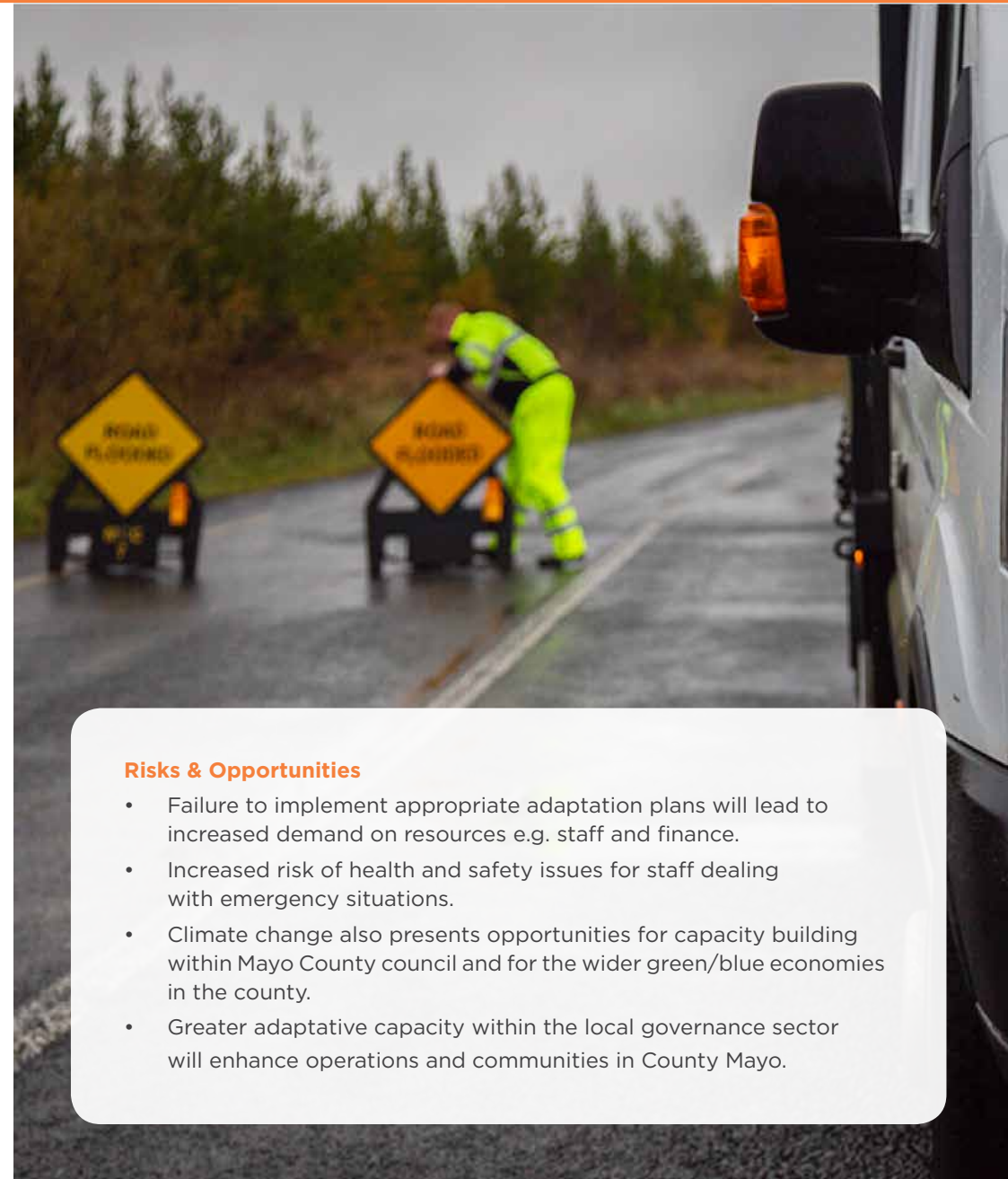
Overheating in buildings has also been identified as an issue during sunny and warm weather, as experienced in 2018. The inability to provide reasonably comfortable or safe temperatures may cause reduced working efficiencies and the closure of workplaces in the future.

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 health and safety 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.
- Increased risk of health and safety issues for staff dealing with emergency situations.
- Climate change also presents opportunities for capacity building within Mayo County council and for the wider green/blue economies in the county.
- Greater adaptative capacity within the local governance sector will enhance operations and communities in County Mayo.



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION



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 Mayo are river (fluvial), coastal (tidal), local intense rainfall (pluvial), groundwater in southern 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 this increased flows. Mayo 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 primarily rural context of County Mayo extreme wind events can cause disruption to road, rail, sea, and air 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.

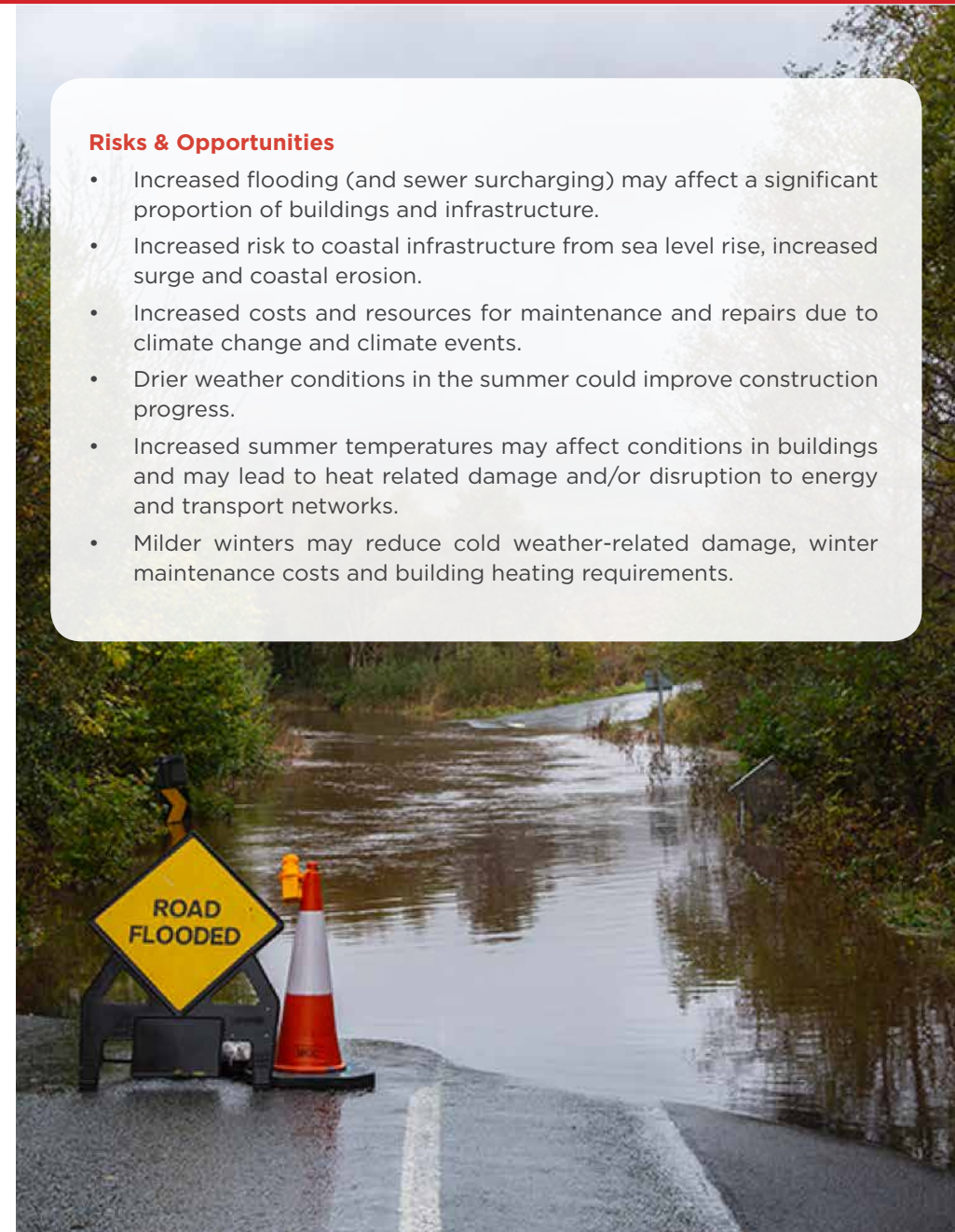
The cascading impact of power outages due to wind related damage to the electricity network can have an effect on most of the operational areas of the authority.

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.



LANDUSE & PLANNING

Effective County and Local Area Development Plans can help to deliver a range of key solutions to climate change issues and can also help local communities to reap the economic, environmental and social benefits of such action over the long term. Implementing adaptation measures through landuse and development policies is an effective strategy to prevent climate impacts on infrastructure and communities, reduce the pressure on natural resources, improve environmental risk management, and influence positive behaviour.

The National Adaptation Framework places a strong emphasis on the role of spatial planning in delivering climate resilience:

“It is clear that climate change considerations need to be taken into account as a matter of course in planning related decision-making processes...

...Effective planning reduces vulnerability to the negative effects of climate change by integrating climate considerations into decision making in order to avoid inappropriate forms of development in vulnerable areas and promoting compact development in less vulnerable areas”

Because of its visible impact, flood risk is often the top priority of any adaptation strategy and the The Planning System and Flood Risk Management Guidelines (2008) provides some direction to local authorities in managing this particular risk. Flood hazard and potential flood risk from all sources need to be identified and considered at the earliest stage in the planning process. A precautionary approach should be applied to reflect uncertainties in flooding datasets, risk assessment techniques and the ability to predict future climate and performance of existing flood defences. Development should also be designed with careful consideration to possible future changes in flood risk, including the effects of climate change and/or coastal erosion so that future occupants are not subject to unacceptable risks.

However, successful adaptation policy involves much more than simply addressing flood risk and has to take account of a range of severe and complex climate impacts. Even if global climate stabilisation can be achieved at no more than a 2°C global temperature change compared with preindustrial levels), there will be a dramatic increase in severe weather incidents – from heat waves to flooding and major changes in rainfall that will have a major impact on water supply.

Dealing with this reality requires holistic planning over the long term based on an understanding of how such changes will interact and affect people’s health and wellbeing, and includes everything from flood risk to heat stress. Building climate resilience requires an inter-organisational, inter-departmental local response in which the local plan can be an integrating aspect.

For much of the adaptation action that can be taken there will be multiple benefits, such as in the deployment of green infrastructure. As part of planning for a wider green infrastructure network to support local biodiversity and healthy living environment, green infrastructure can provide for climate adaptation, for example through urban cooling and local flood risk management.

County and Local Development Plans can set out how the local authority area will be planned over the long term to adapt to the opportunities and impacts arising from climate change. Development Plans need to consider adaptation action across all spatial scales, from micro building-scale measures to future patterns of urban development. In some areas this may require the radical reconsideration of future growth options. The actions in this adaptation strategy seek to work with and inform the strategic objectives, policies and development standards of the County Development Plan, in line with the provisions of the NPF and the RSES.

COASTAL & MARINE ENVIRONMENT

The Mayo 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 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 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 on the long-term viability of coastal defences and the communities they protect.

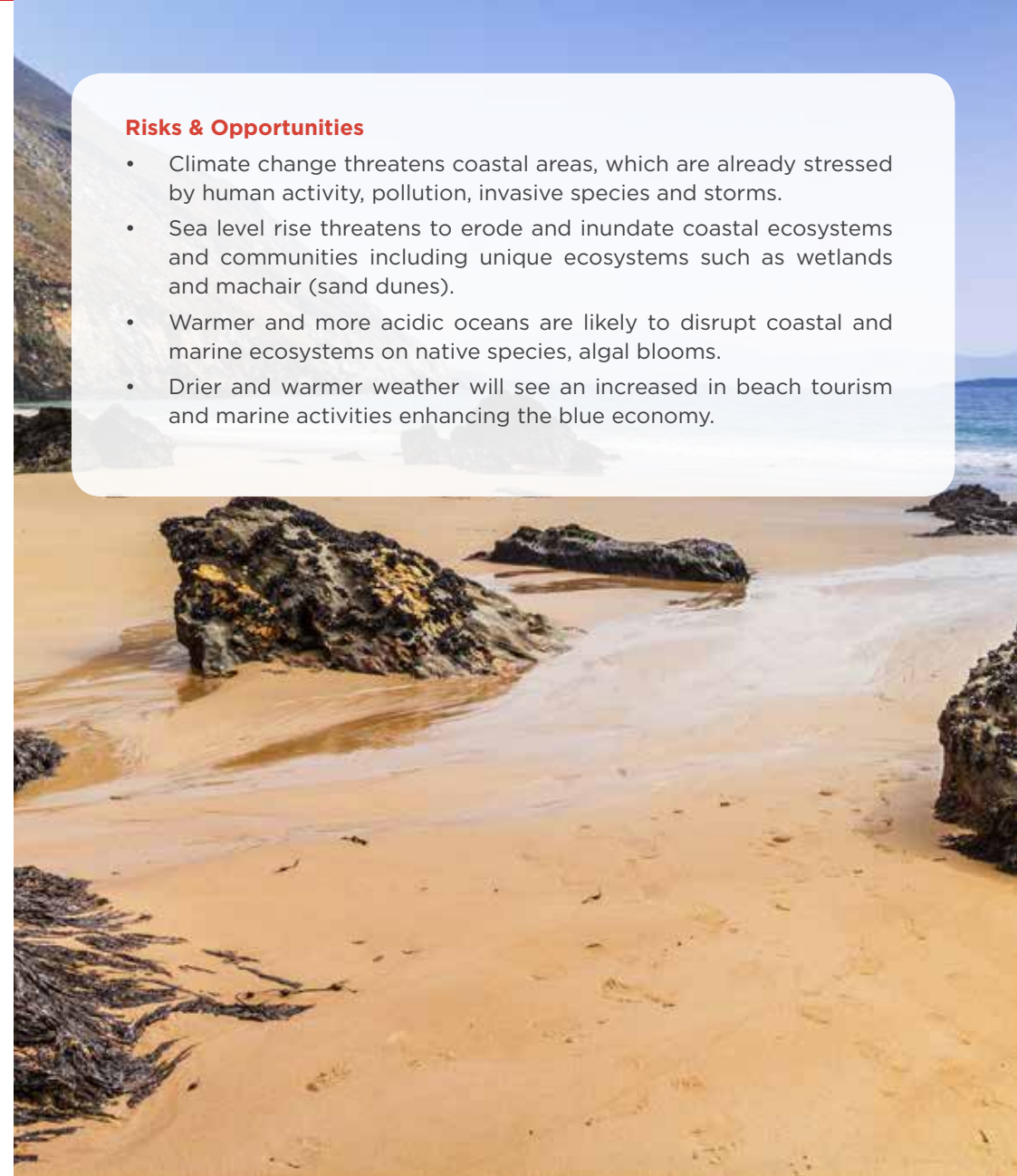
Sea level rise and an increase in wave energy will alter coastal morphology and these changes to coastal processes will have the most considerable effects in low-lying vulnerable environments along the coast.

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 the foundations of some fortifications, such as Rockfleet Castle on the shores of Clew Bay.

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 and communities 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.



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 °C- 2.5°C 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.

Mayo's wildlife, 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.

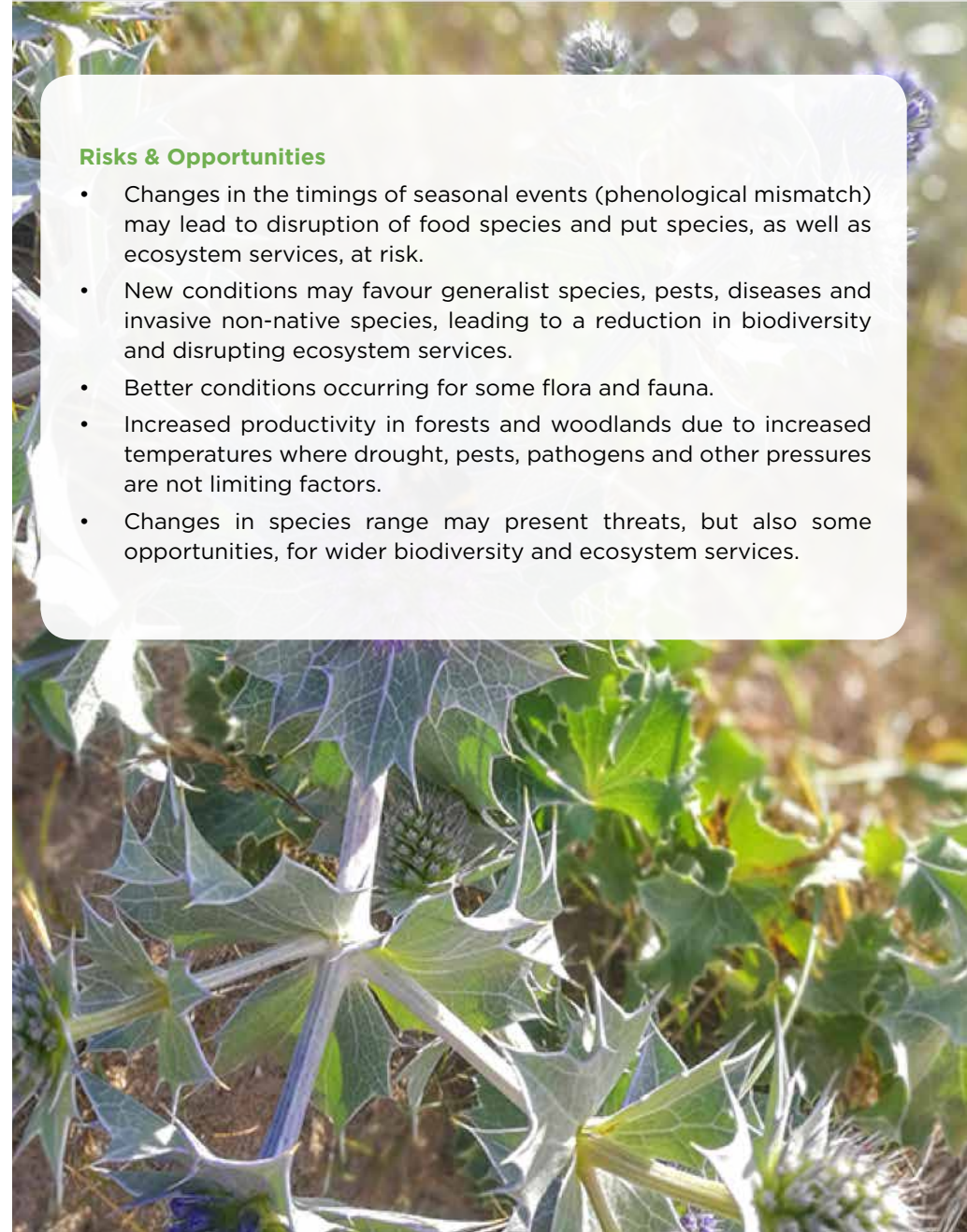
These new climatic conditions may be more favourable to species of plants or animals that currently do not live here, but which may in time become invasive at the expense of existing species. This is already occurring e.g. on our inland waterways and the spread of Zebra Mussels.

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 the most productive ecosystems in Mayo may shrink significantly as a result of climate change, namely peatlands and coastal habitats.

Peatlands

Peatlands account for approximately 38% of land cover in Mayo and 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 functioning of peatlands in Mayo 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 changes 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 Mayo’s rare protected species, including Annex II listed.

Coastal Habitats

Coastal areas are of particular concern through the combined effect of sea level rise and increasing storm surges is eroding coastal habitats. Some habitat shift landwards is possible but may be inhibited in some places by man-made barriers such as 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 saltmarshes 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.

CULTURE & HERITAGE

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

Mayo's most prominent cultural asset is its landscape, which has been continually shaped by the sea and human activity. Inevitably, the character of Mayo's landscape will change in response to climate change. In most cases this landscape change is likely to be gradual and subtle.

Climate change predicted will exacerbate existing processes of decay and damage, but the greater frequency of extreme events e.g. flooding, may also result in abrupt intensification of these processes or irreparable damage to some elements.

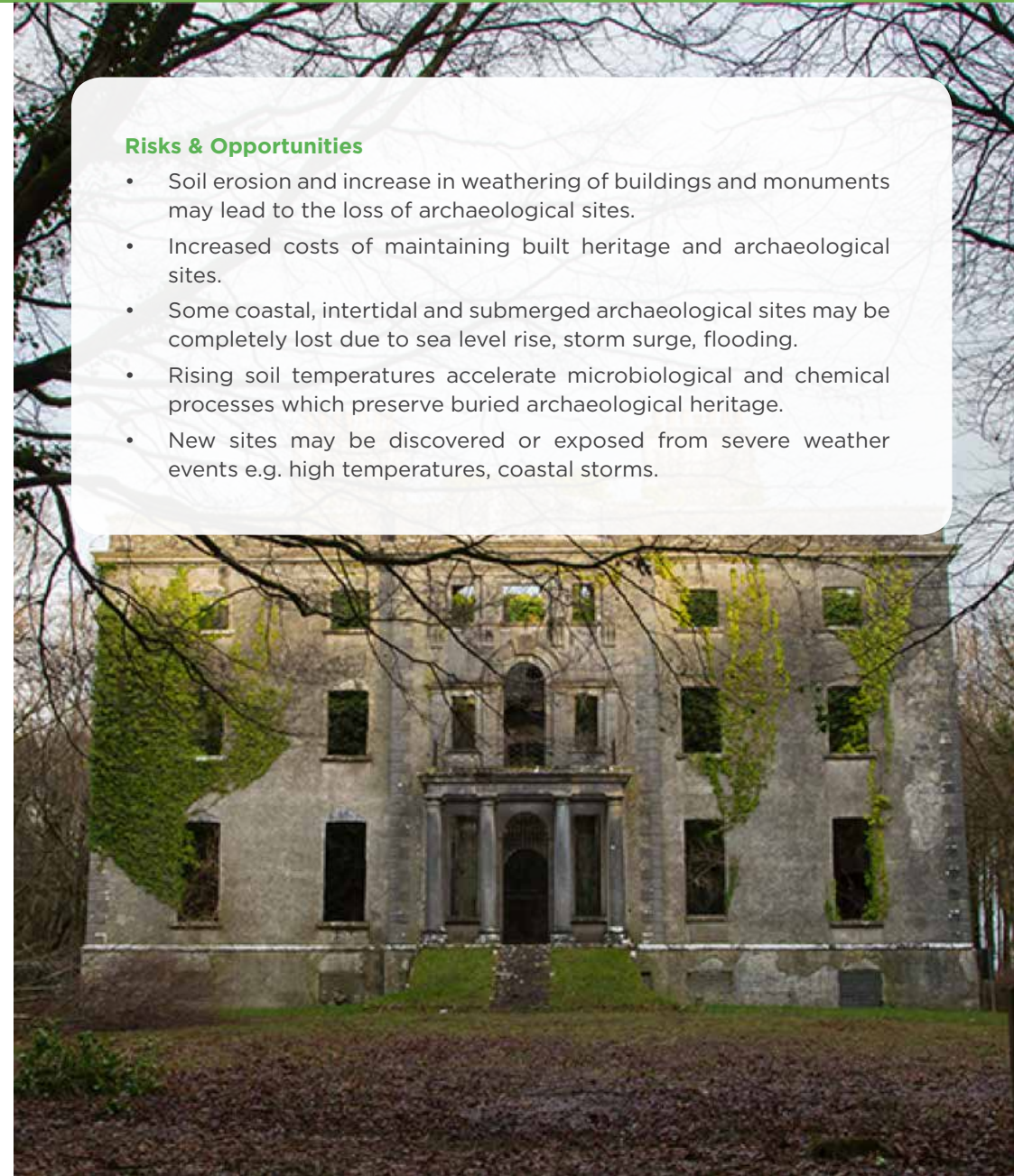
Major impacts on coastal cultural heritage are likely to occur from projected sea level rise, increased coastal erosion and coastal flooding, more frequent storm events and greater wave energy. Coastal erosion will be one of the most widespread and demanding impacts of climate change, posing challenges 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.



TOURISM

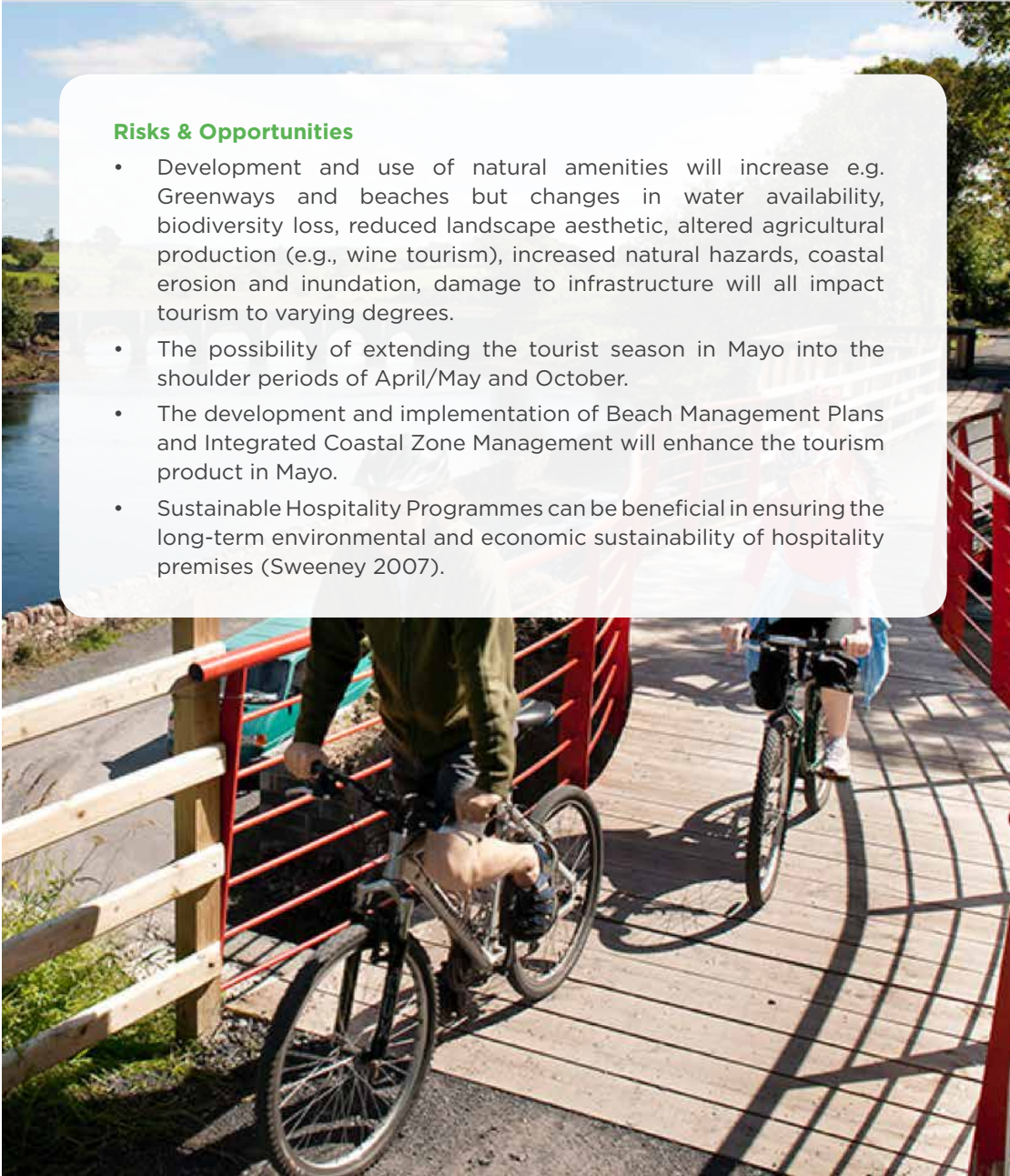
Visitors to Mayo choose to visit for many reasons, among them being the richness of Mayo’s cultural and natural heritage. As changes to the climate affect our natural heritage, this will have implications for Mayo’s tourism industry. We need to build an understanding of the likely effects on tourism 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”.[Failte 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 to Mayo 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 Mayo. For example, warmer drier summers e.g. 2018, will increase the appeal of many of Mayo’s Blue Flag Beaches, as well as the appeal of our Greenways, our water-based and other outdoor activities. This will bring its own pressures on amenities, services and resources and it will be necessary to prepare for 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 Mayo’s 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 (e.g., wine tourism), increased natural hazards, coastal erosion and inundation, damage to infrastructure will all impact tourism to varying degrees.
- The possibility of extending the tourist season in Mayo into the shoulder periods of April/May and October.
- The development and implementation of Beach Management Plans and Integrated Coastal Zone Management will enhance the tourism product in Mayo.
- Sustainable Hospitality Programmes can be beneficial in ensuring the long-term environmental and economic sustainability of hospitality premises (Sweeney 2007).



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

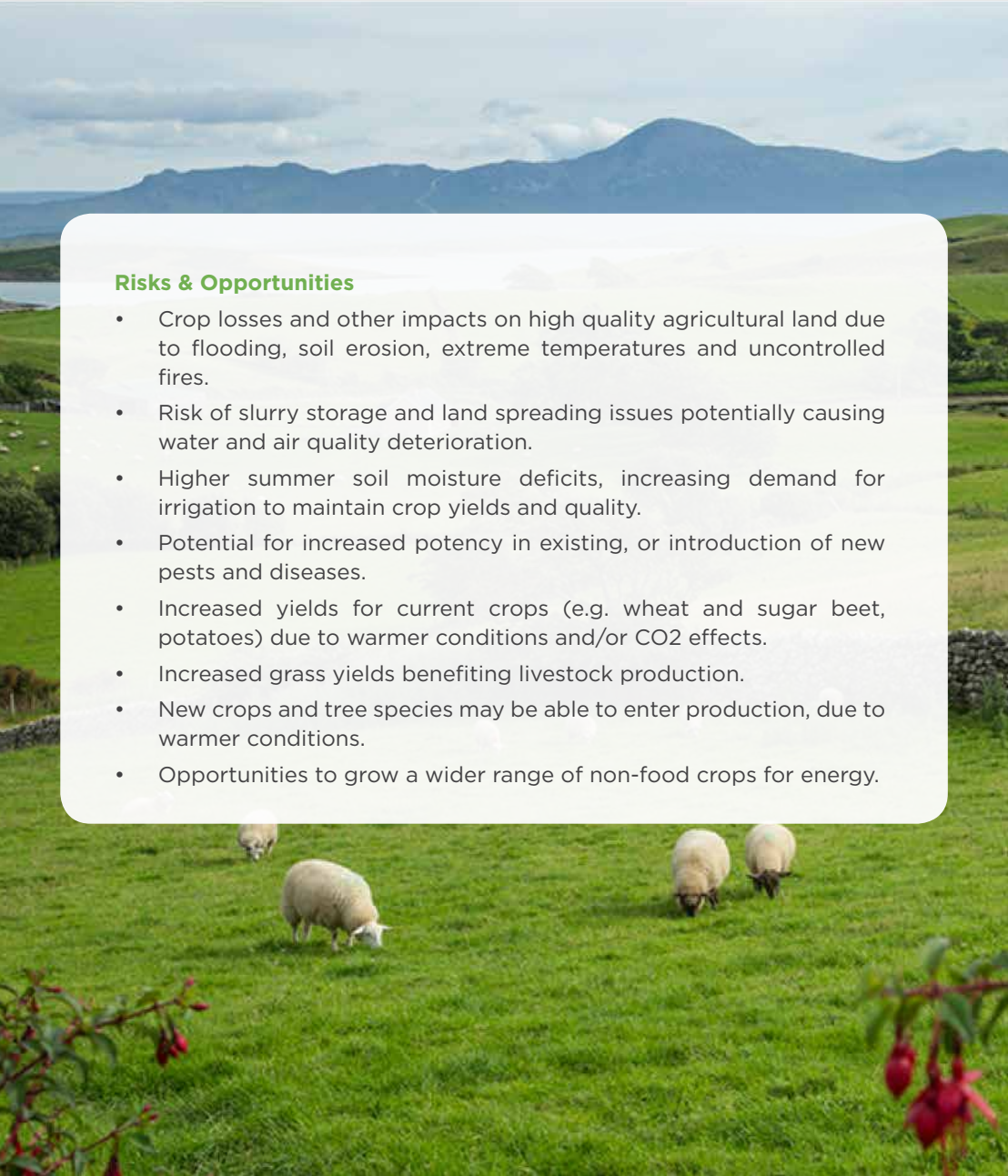
STEP 5: IMPLEMENTATION

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, extreme temperatures and uncontrolled fires.
- Risk of slurry storage and land spreading issues potentially causing water and air quality deterioration.
- 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.



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 Mayo 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.

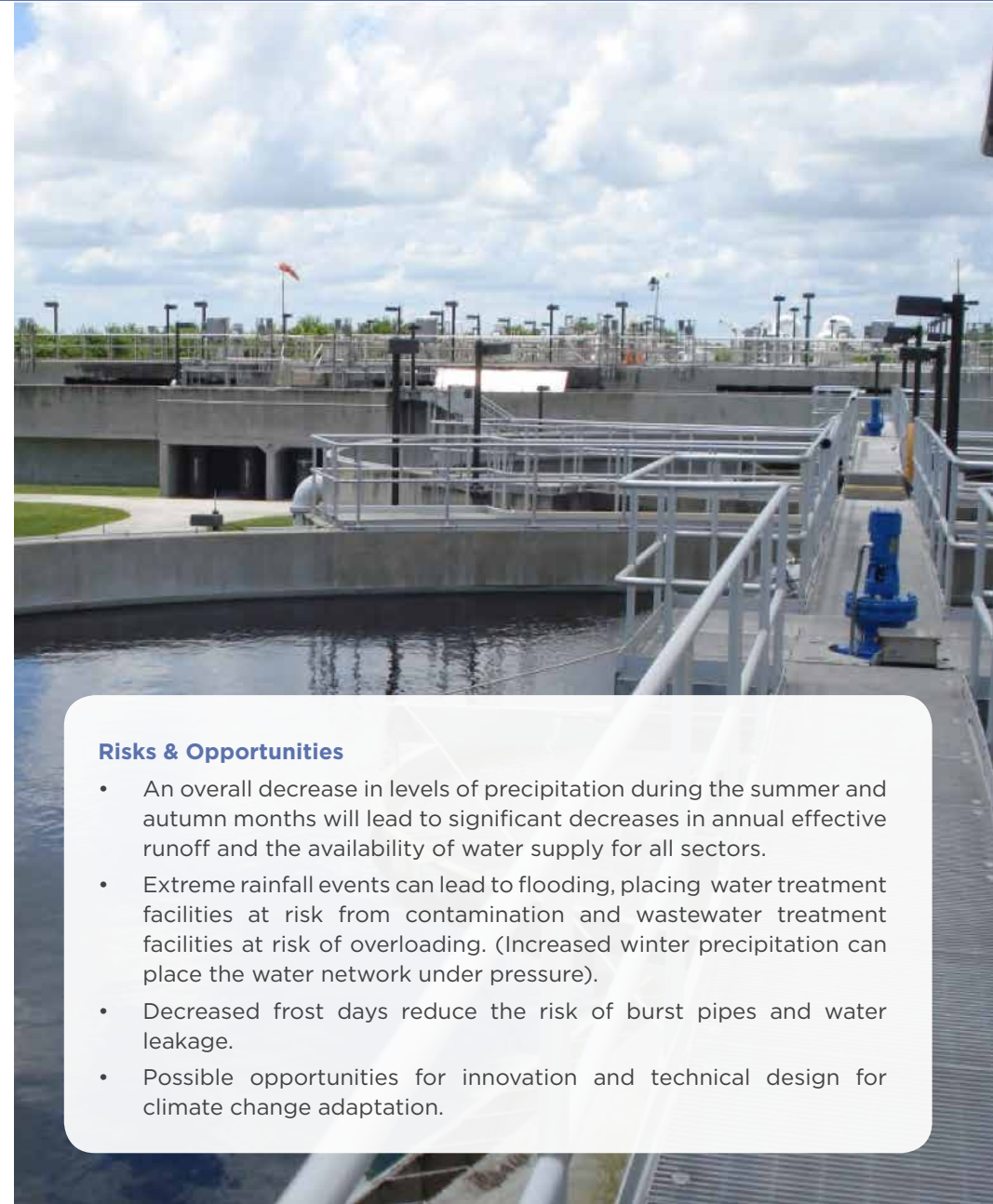
The review of water supply vulnerability to climate change also identified that pressure will not just come from the domestic sector, but other sectors such as agricultural are particularly sensitive to climate change.

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.

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.

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.

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 Mayo 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.

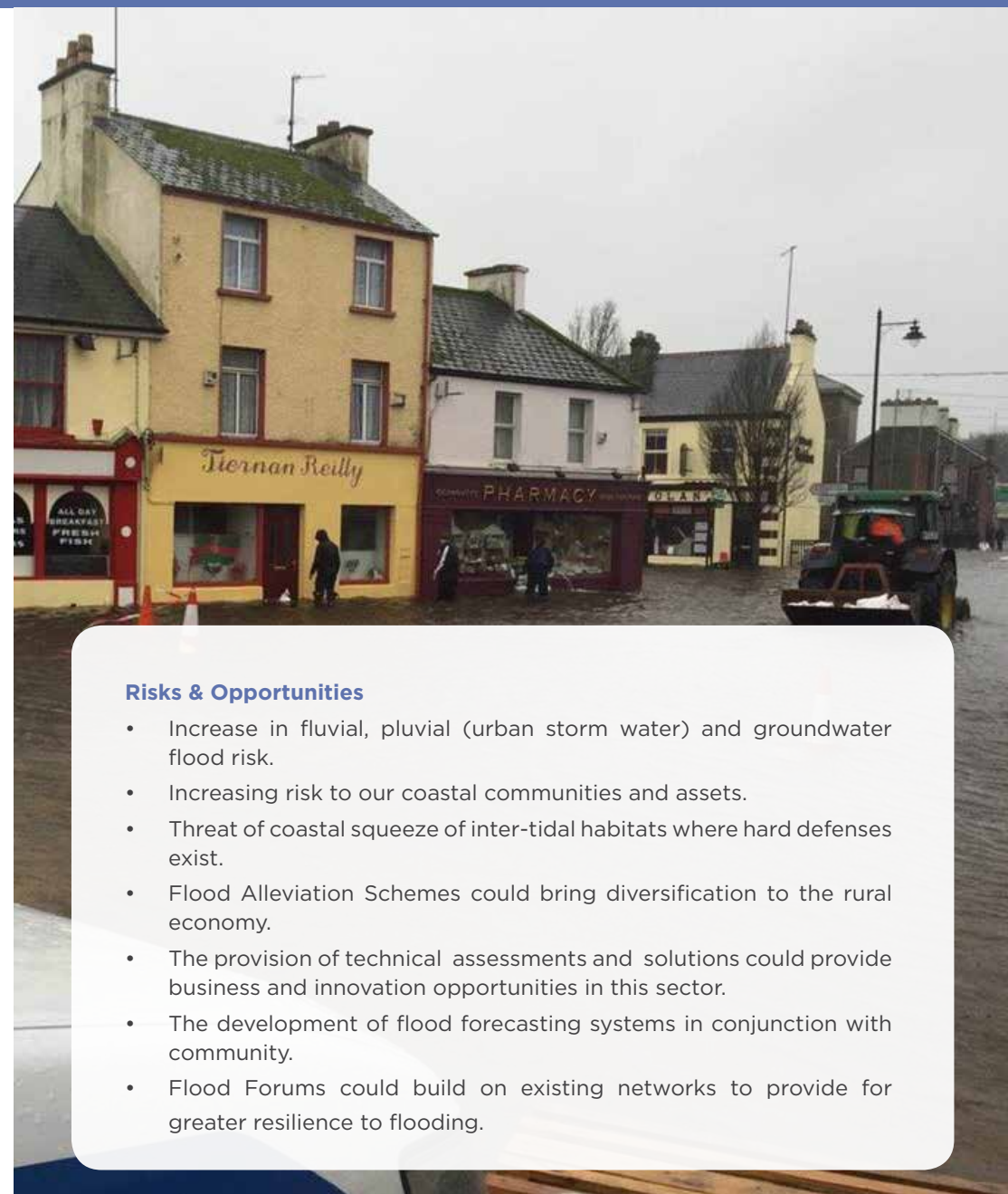
The projected changes raise concerns regarding the integrity of flood defences, the capacity of urban storm drainage systems, the need for better planning and development in vulnerable areas, as well as emergency response planning and resourcing. Additional adaptation may be able to counter the increase 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 Mayo 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.



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION



COMMUNITY & BUSINESS SUPPORT SERVICES

Community Engagement & Sports Partnership

Many of Mayo's communities and sporting organisations vulnerable to climate change impacts are already dealing with climate change and have experience of adapting.

Crossmolina town is a good example of a community using their own knowledge and decision-making processes to act against flooding, in advance of the major flood protection scheme being implemented by Mayo County Council in conjunction with the OPW.

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

Local Enterprise Office

Some of the impacts on business in Mayo 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.

The Local Enterprise Office Mayo forms part of the Enterprise & Investment Unit within Mayo County Council and acts as a "First Stop Shop" for anyone seeking information and support on starting or growing a business in Mayo. 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.

EMERGENCY MANAGEMENT

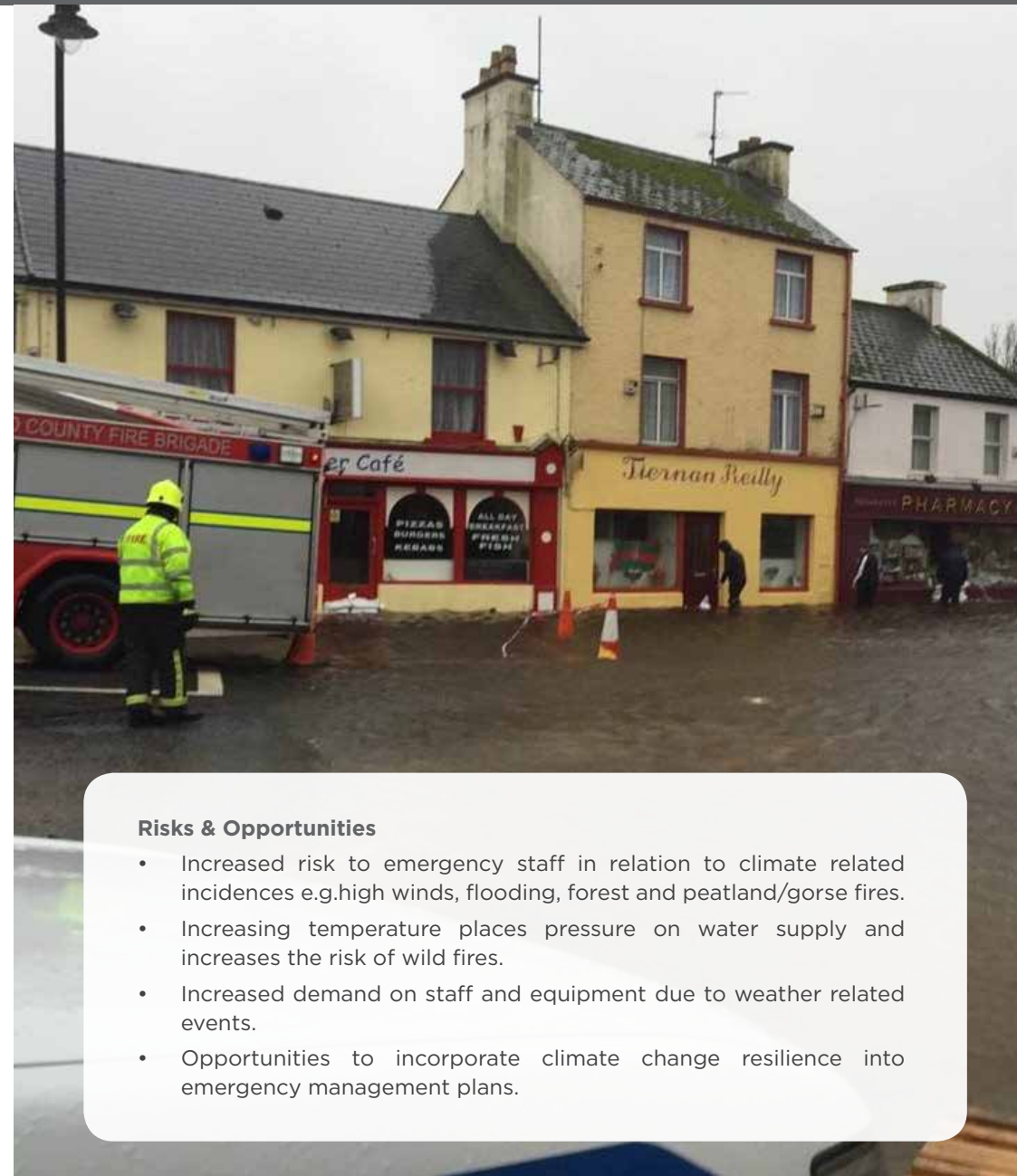
Mayo County Council plays a pivotal role in planning for and responding to emergency situations. In managing climate risks and vulnerabilities, Mayo County Council possess up-to-date knowledge of the local natural and man-made environment.

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.

Mayo County Council's communication section plays an important role informing the public of warnings, and in providing advice during and after climate events. There is a risk that these services may be disrupted during extreme storm events.

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 poisoning or infection.

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



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.

HEALTH & WELLBEING

Climate change will have major impacts for health on a global scale, acting as an amplifying factor for many causes of illness. The potential impacts on health are wide ranging such as deaths, injuries, respiratory disease, heat stroke, poisoning, water-borne diseases, infectious diseases, under nutrition, mental illness.

Climate change can influence health through altering exposure to stressors such as extreme weather events; infectious diseases; changes in the quality and safety of air, food, and water; and stresses to mental health and well-being. The Health Sector Adaptation Strategy has identified a number of climate scenarios with profound health implications.



Increased Ultraviolet Radiation & Sun Exposure

As most Irish people have fair skin we are particularly vulnerable to UV damage and at a higher risk of skin cancer. Higher ambient levels of Ultraviolet (UV) radiation and the potential of increased time spent outdoors, could increase health risks associated with UV including some skin cancers. However, moderate exposure to the sun is beneficial for the production of vitamin D.



Air pollution

Climate change is expected to aggravate existing health risks through weather-driven increases in air pollutants such as ozone and particulate matter (PM).



Windstorms

There is a direct risk from storm events, such as Storm Ophelia in 2017 when three people died, but also indirect health impacts such as disruption to road infrastructure and power, and in the health service there was widespread disruption to outpatient services, hospital procedures and discharges.



Heat / Heatwaves

While warmer weather may reduce the risk of cold-related illness and may potentially improve wellbeing and physical activity levels, extreme heat and heatwaves are also projected to increase in frequency. Extreme heat can cause heat exhaustion and heat stroke as well as aggravate pre-existing health conditions such as cardiovascular, respiratory and neurological disorders.



High Precipitation / Flooding

Flooding has direct health impacts, through drownings or injury. There are also indirect health effects from flooding including impacts arising from damage to infrastructure; injuries during the clean-up phase following a flood; risks from chemical contamination of water due to overloaded sewers, stormwater floods and landfill sites. There has been an observed increase in waterborne diseases such as leptospirosis in the aftermath of heavy flooding in European countries in recent decades. While outbreaks of infectious disease due to flooding are rare, private wells compromised by flood damage potentially could lead to an increase in water-borne illness.

There are also possible negative impacts on short- and long-term mental health from the loss of personal belongings, potential loss of livelihood or from displacement.



Potential Indirect Benefits

There are potential health co-benefits of measures to reduce greenhouse gas emissions, such as a decline in air pollution, increased physical activity as a result of reduced car use in urban centres, and health benefits from reduced dietary saturated fat consumption from animal products.

STEP 4: GOALS, OBJECTIVES & ACTIONS



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

OUR VISION FOR A CLIMATE READY MAYO

Mayo County Council is already taking steps to improve energy efficiency and to reduce our carbon emissions, as part of the global fight against climate change.

While working to reduce our green house gas 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.



Communicate

A clear communication strategy and climate awareness programme has helped the public understand the reasons and benefits of adaptation improvements.

Collaborate

As Mayo faces new challenges and opportunities, all parties collaborate to make sure climate resilience is taken into account in plans, policies and investment decisions.

Empower

Empowered communities, responsible businesses and public sector organisations work together in trust and partnership to shape how the county develops.

Champion

The county is building a reputation as a champion in climate adaptation (and mitigation), drawing international attention, and opening up funding and investment opportunities.

Our Vision of a Climate Ready Mayo

A county that understands how climate change will affect the region, our businesses and communities, and actively working together to reduce our exposure to climate risks and to capture new opportunities.

HOW WE WILL MEET THESE ADAPTATION GOALS

Engage

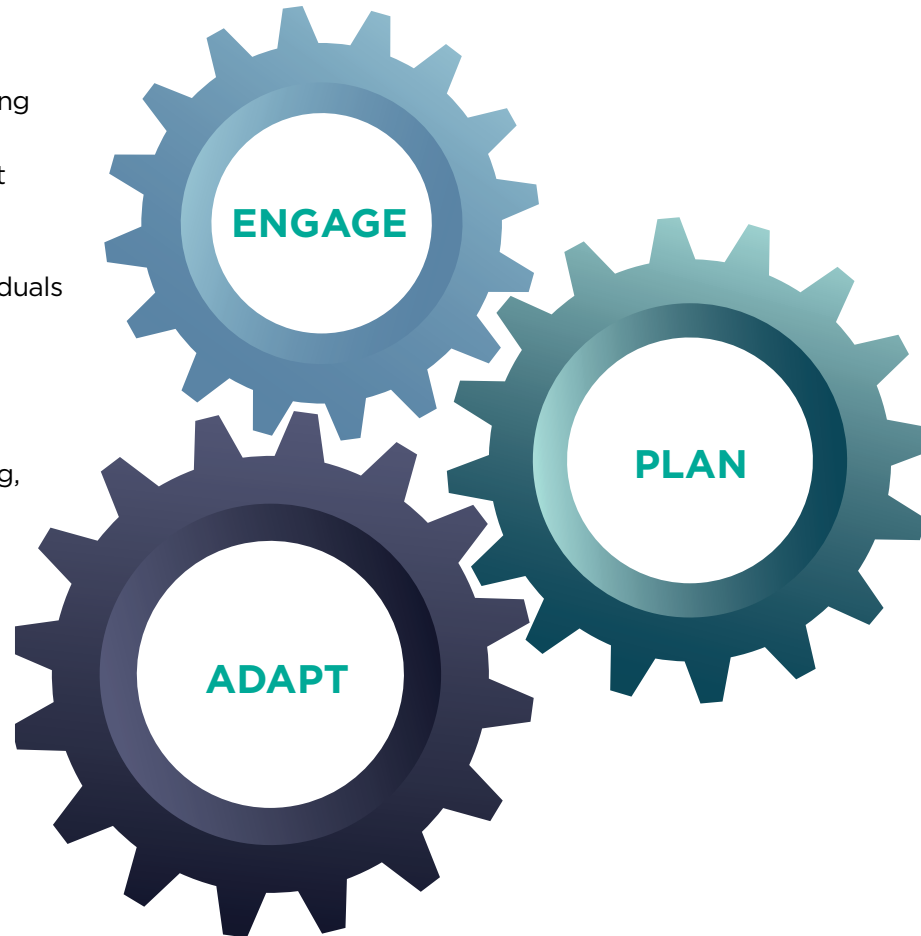
Improve education, awareness-raising and capacity on climate change, adaptation (and mitigation), impact reduction and early warning across the Local Authority departments, businesses, communities and individuals

Plan

Integrate climate change measures into policies, strategies and planning, as well as the identification of areas at risk to inform planning and decision-making

Adapt

Strengthen resilience and adaptive capacity, and develop and implement co-ordinated responses to climate risk where needed



Monitoring, Reporting & Evaluating will be an essential component of implementing the Adaptation Strategy to track the success of our actions and identify emerging risks and opportunities



ADAPTATION GOALS, OBJECTIVES & ACTIONS

The Goals, Objectives and Actions of the Adaptation Strategy provide an overarching framework for climate adaptation planning in Mayo.

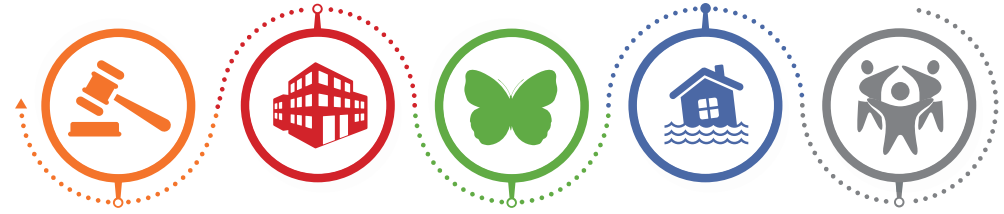
The Adaptation Actions will be implemented in the Short (5 years or less), Medium (greater than 5 and less than 10 year) and Long term (greater than 10 years).

Many of the early Actions are centred around awareness, training, and updating policies, procedures and plans to take account of climate projections and impacts.

For those measured for implementation in the medium and long term, some Actions have been identified to gather data and build a better understanding of impacts in the short term.



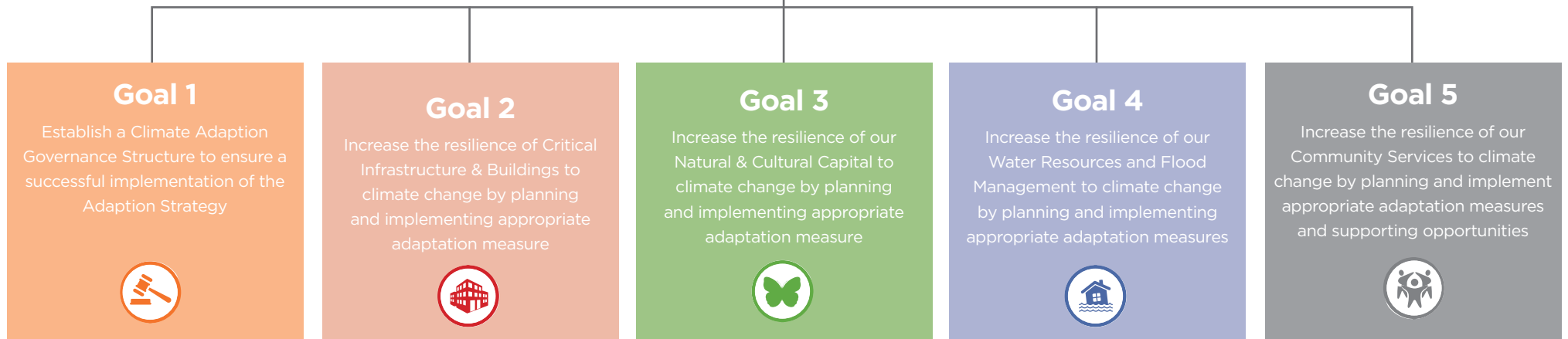
GOALS FOR A CLIMATE READY MAYO

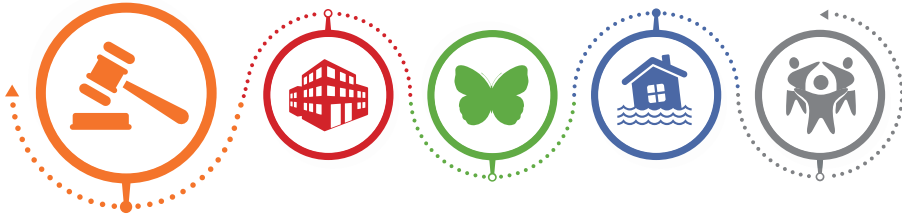


This first Climate Adaptation Strategy for the Mayo County Council is a starting point on our adaption journey towards a Climate Ready Mayo. To achieve a Climate Ready Mayo, five Goals have been identified under this first Strategy, which are high level long-term statements

A Climate Ready Mayo

A county that understands how climate change will affect the region, our businesses and communities, and actively working together to reduce our exposure to climate risks and to capture new opportunities





OUR VISION OF A CLIMATE READY MAYO GOVERNANCE

This is Mayo County County's first Climate Adaptation Strategy to provide a framework for dealing with the impacts of climate change across its functional areas. Integrating climate risk into the relevant business operations of Mayo County Council will be extremely important in terms of

- (a) Building resilience to the impacts of climate change locally and,
- (b) Capturing opportunities in terms of benefits to the natural environment and positive contributions to local economies.

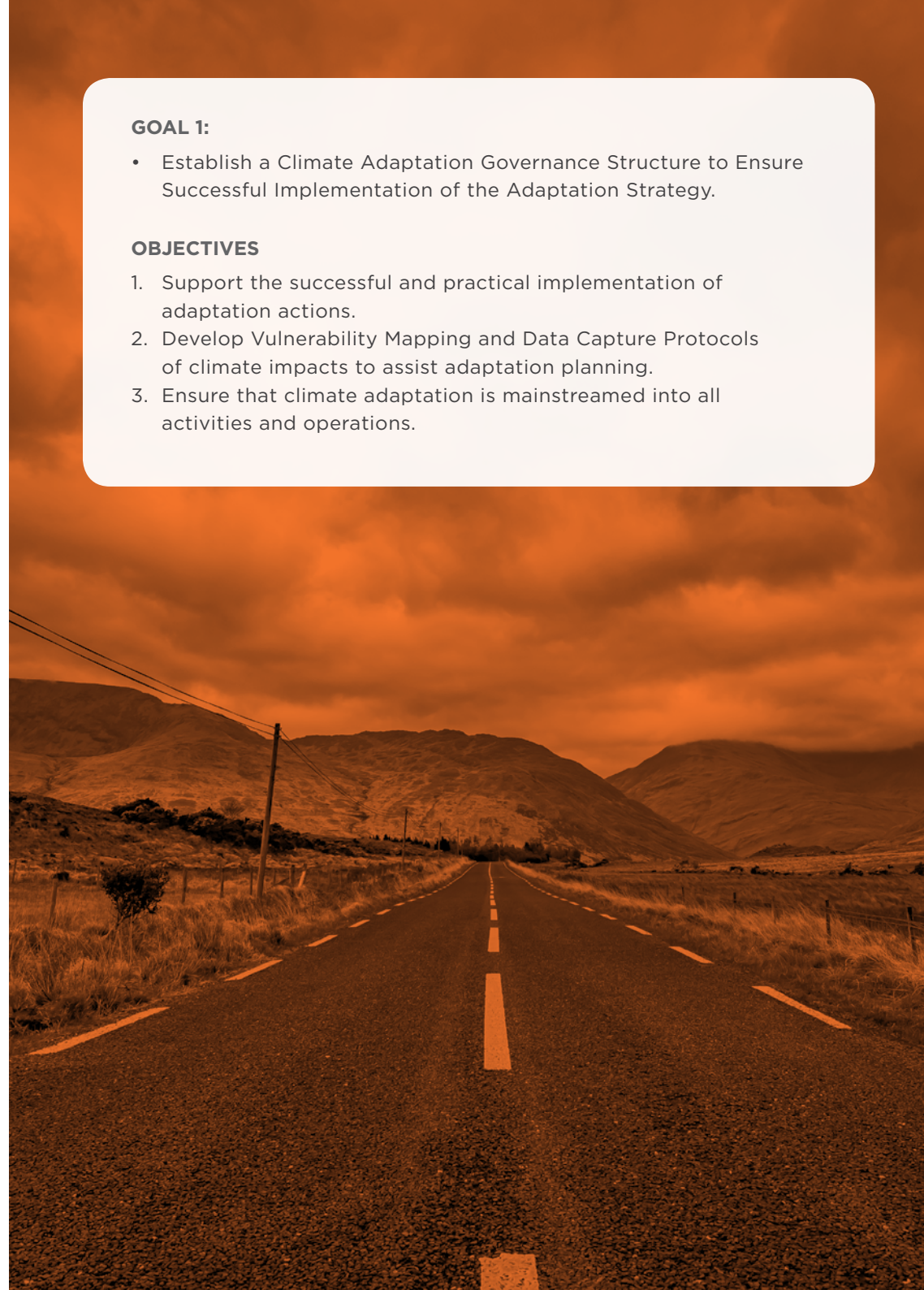
The Governance & Support Structure proposed under this Strategy will allow for implementation and monitoring of the adaptation actions and climate adaptation considerations into all activities and functions of the Council.

GOAL 1:

- Establish a Climate Adaptation Governance Structure to Ensure Successful Implementation of the Adaptation Strategy.

OBJECTIVES

1. Support the successful and practical implementation of adaptation actions.
2. Develop Vulnerability Mapping and Data Capture Protocols of climate impacts to assist adaptation planning.
3. Ensure that climate adaptation is mainstreamed into all activities and operations.



ACTION: GOVERNANCE

GOAL 1: ESTABLISH A CLIMATE ADAPTATION GOVERNANCE STRUCTURE TO ENSURE SUCCESSFUL IMPLEMENTATION OF THE ADAPTATION STRATEGY

OBJECTIVE 1: SUPPORT THE SUCCESSFUL AND PRACTICAL IMPLEMENTATION OF ADAPTATION ACTIONS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
1	<p>Establish a Climate Adaptation Steering Group with representatives from the key functions of Mayo County Council to:</p> <p>1.1. Ensure the successful implementation of the Mayo Climate Adaptation Strategy and oversee the mainstreaming of Climate Adaptation into all plans, programmes, strategies and policies of Mayo County Council.</p> <p>1.2. Coordinate the development of Implementation Plans for each Adaptation Action.</p> <p>1.3. Develop Key Performance Indicators to be used to track and monitor actions and report on progress of the Adaptation Strategy.</p> <p>1.4. Through the Steering Group and/or its sub groups facilitate potential partnerships and/or funding sources to take forward projects across the county.</p>	Short	✓	Senior Management Team	CARO, Sectors named in the NAF, Government Departments, EU Funds
2	<p>Include the objective of being “Climate Ready” as a Strategic Goal of the Corporate Plan, providing for all local authority activities and the delivery of functions and services across the administrative area. Prepare an annual progress report on the Strategy which will be submitted to the Council with the draft budget.</p>	Short	✓	Senior Management Team	CARO
3	<p>Support to Local Climate Adaptation: Support the local implementation of climate change policy by identifying how local priorities can be pursued in line with climate change objectives to ensure that all forms of climate inequality are reduced.</p>	Short	✓	Environment, Climate Change & Agriculture	CARO, DCCE
4	<p>Liaise, collaborate and work in partnership with the sectors identified in the NAF, subject to funding and resources, in the delivery of the Government approved sectoral adaptation actions, where they relate and are relevant to the functions and activities of the council at local level.</p>	Short	✗	Climate Adaptation Steering Group	All Sectors, CARO

GOAL 1: ESTABLISH A CLIMATE ADAPTATION GOVERNANCE STRUCTURE TO ENSURE SUCCESSFUL IMPLEMENTATION OF THE ADAPTATION STRATEGY

OBJECTIVE 1: SUPPORT THE SUCCESSFUL AND PRACTICAL IMPLEMENTATION OF ADAPTATION ACTIONS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
5	Liaise, collaborate and work in partnership with the Atlantic Seaboard North CARO in the delivery of adaptation actions from this strategy.	Short	✓	Climate Adaptation Steering Group	CARO

OBJECTIVE 2: DEVELOP VULNERABILITY MAPPING AND DATA CAPTURE PROTOCOLS OF CLIMATE IMPACTS TO ASSIST ADAPTATION PLANNING

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
6	<p>Data Capture of Impacts of Extreme Climate Events:</p> <p>6.1. Research, collate and document the full impacts of extreme climate events in Mayo, including areas and</p> <p>6.2. Capture the impacts of climate events on critical infrastructure and buildings through GIS mapping to help identify hazards and vulnerable areas to allow for future adaptation planning.</p> <p>6.3. Develop a reporting and information sharing system that allows for the assessment of the full impacts of climate change and supports a true economic evaluation of adaptation projects in the future.</p>	Short	✓	Climate Adaptation Steering Group	Government
7	<p>Capture Cost of Climate Events:</p> <p>Develop procedures and templates to ensure that the financial aspects of extreme weather are collated, recorded and reported to operational and senior management team</p>	Short	✓	Finance	All Departments, CARO

GOAL 1: ESTABLISH A CLIMATE ADAPTATION GOVERNANCE STRUCTURE TO ENSURE SUCCESSFUL IMPLEMENTATION OF THE ADAPTATION STRATEGY

OBJECTIVE 3: ENSURE THAT CLIMATE ADAPTATION IS MAINSTREAMED INTO ALL ACTIVITIES AND OPERATIONS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
8	<p>Develop and engage with Climate Change Awareness Training to staff and elected members:</p> <p>8.1. Awareness of climate change projections and implications of climate change in Mayo.</p> <p>8.2 Build expertise, capacity and increase knowledge base through relevant training programmes on Climate Change and its implications on the operations/ functions of Mayo County Council.</p> <p>8.3. Identify and address knowledge gaps in Flood Risk Management and Flood Risk Assessments.</p>	Short	✓	Climate Adaptation Steering Group	CARO
9	<p>Integrate climate adaptation action into the Service Delivery Programme and provide for its translation to Team Development Plans and Personal Development Plans to enable actions to be directly pursued per operational area.</p>	Short	✓	Senior Management Team	
10	<p>Review and update the Health & Safety statements and Risk Assessments to take account of climate change, frequency and severity of climatic events:</p> <p>10.1. Ensure risk statements and assessments are completed for job roles in each operational area taking into consideration the potential risks to works from extreme weather events.</p> <p>10.2. Review operational plans and alerts for outdoor and indoor workers around time of climate events.</p> <p>10.3. Develop an internal communication protocol for extreme weather events to avoid ambiguity, increase staff.</p>	Short	✓	Corporate Affairs	All Departments, HSE
11	<p>Develop Business Continuity Plan to identify and address the impacts associated with extreme weather events on all functions/services of Mayo County Council and explore measures to increase resilience and to maintain an acceptable level of service.</p>	Short	✓	Corporate Affairs	All Sectors, CARO



OUR VISION OF A CLIMATE READY MAYO

CRITICAL INFRASTRUCTURE & BUILDINGS

Disruption to critical infrastructure is kept to a minimum despite an increase in extreme rainfall, storm events and sea level rise.

Smarter and sustainable transport continues to grow across the county, reducing pressure on the road network infrastructure, improving health and allowing for essential travel and haulage has become more efficient. Proactive road maintenance ensures road surfaces and foundations are resilient to new climate pressures.

New developments combine cutting edge technologies with green and blue architecture, to create demonstration sites and new buildings that are climate ready. By utilising natural systems this green and blue infrastructure is also delivering co-benefits for carbon reduction efforts, linking climate adaptation and mitigation.

GOAL 2:

- Increase the resilience of Critical Infrastructure & Buildings to climate change by planning and implementing appropriate adaptation measure.

OBJECTIVES

1. Integrate climate change and climate adaptation into the County and Local Area Development Plan.
2. Implement a new Development Checklist & Guidance Document.
3. Promote green Infrastructure and climate resilient solutions.
4. Ensure new developments are planned and built in consideration of future flood risk projections.
5. Implement a Risk & Opportunities Register for Critical Infrastructure and Buildings.
6. Increase the resilience of Social Housing & Building Stock.
7. Increase the resilience of roads and transport infrastructure.
8. Undertake a risk assessment for Waste Management Activities.
9. Work towards the development of an Integrated Coastal Zone Management Plan.

ACTION: INFRASTRUCTURE

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 1: INTEGRATE CLIMATE CHANGE AND CLIMATE ADAPTATION INTO THE COUNTY AND LOCAL AREA DEVELOPMENT PLAN.

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
12	<p>Identify and integrate climate change as a critical consideration, guiding principle and/or strategic objective informing the Mayo County and Local Area Development Plans and apply planning policies to reduce the vulnerability of County Mayo to the impacts of climate change:</p> <p>12.1. Promote quality climate resilient and sustainable design and construction.</p> <p>12.2. Incorporate the role of the natural environment to promote climate adaptation through promoting green infrastructure, such as living roofs and walls in appropriate locations.</p> <p>12.3. Promote the design and construction of new developments to create low carbon, walkable neighbourhoods and work places containing high quality green and blue infrastructure.</p> <p>12.4. Review the SUDs design requirements within the County and Local Area Development Plans.</p> <p>12.5. Implement the Flood Planning Guidelines and best practice to reduce the risk of new developments from risks of coastal, fluvial, pluvial or ground water flooding.</p> <p>12.6. Protect open spaces, with multifunctional green and blue infrastructure in developments, with connections to the wider network of open spaces and habitats.</p>	Short	✓	Forward Planning	DHPLG, NWRA

OBJECTIVE 2: IMPLEMENT A NEW DEVELOPMENT CHECKLIST & GUIDANCE DOCUMENT

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
13	<p>Develop and implement a Design Checklist and Guidance Document for new developments to take account of climate change over the lifetime of a development, especially with regard to its location, site layout, building, ventilation and cooling, drainage, water, outdoor spaces and connectivity. New developments should incorporate green infrastructure as a mechanism for adaptation.</p>	Short	✓	Planning Environment, Climate Change and Agriculture	DHPLG, CARO

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 3: PROMOTE GREEN INFRASTRUCTURE AND CLIMATE RESILIENT SOLUTIONS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
14	<p>Identify opportunities to increase the climate resilience of infrastructure and the built environment through natural greening measures in new developments (and retrofit of existing), such as the use of natural features (e.g. street trees, green roofs, rain gardens etc) and other materials such as permeable paving. This will involve:</p> <p>14.1. Developing mechanisms and communications channels to ensure adaptation and green infrastructure are promoted and embedded in future development and maintenance works, and connect with developers to showcase high quality, climate friendly and adapted infrastructure and building projects.</p> <p>14.2. Identifying sites or projects for temporary greening on vacant and derelict land.</p>	Short	✓	Climate Adaptation Steering Group	All Departments/ Sections, CARO, Academia, SEAI, PPN
15	<p>Promoting Climate Resilient Solutions: Raise awareness of climate resilient solutions at an early stage in the design process for new public and private infrastructure.</p>	Short	✓	Planning Department	

OBJECTIVE 4: ENSURE NEW DEVELOPMENTS ARE PLANNED AND BUILT IN CONSIDERATION OF FUTURE FLOOD RISK PROJECTIONS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
16	<p>Ensuring new developments are planned and built in consideration of future flood risk projections will involve:</p> <p>16.1. Reviewing and updating periodically the flood risk zones for coastal, fluvial, pluvial and groundwater flooding to ensure that they take account of projected climate change, OPW flood maps, local knowledge and events, research and other sources of data to inform planning decisions.</p> <p>16.2. Ensuring robust site specific Flood Risk Assessments are prepared for new infrastructure and buildings that inform planning decisions and suitable adaptation requirements in line with the Planning System and Flood Risk Management Guidelines.</p> <p>16.3. Ensuring storm water drainage systems for new development take into account the potential future impacts of climate change in their designs, particularly the projected increase in intense rainfall events, and include the use of sustainable urban drainage systems (SUDs).</p>	Short	✓	Environment, Climate Change and Agriculture Planning	OPW, CARO, Marine Institute, Met Eireann, Communities, Municipal Districts, Elected Members

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 5: IMPLEMENT A RISK & OPPORTUNITIES REGISTER FOR CRITICAL INFRASTRUCTURE AND BUILDINGS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
17	<p>Implement a Risk and Opportunities Register and management framework for all Mayo County Council owned critical infrastructure and buildings, including roads, buildings, IT infrastructure, critical equipment, waste by:</p> <p>17.1. Developing a register that takes into account potential impacts and frequency of climate change on critical</p> <p>17.2. Putting in place a monitoring plan to inspect the integrity of existing infrastructure, particularly elements at risk from extreme events, to determine their physical condition, and ability to deal with projected climate change;</p> <p>17.3. Identifying and implementing any operational measures to isolate and protect critical infrastructure/equipment to reduce the risk/impact from climate events, and develop necessary maintenance/upgrade programme to prolong the lifespan and address climate risk.</p> <p>17.4. Identifying backup and contingency plans for climate events that have the potential to impact critical infrastructure, the failure of which would have major consequences and/or a cascading effect on other services.</p> <p>17.5. Developing a strategic investment and management plan to address critical infrastructure and buildings identified as being vulnerable to the impacts of climate change, the failure of which would have major consequences and/or a cascading effect on other services.</p>	Short		Climate Adaptation Steering Group to coordinate	Infrastructure Departments, Municipal Districts, Climate Ireland, CARO
			✓		
			✓		
			✗		
			✓		
			✗		
18	Develop and implement protocols for structural integrity assessments of critical infrastructure and buildings after extreme events.	Short	✗	Climate Adaptation Steering Group	Infrastructure Departments, Municipal Districts, Climate Ireland, CARO

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 6: INCREASE THE RESILIENCE OF SOCIAL HOUSING & BUILDING STOCK

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
19	Implementing a Building Risk Register and Remedial Action List:	Short			DHPLG
	19.1. As part of Action 16, undertake a Risk Assessment of all Mayo County Council's Social Housing and Building Stock to identify the potential hazards, impacts and consequences of climate change and climate events: <ul style="list-style-type: none"> Identifying old and derelict buildings that may cause a risk to public safety during extreme weather events; Identify buildings (and rooms) at risk overheating due to extreme events and explore building design options that promote natural cooling, thus reducing the need for expensive air conditioning in Council owned buildings. 		✓	Municipal District	
	19.2. Develop and implement a Remedial Action List of Mayo County Council's Social Housing and Building Stock identified in the risk assessment and integrate into decision making processes for the road infrastructure programmes; design, planning and maintenance.	Short - Medium	✗	Municipal District	
	19.3. Review ways to improve building, maintenance and repair standards, maintenance frequency and procedures for housing stock and Council buildings to reduce the impacts of climate change.	Short	✓	Architects	
20	Increase awareness of private house owners and housing stock tenants to potential impacts on housing from climate change events and how best to look after their home to avoid or reduce impacts. This is to include updating the tenant's handbook and the online communication and social media plan to provide the necessary climate change resilience information.	Short	✓	Housing	DHPLG

OBJECTIVE 7: INCREASE THE RESILIENCE OF ROADS AND TRANSPORT INFRASTRUCTURE

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
21	Implementing a Roads Risk Register & Remedial Action List:			Road Design Department	DTTS, TII
	21.1. As part of Action 16, undertake a Risk Assessment of all public road infrastructure in Mayo to identify the potential hazards, impacts and consequences of climate change and climate events on their function and conditions.	Short	✓		
	22.2. Develop and implement a Remedial Action List of public roads identified in the risk assessment and integrate into decision making processes for the road infrastructure programmes; design, planning and maintenance.	Short - Medium	✗		

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 7: INCREASE THE RESILIENCE OF ROADS AND TRANSPORT INFRASTRUCTURE

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
22	Integrate Climate considerations into the design, planning, construction and maintenance of all roads, footpaths, bridges and other construction projects and make provision to incorporate green infrastructure as a means to supporting biodiversity, alleviating heat stress, water retention, flood alleviation, as well as for wider environmental benefits.	Short	✓	Road Design Department	
23	Identify vulnerabilities of road safety in the face of projected climate events, build public awareness of these risks and promote best practise driving in adverse conditions.	Short	✓	Housing	
24	<p>Research and work with TII to develop guidance on maintenance and design standards that address future climate change projections that impact on road structures, lifespan and use by:</p> <p>24.1. Integrating climate change considerations at design / potential re-design stages.</p> <p>24.2. Exploring the climate resilience of materials used in road construction and road finish.</p> <p>24.3. Examining options to reduce road settlement deterioration occurring from severe weather event.</p>	Short	x	Roads Design Department	

OBJECTIVE 8 - UNDERTAKE A RISK ASSESSMENT FOR WASTE MANAGEMENT ACTIVITIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
25	<p>Under take a Risk Assessment for Waste Management Activities by:</p> <p>25.1. Carrying out a Risk Assessment of the potential impacts of climate change on Mayo County Council waste management facilities to identify sites and processes most affected by climate change, and formulate appropriate action plans to address the potential impacts.</p> <p>25.2. Working with the Connaught/Ulster Regional Waste Management Office, waste regulators and waste companies to build a shared understanding of the potential impacts of climate change on waste management policies and practices, and identify adaptation actions for waste management processes; engineering, operational, investment etc.</p>	Short - Medium	✓	Environment, Climate Change and Agriculture	Regional Waste Management Office, Waste Regulator, Waste Operators, Academia, EPA

GOAL 2: INCREASE THE RESILIENCE OF CRITICAL INFRASTRUCTURE AND BUILDINGS

OBJECTIVE 9: WORK TOWARDS THE DEVELOPMENT OF AN INTEGRATED COASTAL ZONE MANAGEMENT PLAN

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
26	Working towards the development of an Integrated Coastal Zone Management Plan will involve:			Environment, Climate Change and Agriculture Forward Planning	DHPLG, DAFM, DCHG, DCCAE, Academia, Marine Institute, DTTAS EPA , OPW, GSI
	26.1. Engaging stakeholders to identify how Mayo can adapt to accommodate a dynamic and changing coast and live with increased coastal flood and erosion risk.	Short	✓		
	26.2. Identifying research and case studies, developing Guidance and Policies, and implementing Coastal Restoration Plans to preserve, enhance and develop protective habitats of coastal ecosystems, dunes and wetlands, to protect critical infrastructure and assets from damaging storm surges.	Short - Medium	✗		
	26.3. Working with stakeholders to develop an Integrated Coastal Zone Management Plan (or similar type plan) for County Mayo to ensure new developments take account of future risk from coastal erosion/storm surges and sea level rise, including the identification and restriction of development in coastal erosion zones where appropriate, and ecosystem based adaptation actions to manage climate risk and build resilience to climate change.	Short	✗		



OUR VISION OF A CLIMATE READY MAYO

NATURAL & CULTURAL HERITAGE

Distribution and populations of plant and animal species will change across the county, but regular monitoring will allow the county to protect important ecosystems from new pests and diseases. Wildlife corridors are maintained and protected to help animals move safely around the county and increases ecosystem resilience.

Important historic buildings and heritage sites are being maintained and protected to take account of the changing climate, safeguarding the county's heritage without altering its character and significance.

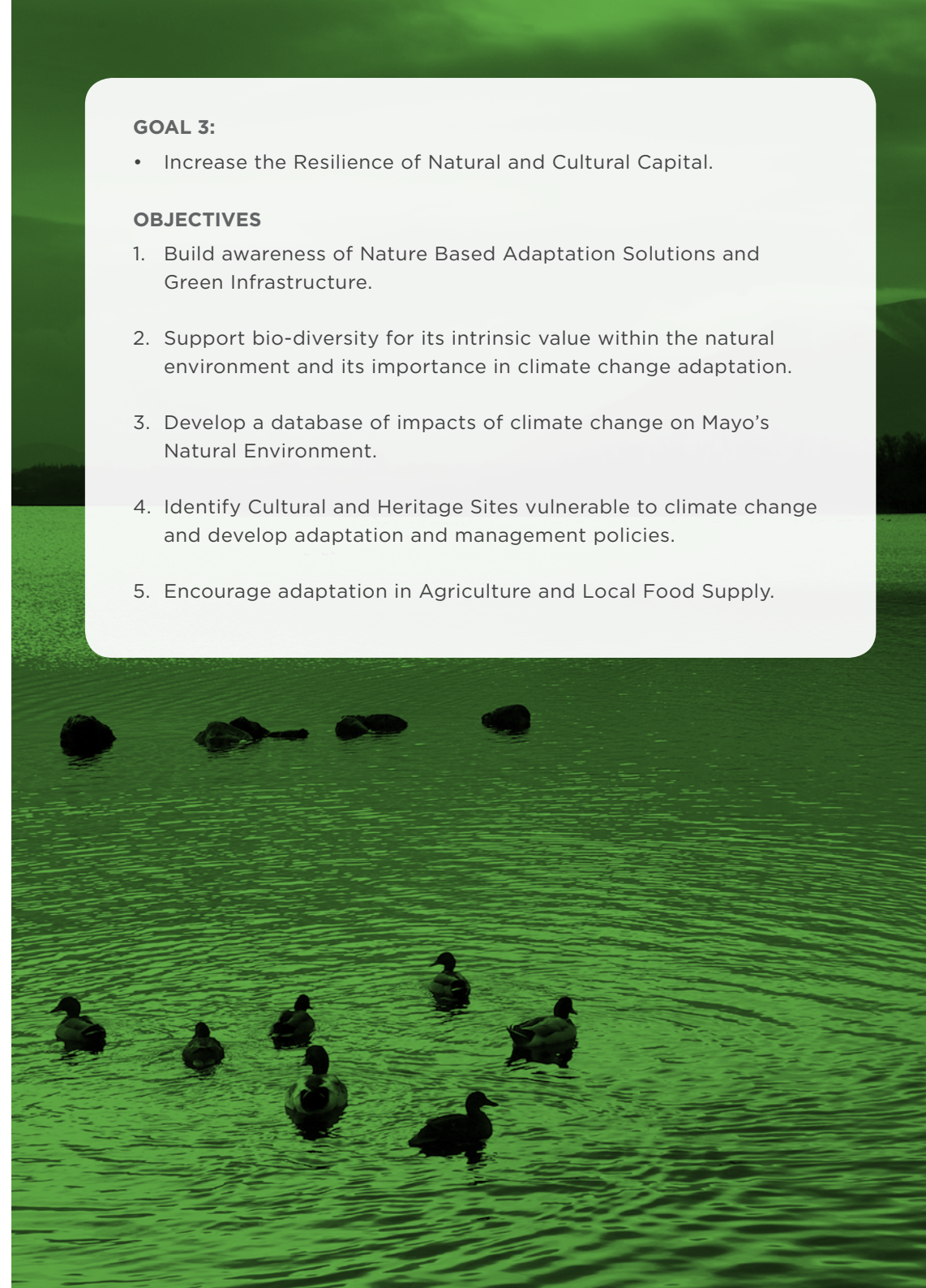
The county's vibrant green reputation is also attracting new families, tourists and new investment in the county.

GOAL 3:

- Increase the Resilience of Natural and Cultural Capital.

OBJECTIVES

1. Build awareness of Nature Based Adaptation Solutions and Green Infrastructure.
2. Support bio-diversity for its intrinsic value within the natural environment and its importance in climate change adaptation.
3. Develop a database of impacts of climate change on Mayo's Natural Environment.
4. Identify Cultural and Heritage Sites vulnerable to climate change and develop adaptation and management policies.
5. Encourage adaptation in Agriculture and Local Food Supply.



ACTION: NATURAL & CULTURAL HERITAGE

GOAL 3: INCREASE THE RESILIENCE OF NATURAL AND CULTURAL CAPITAL

OBJECTIVE 1: BUILD AWARENESS OF NATURE BASED ADAPTATION SOLUTIONS AND GREEN INFRASTRUCTURE

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
27	Identify green infrastructure and sustainable design that supports biodiversity and natural systems to adapt to climate change and also contribute to climate adaptation in the built environment.	Short	✓	Planning (Biodiversity)	EPA, NPWS National Biodiversity Data Centre, Academia DCHG, Arts Office, Municipal Districts, Community Office, PPN
28	<p>Developing and implementing an awareness campaign around the role of the natural environment and its positive contribution to Climate Adaptation by reducing the effects of extreme weather events (impact of heavy rain and floods through natural water attenuation, heat effect through tree planting etc.) through:</p> <p>28.1. Encouraging the use of information boards at amenity, tourism, wilderness, natural landscape, cultural heritage and other appropriate locations across the county to bring awareness and encourage respect of the benefits of natural environment and its role in climate adaptation.</p> <p>28.2. Through the Arts Programme, raising awareness of climate change and the importance and potential for green solutions to tackle climate change.</p>	Short	✓	Climate Adaptation Steering Group	

OBJECTIVE 2: SUPPORT BIO-DIVERSITY FOR ITS INTRINSIC VALUE WITHIN THE NATURAL ENVIRONMENT AND ITS IMPORTANCE IN CLIMATE CHANGE ADAPTATION

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
29	Review Mayo County Council's Biodiversity Management Plan and site specific Plans and projects to ensure that the risks from climate change have been identified and taken into account including an examination of the changes of seasonality.	Short	✓	Planning (Biodiversity)	EPA, NPWS National Biodiversity Data Centre, Academia, DCHG
30	Undertake natural capital accounting in all sectors to ensure ecosystem goods and services are being valued and Nature Based Adaptation solutions and Green Infrastructure options are being employed.	Short - Medium	✓	Planning (Biodiversity)	

GOAL 3: INCREASE THE RESILIENCE OF NATURAL AND CULTURAL CAPITAL

OBJECTIVE 2: SUPPORT BIO-DIVERSITY FOR ITS INTRINSIC VALUE WITHIN THE NATURAL ENVIRONMENT AND ITS IMPORTANCE IN CLIMATE CHANGE ADAPTATION

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
31	<p>Support bio-diversity through natural pollination by:</p> <p>31.1. Reviewing the National Pollinator Plan to explore how Mayo County Council can support a diversity of plant species to increase food sources and habitats for pollinators.</p> <p>31.2. Exploring ways to reduce the impact of a longer growing season on lifecycles of bees and other pollinators in terms of food availability and lifecycles mismatch.</p>	Short	✓	Planning (Biodiversity)	EPA, NPWS National Biodiversity Data Centre, Academia PPN, DCHG
32	<p>Species Spatial Responses: Identify and implement measures to reduce the barrier effects of roads, railways and technical objects in rivers and streams to facilitate species spatial responses to climate change.</p>	Short	✗	Infrastructure Departments	TII, OPW, DCCAE (IFI), NPWS
33	<p>Invasive Species Management Plan:</p> <p>33.1. Review the Invasive Species Management Plan to ensure that; the relevant risks from climate change have been identified; invasive species whose spread is linked with climate change are identified and appropriate management techniques for their control are developed.</p> <p>33.2. Establish an invasive species programme to monitor the spread of terrestrial, aquatic and marine invasive species in a changing climate and control, invasive species where their spread is considered problematic.</p>	Short	✓	Planning (Biodiversity)	DCHG, NPWS National Biodiversity Centre, Academia
34	<p>Develop and implement a Peatland Management Strategy for County Mayo that will:</p> <p>34.1. Identify damaged Peatlands in the county and those at risk from climate change and becoming carbon emitters.</p> <p>34.2. Initiate conservation and management of Mayo's peatlands, particularly those sites nominated for designation as Special Areas of Conservation and Natural Heritage Areas, to preserve the habitat and their unique ecosystems, managing flood risk and other environmental benefits.</p>	Short - Medium	✗	Planning (Biodiversity)	Environment, Climate Change and Agriculture EPA, NPWS, Academia, DAFM

GOAL 3: INCREASE THE RESILIENCE OF NATURAL AND CULTURAL CAPITAL

OBJECTIVE 2: SUPPORT BIO-DIVERSITY FOR ITS INTRINSIC VALUE WITHIN THE NATURAL ENVIRONMENT AND ITS IMPORTANCE IN CLIMATE CHANGE ADAPTATION

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
35	Work with the Mayo County Council Adaptation Steering Group, as part of the action to develop local Community Resilient Plans, to enhance, conserve and protect local Biodiversity.	Short	✓	Planning (Biodiversity)	

OBJECTIVE 3: DEVELOP A DATABASE OF IMPACTS OF CLIMATE CHANGE ON MAYO'S NATURAL ENVIRONMENT

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
36	<p>Database of Impacts on the Natural Environment:</p> <p>Work with national bodies to establish and develop an evidence database of ecosystem health measures and indicators of the effects of climate change, and their impact on the natural environment, that will inform adaptation policy and management.</p>	Short - Medium	✗	Planning (Biodiversity)	Environment, Climate Change and Agriculture, EPA, NPWS, CARO, private landowners, DCHG
37	<p>Enhancement & Restoration of Natural Systems:</p> <p>Work with national bodies to enhance and restore natural systems through management to increase resilience - hydrological processes (freshwater and marine), flood attenuation (for bogs) and pollination.</p>	Short	✗	Planning (Biodiversity)	DCHG, DAFM, MI, BIM, OPW, DCCAE (IFI), Bord na Mona, Coillte, eNGOs
38	<p>Implement a Cultural & Heritage Risk and Opportunities Register, Monitoring & Maintenance Strategy:</p> <p>38.1. Develop a register for heritage and cultural sites in County Mayo that considers the impacts and any potential opportunities from climate change, including the indirect impacts on communities and their cultural identity."</p> <p>38.2. In partnership with national bodies, develop protocols and procedures to monitor the effects of climate change on cultural and heritage sites in the county to inform by national and local adaptation policy and management and support the appropriate maintenance and repair programmes.</p>	<p>Short</p> <p>Short-Medium</p>	<p>✗</p> <p>✗</p>	<p>Planning (Heritage)</p>	<p>OPW, Communities office, Municipal Districts, CARO, DCHG, Fáilte Ireland, private landowners, PPN</p>

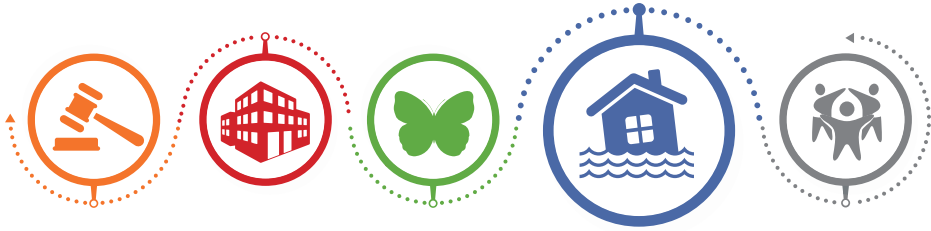
GOAL 3: INCREASE THE RESILIENCE OF NATURAL AND CULTURAL CAPITAL

OBJECTIVE 4: IDENTIFY CULTURAL AND HERITAGE SITES VULNERABLE TO CLIMATE CHANGE AND DEVELOP ADAPTATION AND MANAGEMENT POLICIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
39	Work with national bodies to integrate climate change adaptation into all heritage works and maintenance plans, and redesign, protect or relocate access, visitor services, drainage and other infrastructure to provide maximum protection for heritage against climate impacts.	Short	✓	Planning (Heritage)	DCHG, Municipal Districts, Private landowners
40	Implement a Tourism Risk and Opportunities Register: 40.1. Analyse the potential for loss of tourism resources as a consequence of impacts such on heritage, cultural and amenity sites and determine any potential opportunities that may come from climate change. 40.2. Undertake cost-benefit analysis of adaptation investment for high risk sites which are also priority for tourism and develop a strategic investment plan to adapt tourism resources to identified risks and opportunities.	Short-Medium	✓	Tourism Department	DCHG, Fáilte Ireland
43	Work with the Mayo County Council Adaptation Steering Group, as part of the action to develop local Community Resilient Plans, to incorporate adaptation of local heritage and cultural sites at community level.	Short-Medium	✓	Planning (Heritage)	

OBJECTIVE 5: ENCOURAGE ADAPTATION IN AGRICULTURE AND LOCAL FOOD SUPPLY

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
44	Work with relevant stakeholders to foster and support the development of resilience in local food supply systems and communities.	Short - Medium	✓	LEO	IFA, IBEC, Teagas, Mayo Agricultural Group, DAFM.
45	Implement Mayo County Council's Sustainable Agricultural Strategy 2019.	Short - Medium	✓	Environment, Climate Change and Agriculture	



OUR VISION OF A CLIMATE READY MAYO

WATER RESOURCES & FLOOD RISK MANAGEMENT

Regular monitoring of water quality and the implementation of adaptation measures have ensured our lakes, rivers, and beaches have maintained a “Very Good” water quality status.

Working with Irish Water, the Group Water Scheme Section and the Waters & Communities Office will enable investment to ensure a resilient water and wastewater networks in the county.

Through informed decision making, investing in targeted flood protection measures, early warning systems, land use planning, green infrastructure and catchment management, enables water to flow through the county in a controlled manner, reducing the potential of flooding and damage.

GOAL 4:

- Increase the resilience of Water Resources and Flood Risk Management.

OBJECTIVES

1. Understand and alleviate the risk and impact of flooding.
2. Provide and plan for effective drainage systems.
3. Develop knowledge and capacity on coastal risk arising from climate change.
4. Work with partners to build resilience in Public and Private Water Supplies to ensure adequate and quality supply.
5. Building public awareness and community resilience to flooding.

ACTION: WATER & FLOODING

GOAL 4: INCREASE THE RESILIENCE OF WATER RESOURCES AND FLOOD RISK MANAGEMENT

OBJECTIVE 1: UNDERSTAND AND ALLEVIATE THE RISK AND IMPACT OF FLOODING

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
46	Work with the OPW and other organisations to identify and support the development of Major and Minor Flood Protection and Flood Proofing Schemes around the County.	Short	✗	Environment, Climate Change and Agriculture	OPW, CARO, Academia, Marine Institute, Met Eireann, EPA, Climate Ireland
47	Implement a Register of Flood Protection Infrastructure and Management Plans:			Environment, Climate Change and Agriculture	OPW, Tidy Towns, Coillte, private landowners
	47.1. Identify and develop a register of existing hard and soft flood protection infrastructure around the county.	Short	✓		
	47.2. Carry out a climate resilience review and risk assessment, considering the condition of flood protection infrastructure, the design capacity, and the vulnerability of receptors if the infrastructure fails.	Short - Medium	✗		
	47.3. Develop and implement protocols for structural integrity assessments of flood infrastructure after extreme events.	Short - Medium	✗		
	47.4. Develop a maintenance programme to maintain the integrity of the infrastructure.	Short - Medium	✗		
48	Explore Natural Flood Management Projects and Green Infrastructure Proposals:	Short	✓	Environment, Climate Change and Agriculture	OPW, DCHG, Municipal Districts
	48.1. Identify opportunities for natural flood management, green infrastructure or other enhancement projects to address flood risk”				
	48.2. Identify areas to increase tree and vegetation cover that could reduce stormwater runoff and protect against erosion, and also lower surface and air temperatures by providing shade and cooling through evapotranspiration.				
	48.3. Investigate land management opportunities for water attenuation in council owned lands.				

GOAL 4: INCREASE THE RESILIENCE OF WATER RESOURCES AND FLOOD RISK MANAGEMENT

OBJECTIVE 1: UNDERSTAND AND ALLEVIATE THE RISK AND IMPACT OF FLOODING

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
49	<p>Flood Buffer Zones:</p> <p>Identify protective measures and acquisitions to manage ecosystems in buffer zones along rivers, lakes, reservoirs and coasts for flood control and water quality management.</p>	Short - Medium	x	Environment, Climate Change and Agriculture	OPW, CARO, Academia, EPA, NPWS
50	<p>Identification of Low-Cost Minor Works Flood Relief Schemes:</p> <p>Work with Infrastructure Departments to identify and assess infrastructure/buildings at risk from flooding/extreme rainfall to inform site protection plans and the development of low-cost minor works flood relief schemes.</p>	Short	✓	Environment, Climate Change and Agriculture	OPW, CARO, Academia, EPA, NPWS
51	<p>Areas and Communities Isolated by Flooding:</p> <p>Identify areas susceptible to isolation as a consequence of flooding and establish measures to reduce the risk and preparedness to respond, and build awareness and local resilience to the impacts.</p>	Short	✓	Environment, Climate Change and Agriculture	OPW, CARO, Academia, EPA, NPWS
52	<p>Watercourse Maintenance Works:</p> <p>Identify, assess and develop multi-annual maintenance programmes, in conjunction with the OPW, for watercourses and coastlines where such works would substantially reduce flood risk.</p>	Short	x	Environment, Climate Change and Agriculture	Municipal Districts, OPW, NPWS, private landowners, IFA
53	<p>Protection of Floodplains and Wetlands:</p> <p>Identify the county's floodplains, wetlands and coastal areas subject to flooding, and work with relevant stakeholders and landowners to protect and enhance the space for storage and conveyance of floodwater.</p>	Short	x	Environment, Climate Change and Agriculture	Municipal Districts, OPW, NPWS, private landowners, IFA

GOAL 4: INCREASE THE RESILIENCE OF WATER RESOURCES AND FLOOD RISK MANAGEMENT

OBJECTIVE 2: PROVIDE AND PLAN FOR EFFECTIVE DRAINAGE SYSTEMS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
54	<p>Undertake and implement a Surface Water Risk Assessments and Management Plan for surface water flooding:</p> <p>54.1. Identify and map areas prone to surface water and groundwater flooding including surcharging of surface water sewers during extreme rainfall events.</p> <p>54.2. Develop Surface Water Management Plans to manage surface water flood risks in the areas identified:</p> <ul style="list-style-type: none"> Identify and develop locations for green infrastructure to reduce runoff and stormwater flows that may otherwise exceed system capacity; bio-retention areas (rain gardens), green roofs, swales (depressions to capture water) and the use of vegetation or pervious materials instead of impervious surfaces; Identify and develop mechanisms to promote de-paving of front gardens, school grounds, etc and introduce permeable surfaces. Encourage householders to green and enhance their gardens e.g. encourage development of rain gardens in domestic properties to reduce flood risk. Demonstrate de-paving/porous paths/rain gardens/ low maintenance gardens to encourage re-greening; To require, where feasible and practical, the provision of green roof technology for all new public buildings to assist in flood alleviation, insulation and improved biodiversity, and to actively promote these measures where appropriate in new commercial and industrial buildings; Prioritise and implement Surface Water Management Plans/Projects on a risk and impact bases. 	Short-Medium	<p>✓</p> <p>✗</p>	Municipal District	Environmental, Climate Change and Agriculture, Road Design, OPW, Irish Water, GSI, LAWPRO, private landowners
55	<p>Surcharging Combined Sewers:</p> <p>Work with Irish Water to identify combined sewers that are at risk of surcharging during extreme rainfall events and develop suitable solutions.</p>	Short-Medium	✗	Water Services	Irish Water, Municipal Districts, Roads Design Office

GOAL 4: INCREASE THE RESILIENCE OF WATER RESOURCES AND FLOOD RISK MANAGEMENT

OBJECTIVE 3: DEVELOP KNOWLEDGE AND CAPACITY ON COASTAL RISK ARISING FROM CLIMATE CHANGE

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
56	<p>Research Coastal Erosion & Sea Level Rise:</p> <p>56.2. Identify research, case studies and improve awareness of current and future coastal change along the Mayo coast and in the wider context of the Atlantic Seaboard.</p> <p>56.3. Develop links with relevant agencies and academia to enhance knowledge and develop suitable coastal adaptation strategies</p>	Short	✓	Environment, Climate Change and Agriculture	Marine Institute, OPW, CARO, Academia, EPA

OBJECTIVE 4: WORK WITH PARTNERS TO BUILD RESILIENCE IN PUBLIC AND PRIVATE WATER SUPPLIES TO ENSURE ADEQUATE AND QUALITY SUPPLY

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
57	<p>Protection of Public Water Supplies:</p> <p>57.1. Work with and support Irish Water in identifying public drinking water sources vulnerable to climate change and to develop source protection, or alternative sources, in order to maintain water quantity and quality levels.”</p> <p>57.2. Work with Irish Water to identify impacts of power outages of varying durations on specific Water and Wastewater Scheme operations, and identify critical and vulnerable receptors.</p> <p>57.3. Liaise, support and work with IW in the development, conservation and upgrade of the water supply systems so as to ensure that County Mayo has an adequate supply of water to address climate change demands.</p>	Short	✓	Water Services	Irish Water, Environment, Climate Change and Agriculture, LAWPRO, private landowners, IFA, EPA
58	<p>Protection of Private GWS Water Supplies:</p> <p>Work with and support private Group Water Schemes to identify drinking water sources vulnerable to climate change and to develop source protection, or alternative sources, in order to maintain water quantity and quality levels.</p>	Short	✓	Group Water Schemes	Irish Water, Private GWS, GWS Federation, EPA, LAWCO
59	<p>Internal Water Conservation:</p> <p>Develop and implement water conservation, energy management, and waste management programmes in all Mayo County Council office buildings.</p>	Short	✗	Corporate Affairs	Water Services, Irish Water, SEAI

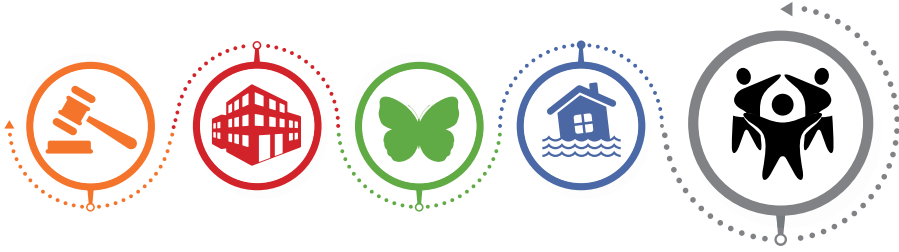
GOAL 4: INCREASE THE RESILIENCE OF WATER RESOURCES AND FLOOD RISK MANAGEMENT

OBJECTIVE 4: WORK WITH PARTNERS TO BUILD RESILIENCE IN PUBLIC AND PRIVATE WATER SUPPLIES TO

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
60	Water Quality Monitoring: Monitor surface water conditions during/after climate events to build an understanding of conditions and the factors that alter water quality.	Short	✓	Environment, Climate Change and Agriculture	LAWPRO, EPA, IW, OPW (Hydrometric Data)
61	Septic Tanks & Ground Water Vulnerability: Identify areas at risk of groundwater pollution from septic tanks, taking into account projected climate change, the vulnerability of the aquifer, high groundwater table and a high concentration of septic tanks.	Short	✗	Environment, Climate Change and Agriculture	Irish Water, Municipal Districts, Roads Design Office

OBJECTIVE 5: BUILDING PUBLIC AWARENESS AND COMMUNITY RESILIENCE TO FLOODING

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
62	Collaborate with relevant state bodies, agencies and stakeholders to build awareness of climate change impacts on flood events and water quality, and work with these stakeholders to development and implement adaptation measures.	Short	✓	Environment, Climate Change and Agriculture	Municipal Districts, OPW, LCDC, Water Programmes Office, Landowners
63	Engage with local communities to build awareness of flood risk, to allow individuals and business build resilience and to develop actions that allow communities prepare for flood events to reduce the overall impact.	Short	✓	Environment, Climate Change and Agriculture	Municipal Districts, OPW, LCDC, Water Programmes Office, Landowners



OUR VISION OF A CLIMATE READY MAYO

COMMUNITY SERVICES

Climate opportunities and risks are well communicated within the organisation and the communities it serves.

Businesses are benefiting from early identification of vulnerabilities, and investment in adaptation measures. Mayo is building a reputation for resilience, increasing confidence among citizens and investors, and encouraging new businesses to make Mayo their home.

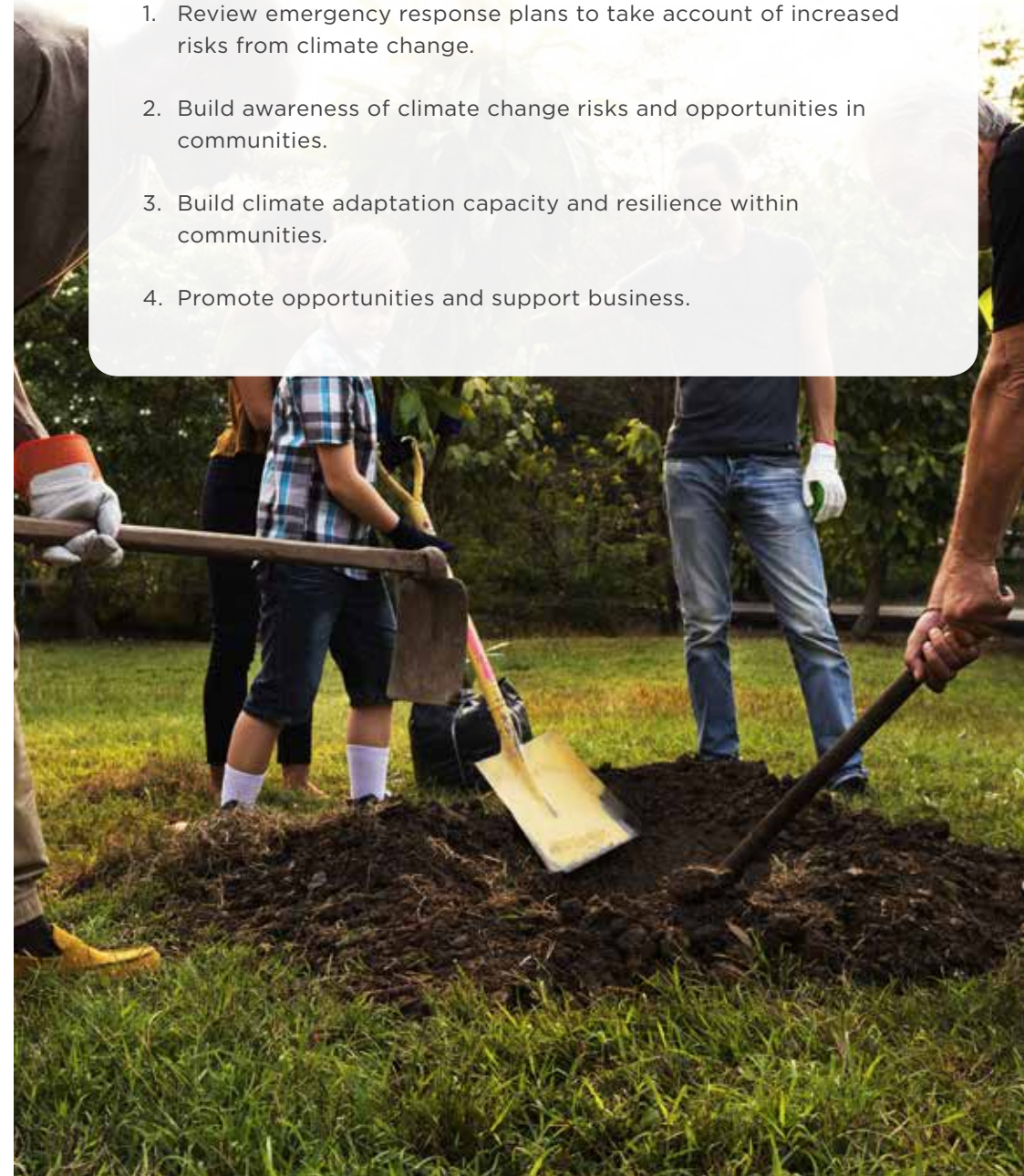
Mayo has seized the opportunities afforded by changing tourism patterns and made sure its many festivals and celebrations are climate ready. Key events in Mayo's cultural and festival calendar are prepared for more frequent extreme weather, safeguarding the county's status as a destination.

GOAL 5:

- Increase the Resilience of Community Services.

OBJECTIVES

1. Review emergency response plans to take account of increased risks from climate change.
2. Build awareness of climate change risks and opportunities in communities.
3. Build climate adaptation capacity and resilience within communities.
4. Promote opportunities and support business.



ACTION: COMMUNITY SERVICES

GOAL 5: INCREASE THE RESILIENCE OF COMMUNITY SERVICES

OBJECTIVE 1: REVIEW EMERGENCY RESPONSE PLANS TO TAKE ACCOUNT OF INCREASED RISKS FROM CLIMATE CHANGE

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
64	<p>Review Emergency Response Plans:</p> <p>64.1. Review and update the Emergency Response Plans to take account of climate change, frequency and severity of climatic events.</p> <p>64.2. Ensure that Emergency Response Plans are reviewed annually to reflect the increasing severity of climatic events, lessons learned from past events and best practice elsewhere.</p> <p>64.3. Endeavour to ensure communication, alerts and backup systems for emergency responders are appropriate to maintain communications during extreme events.</p> <p>64.4. Identify lessons learned, case studies and training programmes to maintain a high level of understanding and upskilling to manage Emergency Response in the face of increased risks and vulnerabilities from climate change.</p>	Short	✓	Emergency Response Team	Communications Department, HSE, Gardai, Met Eireann, Municipal Districts, Corporate Affairs

OBJECTIVE 2: BUILD AWARENESS OF CLIMATE CHANGE RISKS AND OPPORTUNITIES IN COMMUNITIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
65	<p>Community Awareness Campaign:</p> <p>Work with relevant agencies and existing networks, such as the PPN, to develop and implement community awareness and training programmes to inform communities of climate change projections, local impacts and local adaptation options.</p>	Short	✗	Environment, Climate Change and Agriculture	Community and Development, LCDC, CARO, DCCAE, EPA, Climate Ireland, Academia, NTG
66	<p>Use educational projects in schools or through community events as opportunities to disseminate climate change information to the public.</p>	Short	✓	Environment, Climate Change and Agriculture	

GOAL 5: INCREASE THE RESILIENCE OF COMMUNITY SERVICES

OBJECTIVE 2: BUILD AWARENESS OF CLIMATE CHANGE RISKS AND OPPORTUNITIES IN COMMUNITIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
67	Promote adaptation through providing advice and support to local businesses and organisations on adaptation, and undertaking research into tackling the challenges of the impacts of climate change.	Short	✓	Local Enterprise Office	CARO, SEAI, Academia, IBEC, Chamber of Commerce, EPA, Climate Ireland
68	Collate and showcase successes and best practice on adaptation and mitigation, and provide support to those looking to take independent adaptation action.	Short	✓	Climate Adaptation Steering Group	

OBJECTIVE 3: BUILD CLIMATE ADAPTATION CAPACITY AND RESILIENCE WITHIN COMMUNITIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
69	<p>Climate Resilience Plans:</p> <p>69.1. Identify communities vulnerable to the adverse impacts of climate change and extreme events.</p> <p>69.2. Assist communities to develop and implement Community Resilience Plans to drive climate adaptation at a local level and build local resilience to climate impacts.</p>	Short	✗	Municipal Districts	LCDC, CARO, DCCAE, EPA, Climate Ireland, DHPLG, NWRA, Climate Adaptation Steering Group
70	<p>Develop Community Toolkits & promote Climate Leaders:</p> <p>70.1. Identify, promote and support individuals and communities to be champions for adaptation and sustainable living.</p> <p>70.2. Develop a package of resources to support community groups to start conversations about becoming more climate resilient, potentially consisting of short presentations, workshop guide and information sheets. Workshops can be run with different community groups and aim to raise awareness of the need to adapt to local impacts and reduce emissions as a first stage in preparing a community resilience action plan.</p>	Short-Medium	✗	Environment, Climate Change and Agriculture	Community and Development, LCDC, CARO, SEAI, DCCAE, EPA, Climate Ireland, Academia

GOAL 5: INCREASE THE RESILIENCE OF COMMUNITY SERVICES

OBJECTIVE 3: BUILD CLIMATE ADAPTATION CAPACITY AND RESILIENCE WITHIN COMMUNITIES

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
71	Integrate climate change considerations in the planning and licensing of festivals & events, and consider contingency planning for extreme weather events to reduce the risks insofar as possible for public safety, reputational damage and financial loss.	Short	✓	Planning Municipal Districts	Met Eireann, CARO, Community and Development, LCDC, Community Groups, Tourism Agencies
72	<p>Project Funding:</p> <p>72.1. For projects subject to funding and investment of public money, include climate change considerations as criteria for assessment ultimately ensuring that community projects are designed and developed to be climate resilient and/or are proactive in promoting and working positively towards climate action.</p> <p>72.2. Identify funding streams for local climate action projects and support communities in developing and implementing climate adaptation projects at local level.</p>	Short	✓	All Departments	Climate Adaptation Steering Group, CARO, SEAI, DCCAE, EPA, Climate Ireland, NWRA, LEADER

OBJECTIVE 4: PROMOTE OPPORTUNITIES AND SUPPORT BUSINESS

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
73	Identify, source and leverage funding streams for the active implementation of adaptation actions that will contribute both environmentally and economically to Mayo.	Short	✓	LEO	CARO, SEAI, DCCAE, EPA, Climate Ireland, NWRA, LEADER, IDEA, Enterprise Ireland, IBEC, Chamber of Commerce, Science Foundation of Ireland
74	Support, encourage and nurture new ideas, which seek to capture opportunities associated with environmental and technological advances that support Climate Adaptation and Climate Mitigation through the work of LEO Mayo.	Short	✓	LEO	

GOAL 5: INCREASE THE RESILIENCE OF COMMUNITY SERVICES**OBJECTIVE 4: PROMOTE OPPORTUNITIES AND SUPPORT BUSINESS**

No.	Actions	Action Timeframe	Budgeted	Mayo County Council Lead	Relevant Partners
75	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 identifying business supports and funding options to businesses seeking to become more resilient to climate change events.	Short	✓	LEO	CARO, SEAI, DCCAE, EPA, Climate Ireland, NWRA, LEADER, IDEA, Enterprise Ireland, IBEC, Chamber of Commerce, Science Foundation of Ireland
76	Encourage and promote projects that will contribute positively and growing 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.	Short	✓	LEO	

STEP 5: IMPLEMENTATION



STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

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 Mayo to the impacts of climate change. The Strategy is the start of an in-depth, long-term process to ensure Mayo evolves to be a Climate Ready county.

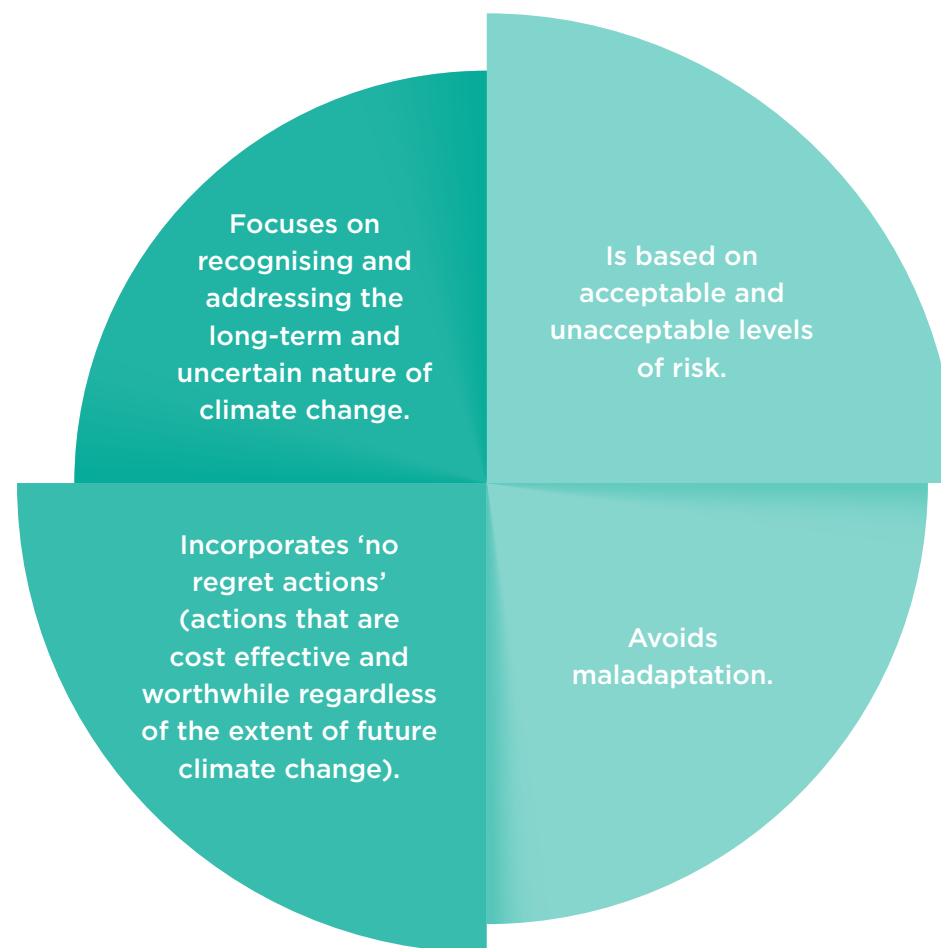
Our adaption journey is a flexible process and subject to regular reviews in terms of the appropriateness of projects, policies and programmes, as well as climate projections.

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, Annual Service Delivery Plans, Operational Policies and Procedures are reviewed.

CORPORATE PLAN

Mayo County Council is central to making County Mayo, Sustainable, Inclusive, Prosperous and Proud, and the Corporate Plan is a key part of our delivering on this commitment in Mayo. The Plan sets out a strategic approach encompassing the various activities of Mayo County Council i.e. what we want to deliver for the people of Mayo and how we are going to meet our commitments to our communities. This Plan also sets out how we will work to achieve this and how we will measure our efforts so that the people of Mayo will see that we deliver effectively on our commitments to them.

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.



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.

STEP 1: PREPARING THE GROUND

STEP 2: BASELINE ASSESSMENT

STEP 3: FUTURE CLIMATE RISKS

STEP 4: GOALS, OBJECTIVES & ACTIONS

STEP 5: IMPLEMENTATION

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 Mayo 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.

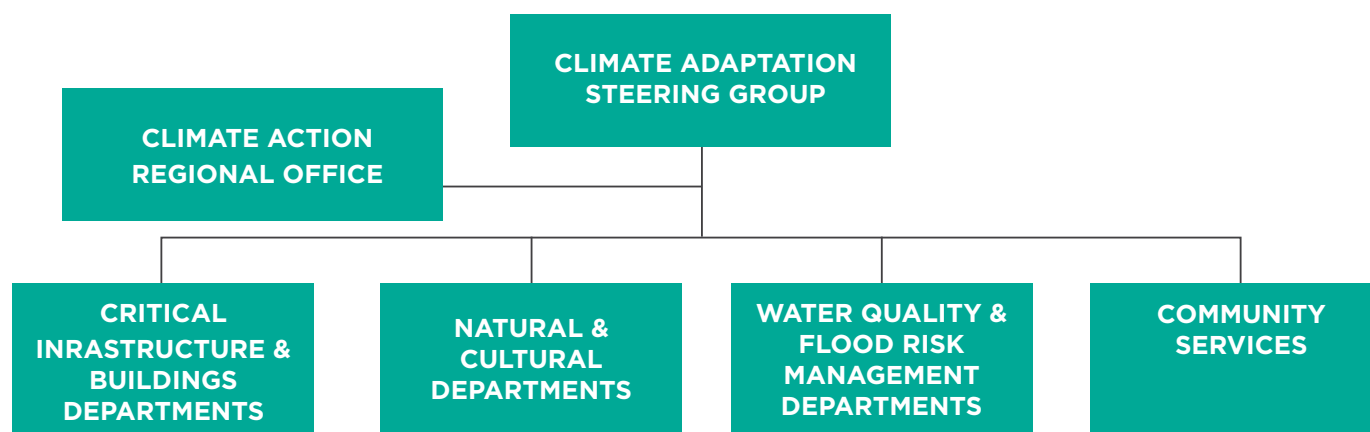
It is also crucial that the Steering Group communicate and raise awareness of climate change and the effects this will have on the county. This will enable the sharing of best practice, help build partnerships and inform, engage and empower all sectors of the county.

The Steering Group will meet quarterly and report on progress annually.

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.



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

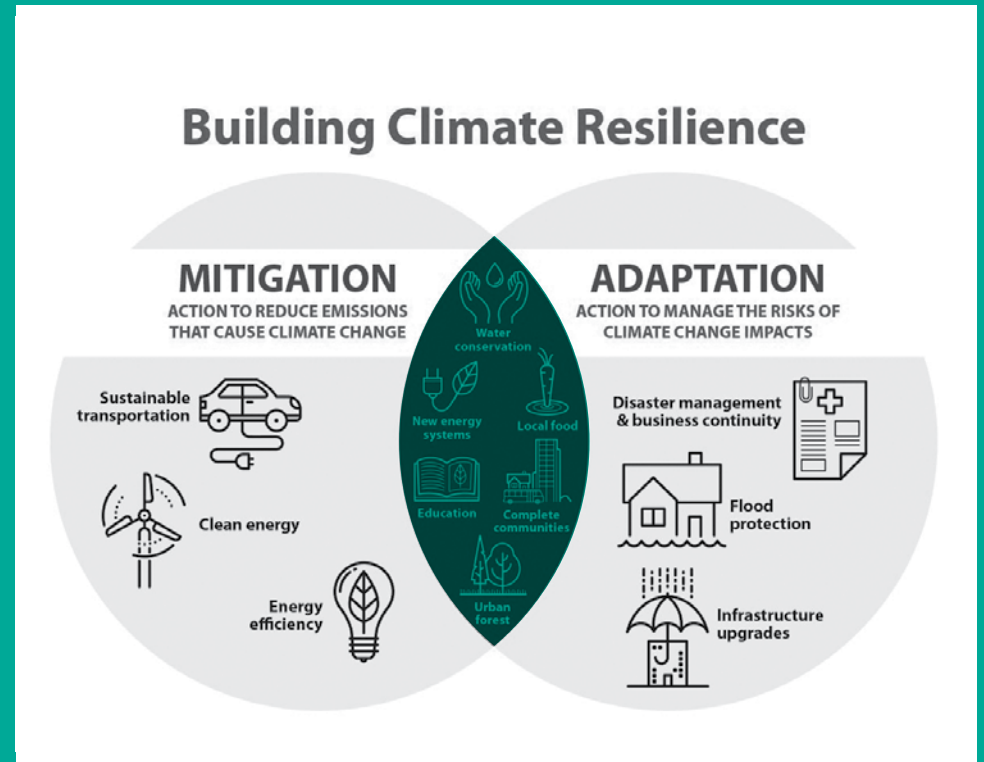
Adaptation will be required to reduce the effects of a changing climate already 'locked in' by past and current emissions and this strategy focuses on the adaptation actions which will be implemented by Mayo County Council. We recognise that to build climate resilience and reduce global warming both 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 from 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 2020 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.

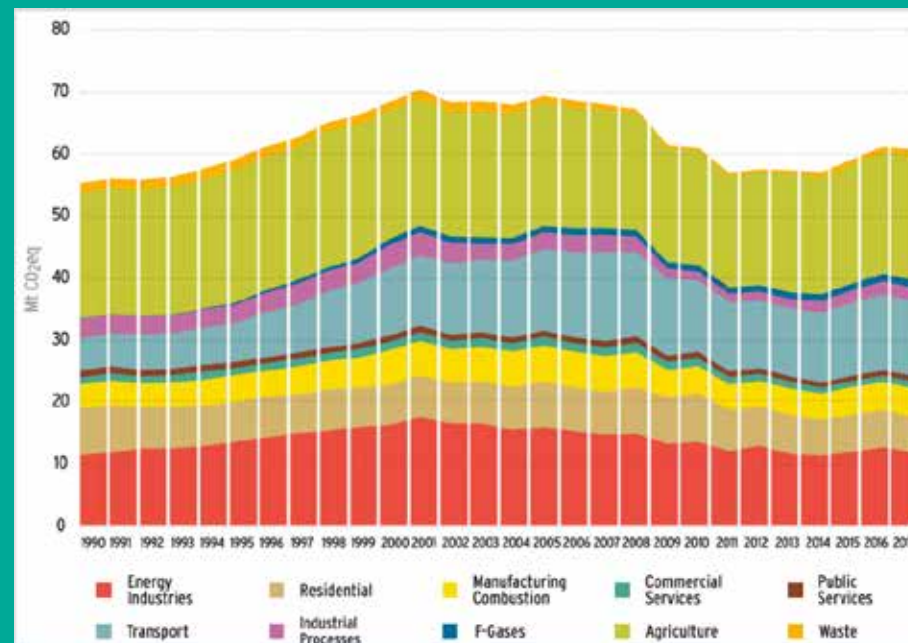
National Picture

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

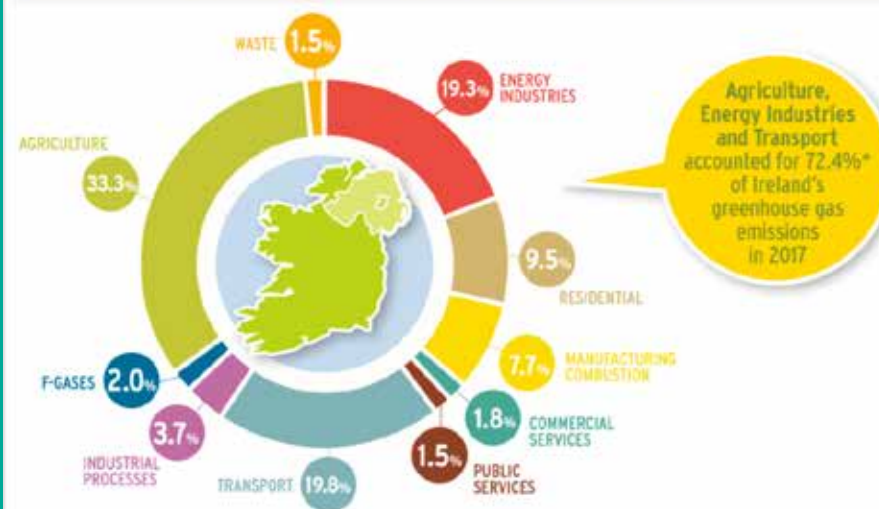
Projected emissions in the 'With Additional Measures' scenario indicate that Ireland remains off-target to achieving a 20% reduction on 2005 levels by 2020.

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

SOURCES OF GREENHOUSE GASES



MITIGATION

Mitigation in Mayo 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 Mayo County Council has achieved energy efficiency improvements of 21.2% between 2009 and 2017.

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 SEAI Better Energy Community programmes, Smarter Travel programmes, the development of greenways, switching to renewable energy supplies and increasing energy efficiency via ISO50001 certification process for energy management.

Westport Smarter Travel

Westport was chosen by the Department of Transport, Tourism and Sport as one of three areas nationally to become Smarter Travel demonstration towns. The objective of the programme was to increase sustainable travel and in turn reduce car usage over the five-year period, 2012 - 2016

Relationships were established with all sectors of society and numerous education and awareness campaigns were held throughout the five-year period. Operation Transportation, a competition between business and community groups to become 'Westport's Smartest Travel Business' and 'Westport's Smartest Travel Community Group' resulted in over 36,000 smarter travel journeys made by participants and in conjunction with other behavioural change initiative effected a 4% reduction in car journeys.





In 2017 Mayo County Council was the first Local Authority in Ireland to appoint a Climate Action Officer with responsibility for improving climate action operations within the Council and engaging in outreach activities with local communities.

Along with a dedicated Climate Action Officer, Mayo County Council also operate an internal Climate Ambassador Programme in which over 25 volunteers from various departments throughout the organisation are provided with specific training on energy, waste and biodiversity topics. The programme raises awareness and increases action on climate change both in the workplace and the home.

Mayo County Council Electric Vans

“On the Move to Low Carbon Future”

The first of a fleet of new electric council vehicles was launched in January 2019, by the Chief Executive of Mayo County Council, Peter Hynes, at Aras an Chontae, Castlebar.

Speaking at the launch, Mr. Hynes said he was proud of the County Council for taking this step towards a greener future; “We talk about Mayo and the organisation we are trying to build here, Sustainable, Inclusive, Prosperous and Proud, today I am proud that we are moving on to the next phase of the transformation of this organisation to being more energy efficient, greener, more environmentally aware and more environmentally friendly”.

APPENDICES

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CLIMATE READY MAYO

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MAYO COUNTY COUNCIL
Climate Adaptation Strategy
September 2019