Comhairle Contae
Ros Comáin
Roscommon
County Council

Climate Change Adaptation Strategy 2019 – 2024

Roscommon County Council

September 2019

Document Control sheet

Revision	Date	Description	Amended by
1	22/05/19	Original	Celine Greaney
2	30/05/19	Minor editing	Celine Greaney
3	04/06/19	Minor editing	Celine Greaney
4	13/08/19	Post Public Consultation	Celine Greaney
5	19/09/19	Updated	Jim Grogan
6	23/09/19	Adopted	Celine Greaney

Contents

Acknowledgements

Roscommon County Council Climate Adaptation Team wish to thank and acknowledge the contributions of the following in the preparation of this Strategy:

- Staff across all Departments of Roscommon County Council
- Staff of Eastern and Midlands Climate Action Regional Office (CARO)
- Resources of Centre for Marine and Renewable Energy (MaREI) and Climate Ireland.
- Resources of Climate Ireland
- Resources of Met Éireann

Foreword

Climate change is one of the most important issues that we as a Council have to face and I welcome the publication of the Draft Climate Change Adaptation Strategy 2019 – 2024. The impacts of climate change are increasingly being felt at local level including the recent heatwave, storms and flooding events. Having regard to the sustainable development of County Roscommon into the future, policy and decision makers need to be committed to embedding climate change into spatial planning, infrastructure development and Local Authority functions and operations.

Climate change is a global challenge but working collaboratively we can all make a difference. I would like to thank the staff of Roscommon County Council for their work in delivering this Strategy together with the staff of the Eastern and Midlands Climate Action Regional Office. I look forward to working with my colleagues on its finalisation and implementation and ensuring, in conjunction with the staff of both Roscommon County Council and the Eastern and Midlands Climate Action Regional Office, that the Strategy is updated to reflect latest policy, technology and climate related impacts.

Paschal Fitzmaurice
Cathaoirleach of Roscommon County Council

Our ***Corporate Plan 2015 – 2019*** aims "to ensure through collaboration and the provision of strong leadership, in partnership with the community, that County Roscommon, is an attractive, inclusive, prosperous and vibrant place to live, invest, work and visit." Climate change is the biggest global challenge that has ever faced humanity and requires an urgent and immediate response. All Public Bodies and Local Government in particular must provide leadership and be exemplars of best practice in fighting and combating climate change. We must mind and protect our environment for future generations and start undoing the damage of past generations.

This ***Climate Change Adaptation Strategy***, which has been prepared in consultation with staff, will serve to guide and inform all of our actions, policies and thinking, as we prepare to urgently respond and adapt to the devastating effects of climate change. Severe weather events will, unfortunately, be far more frequent. This Strategy calls for the building of community resilience that will require citizen engagement and participation to adopt and respond to such events.

I welcome the establishment of the Eastern and Midlands Climate Action Regional Office (CARO), which has been established on a partnership basis with other Local Authorities to assist in the implementation and monitoring of our Climate Change Adaptation Strategy.

Eugene Cummins
Chief Executive of Roscommon County Council

Executive Summary

Roscommon County Council has developed a Climate Change Adaptation Strategy in response to the impact that climate change is having, and will continue to have, on County Roscommon and its citizens and have outlined our commitment to lead by example in tackling this global issue.

The adaptation baseline has identified that the effects of climate change are already impacting County Roscommon at a significant rate and are very likely to increase in their frequency and intensity. The number of days with heavy rainfall has also increased and the amount of extreme flooding events in County Roscommon has risen in the last 10 years. County Roscommon has also experienced extreme temperatures, as witnessed recently in 2018, with Met Éireann issuing its first ever Status Red warning for snow in February, followed by one of the hottest summers on record during June and July. All of these extreme weather events clearly highlight the need to reduce the impacts that climate change is having on the environment, the economy and the citizens of County Roscommon.

In addition, as public awareness is key to tackling climate adaptation, Roscommon County Council commits through this Plan to address the current knowledge-gap and will encourage citizens to act on climate change through a range of awareness and behavioural change actions.

This Adaptation Strategy will be continually monitored and updated by a dedicated Climate Action Team working across all Council Departments. They will be assisted by the newly established Eastern and Midlands Climate Action Regional Office, which will ensure that the overall Plan is fully updated every five years to reflect latest policy, technology and climate-related impacts to ensure that the Adaptation Strategy continues to be informed by international best practice and regional research institutions.

Chapter 1

Introduction & Background

1.1 Introduction:

The Earth's Climate is changing. While natural fluctuations in climate are considered normal, emerging research and observational records from across the world show rates of change that are far greater than those experienced in recent history. Global temperatures have risen and are projected to rise further bringing changes in weather patterns, rising sea levels and increased frequency and intensity of extreme weather. Ireland's climate is changing in line with global patterns and these changes are bringing significant and wide ranging economic, environmental and social impacts.

Climate change is now recognised as a global challenge with policy responses required in terms of both mitigating the causes of climate change and in adapting to the now inevitable consequences of our changing climate. Action at local level is vitally important to help reduce the risks and impacts of climate change across communities.

This Climate Change Adaptation Strategy is the start of the process of adaptation planning in Roscommon and is the first step in increasing knowledge and understanding of our changing climate, growing resilience, and enabling effective responses to the threats posed by climate change.

1.2 Purpose of this strategy:

This Adaptation Strategy forms part of the National Adaptation Framework (NAF) which was published in response to the provisions of the Climate Action and Low Carbon Development Act 2015.

As the level of government closest to local communities and enterprise and as first responders in many emergencies, Roscommon County Council are uniquely placed to effect real positive change with respect to delivery of the national transition objective to a low carbon and a climate resilience future.

The local authority adaptation strategy takes on the role as the primary instrument at local level to:

(i) ensure a proper comprehension of the key risks and vulnerabilities of climate change
(ii) bring forward the implementation of climate resilient actions in a planned and proactive manner
(iii) ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of the local authority

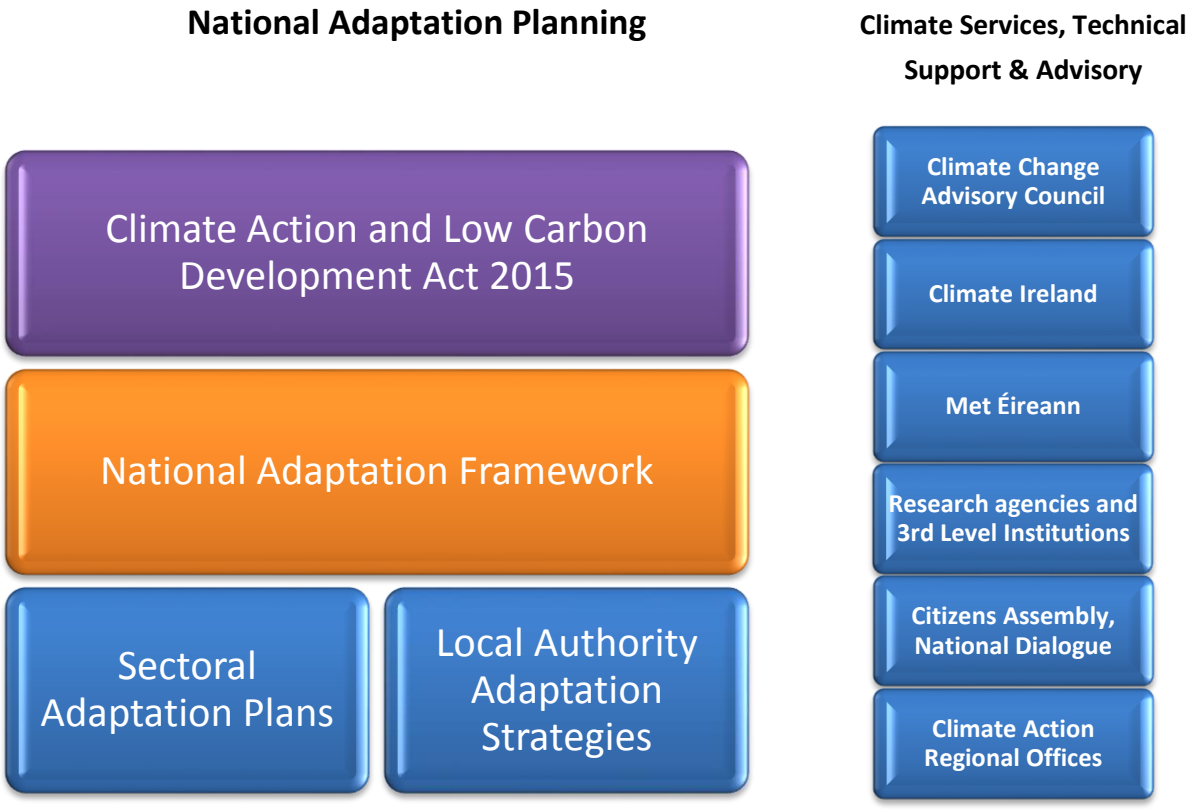
This adaptation strategy serves Roscommon County Council in its two capacities namely:

- As an organisation with an obligation towards customer service, a focus on effectiveness in business, improving efficiencies and maintaining staff welfare and
- In the delivery of services and functions across the administrative and geographical area of County Roscommon.

In accordance with the provisions of the Climate Action and Low Carbon Development Act 2015 this Adaptation Strategy is required to be adopted by the Members of Roscommon County Council before 30th September 2019.

1.2.1 Relationship with other key climate related plans/strategies

This adaptation strategy is set within the context of a national framework for adaptation planning which is prescribed in the Climate Action and Low Carbon Development Act 2015 and elaborated upon in the National Adaptation Framework.



This adaptation strategy commits to aligning with national commitments on climate change adaptation. It must be noted that the process of making 12 sectoral adaptation strategies (identified in the NAF) is running concurrently with the making of local authority strategies. Once published, however, any relevant recommendations or actions will be incorporated into this strategy. For both the preparation of this strategy and the implementation of actions, opportunities will be advanced to align with and collaborate with adjoining local authorities including Galway, Mayo, Sligo, Leitrim, Longford, Westmeath and Offaly.

1.3 The Challenge of Climate Change

Climate is described as the average weather prevailing in an area over a period of time. *Climate Change* is a significant change in weather patterns such as rainfall, temperature, and / or wind, which continue over an extended period of time (i.e. over decades or longer). The Earth's climate is constantly changing. Climatic fluctuations are known to occur from natural causes including the Earth's orbit and

tilt, volcanic eruptions, variations in solar energy and other phenomena such as the El Nino effect[1]. However, in more recent times, there are growing concerns that natural fluctuations in climate are being overtaken by rapid human-related activities which are negatively influencing climate variability and giving rise to serious implications for the rate of global warming.

Scientific evidence for warming of the climate system is unequivocal. According to the Intergovernmental Panel on Climate Change (IPCC)[2] warming of the climate system is attributable to human activities as a consequence of greenhouse gas emissions[3] from:

- Burning of fossil fuels such as oil, gas, peat, and coal resulting in carbon dioxide emissions,
- Agricultural activities that lead to methane and nitrous oxide emissions,
- Emissions from changes in land use such as urbanization, deforestation, reforestation and desertification.

Emissions from these activities are proven to impact the atmosphere by trapping the suns radiation and reflecting back to the earth giving rise to global warming. The term greenhouse effect has been coined to describe this occurrence.

The effects of global warming are observed through reductions in snow and ice in polar regions, increase in global mean surface temperatures, rise in sea levels and changes in some climate extremes i.e. weather events. Scientists state these changes are occurring rapidly, are considerable, and will have consequences for this and future generations. Some impacts of global warming such as sea level rise and coastal flooding are already locked in and unavoidable. The full impacts of current warming have not yet been seen, since ice sheets and oceans take many decades to fully react to higher temperatures.

Climate change is one of the most pressing global policy challenges facing governments needing immediate commitment to action.

1.4 The Challenge for Ireland

There is evidence that Irelands climate is changing in line with global trends of climate change. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and we have been impacted by frequent, intense and more extreme weather events. Temperatures have increased by 0.8^0C since 1900 and sea level rises of about 3.5cm per decade have been observed since 1990. Climate change has diverse and wide ranging impacts on Ireland's economic and natural resources including:

- More intense storms and rainfall events giving rise to disruption to society
- Increased river and coastal flooding
- Water shortages in summer

[1] El Nino is a climate cycle in the Pacific Ocean with a global impact on weather patterns.
[2] The IPCC was created in 1988. One of its key objectives is to provide governments at all levels with scientific information that they can use to develop climate policies. IPCC reports are a key input into international climate change negotiations.
[3] Greenhouse Gases include: water vapour, carbon dioxide (CO2), methane CH4), nitrous oxide (N20) and industrial gasses: Hydrofluorocarbons HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF6), and Nitrogen Trifluoride (NF3). Carbon Dioxide emissions in the atmosphere are the main greenhouse gas caused by human activity

- Increased risk of new pests and diseases
- Adverse impacts on water quality
- Changes in the distribution and phenology of plant and animal species on land and in the oceans[4]

The impacts of climate change are felt more acutely at the local level.

Nationally, climate projections for the next century indicate that the climate trends observed over the last century will continue and intensify over the coming decades i.e.:

- Increase in average temperatures across all seasons. Heat waves are expected to occur more frequently.
- Significant reductions are expected in average levels of spring and summer rainfall with a substantial increase in the frequency of heavy precipitation events in Winter and Autumn
- Decrease in wind speed and an increase in extreme wind speeds. The number of very intense storms is projected to increase over the North Atlantic region.
- Sea levels will continue to rise for all coastal areas. The south of Ireland will likely feel the impacts of these rises first. Sea surface temperatures are projected to continue warming for the coming decade.

This local authority adaptation strategy is set against the background of increasing risks associated with climate change and seeks to reduce and manage these risks at local level through a combination of mitigation and adaptation responses.

All local authorities including Roscommon County Council provide a wide range of services, many of which are already and will increasingly be affected by climate change. It is most likely that we will continue to play a critical role in responding to the impacts of extreme weather events and other impacts that are likely to emerge over the coming decades through various implementation tools available as a local authority[5].

1.5 What is Climate Adaptation?

Climate Adaptation can be best described as planning proactively to take action and make adjustments to minimise or avoid the existing and anticipated impacts from climate change. The Intergovernmental Panel on Climate Change (IPCC), in 2014, defined climate adaptation as:

"The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects."

Climate adaptation aims to build climate resilient communities, to protect people, ecosystems, businesses, infrastructure and buildings from the negative impacts of climate change. As a Local Authority we play a pivotal role in planning for, and responding to, emergency situations. We are best placed to react faster and more effectively to local climate events given our close relationship with

[4] EPA Research, A summary of the state of knowledge on Climate Change Impacts for Ireland, Report No. 223, 2017.

[5] Including: Spatial Planning, development consent, asset management and natural resource protection.

communities and extensive knowledge of the local natural and built environment. This is demonstrated by our prompt and unrelenting emergency responses to varying and more frequent extreme weather events.

Our climate is changing and we as a local authority need to ensure that we adapt to climate change. It is crucial that climate change adaptation is mainstreamed into our decision making processes and implemented proactively in the performance of our duties. In addition, the benefits and opportunities that may arise as a result of climate change must be capitalised upon in respect of cost savings and new ways to foster environmental sustainability.

1.6 Adaptation and Mitigation

It is not possible to develop a Climate Change Adaptation Strategy without discussing measures pertaining to climate mitigation. Mitigation is often defined as the efforts made to reduce the severity of future climate change impacts by reducing the emission of greenhouse gases.

As previously detailed, The Climate Action and Low Carbon Development Act 2015 made provision for, and gives statutory authority to, both the National Mitigation Plan (NMP) which was published in 2017 and the National Adaptation Framework (NAF) published in 2018. The national policy context is to achieve a deep decarbonisation of the economy by the year 2050 and the NAF has been flagged a work in progress reflecting the reality of where we are nationally, in our decarbonisation transition to a more climate resilient economy.

1.6.1 Energy Reduction Targets

The Government of Ireland has committed to wider climate change goals whereby one of these goals is to achieve a 33% improvement in energy efficiency by all Irish public bodies by the year 2020, as defined by SI 426 of 2014. This target was reinforced in 2017 through the publication of the "Public Sector Energy Efficiency Strategy". In its latest performance report entitled "Annual Report 2018 on Public Sector Energy Efficiency Performance", the Sustainable Energy Authority of Ireland (SEAI) have credited Roscommon County Council 22.8% energy savings against its 2009 energy usage baseline. This figure is based on monitoring and reporting by the Local Authority.

1.6.2 Roscommon County Council Mitigation Activities

The Council is corporately committed to mitigating the causes of climate change and to decreasing the organisations dependency on fossil fuels. This goal is defined in the Corporate Plan 2015-2019:

> *Corporate Plan, Objective 2*
>
> "encourage and facilitate the reduction of the carbon footprint in County Roscommon, through the promotion of smarter travel, energy awareness and energy efficiency measures"

Over the past number of years, the Council has developed an extensive portfolio in mitigation related works and will endeavour to build on this activity, in addition to developing new and innovative policies to promote activity within the county.

Through the Energy Management Team, a number of projects have been completed in order to reduce the dependency on fossil fuel energy generation across the county.

These projects include;

- Energy improvement schemes in Local Authority owned buildings,
- Building upgrades to Roscommon, Boyle, Castlerea and Ballaghaderreen fire stations
- Installation of solar photo voltaic (PV) panels at Roscommon fire station

Mitigation in Action

Solar Photovoltaic Installation at Roscommon Fire Station

Roscommon County Council carried out energy efficiency improvement works to Roscommon Fire Station in 2017, works included the installation of solar photovoltaic (PV) panels, upgrading heating and hot water systems and controls, replacement of light fittings to LED. This has increased the use of renewable energy and reduced the use of fossil fuels.

The installation consists of a 6KW, 30m2 array of PV panels and will generate 5,100kWh electricity each year saving €1,020 each year. The payback on this system was estimated at 10.8 years. The project was completed through an SEAI part funded Better Energy Community Scheme (BEC) receiving 30% funding.

LED lighting upgrade at Roscommon Leisure Centre, Roscommon Library and Roscommon Arts Centre

Energy efficiency upgrades were completed in 2018, the projects involved designing a new lighting layout and replacing all existing fluorescent and halogen lights with LED lights.

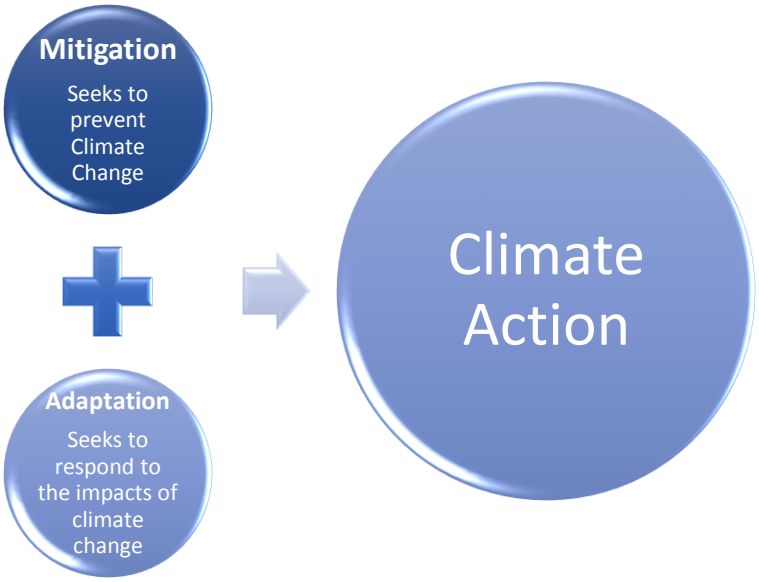
Calculated energy savings at a glance

	Annual energy savings	kwh cost	Annual savings	LED cost	Payback years	Primary energy saving	Reduction in lighting energy consumption
Unit	kWh	€	€	€	No.	kWh	%
Arts Centre	29215	0.1464	4,277.00	14,460.00	3.38	73038	70%
Leisure centre	17902	0.1500	2,685.00	15,198.00	5.66	44755	62%
Roscommon Library	15781	0.1309	2,066.00	28,404.00	13.75	39453	58%

Roscommon Library

Arts Centre dance studio

In addition to the ongoing energy saving projects Roscommon County Council is committed to further developing polices to promote cross sectoral sustainability in areas such as housing by, for example, piloting energy reduction retrofitting schemes within local authority housing stock.



Adaptation *refers to efforts to manage the risks and impacts associated with existing or anticipated impacts of climate change.*

Mitigation *refers to the efforts to reduce the emission of greenhouse gases and reduces the severity of future climate change impacts.*

This local authority Climate Change Adaptation Strategy forms part of Ireland's national strategy for climate adaptation as set out in the National Adaptation Framework (NAF) which was produced under the provisions of the Climate Action and Low Carbon Development Act 2015.

It is tasked with mainstreaming climate change adaptation over time into all functions, operations and services of the local authority. It seeks to inform or 'climate proof' existing plans and policies produced and implemented by the local authority. This ensures a considered, consistent and coherent approach, facing head on the challenges of a changing climate. Crucially, it also helps in building resilience within the local authority organisation itself as well as across all communities.

While there is strong emphasis on local authorities through the NAF to develop and implement adaptation measures and actions, mitigation measures and actions that seek to combat, reduce or eliminate the emissions of greenhouse gases are also hugely important. Local authorities have a significant role to play in actively implementing mitigation actions through measures including the design and construction of flood defences, retrofitting of building stock, energy efficient projects, promoting sustainable energy communities and encouraging sustainable transport and land use.

There are positive interactions between adaptation and mitigation measures. Employing both adaptation and mitigation measures represents a robust climate action response in addressing the challenges associated with climate change at local level. The actions set out in Chapter 5 of this

strategy reflect both adaptation and mitigation measures as a considered, relevant and integrated approach to combating the effects of climate change in County Roscommon.

1.7 Adaptation Policy Context

This local authority Adaptation Strategy is set within a policy framework at International, European and National level.

1.7.1 International Context

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. The frameworks objective is "to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The framework set non-binding limits on greenhouse gas emissions and contained no enforcement mechanisms. However, the framework outlined how specific international treaties may negotiate further action towards its key objective. **The Paris Agreement 2015** is a protocol set within the context of the UNFCC (ratified by Ireland on 4th November 2016) and it is aimed at:

- limiting global warming to less than 2^0C above pre-industrial level and pursue efforts to limit the temperature increase to 1.5^0C
- Increasing the ability to impact of climate change and foster climate resilience

The agreement states the need for Parties to formulate and implement National Adaption Plans.

1.7.2 EU Context

The 2013 EU Strategy on Adaptation to Climate Change encouraged all Member states to adopt comprehensive Adaptation Strategies. It sought for better informed decision making through the identification and addressing of gaps in knowledge about adaptation. The European Climate Adaptation Platform, Climate-ADAPT, was developed as a resource mechanism to help users access and share information on adaptation.

The Global Covenant of Mayors for Climate and Energy is a voluntary, bottom up, approach for cities and local governments to combat Climate Change and move towards a low emission, resilient society. The Global Covenant of Mayors for Climate and Energy brought the Compact of Mayors and the EU Covenant of Mayors under one international body in January 2017 incorporating over 9,000 cities and local governments. Roscommon County Council is working towards becoming a party to the Covenant of Mayors.

1.7.3 National Context

The 2012 National Climate Change Adaptation Framework (NCCAF) was Ireland's first step in developing a national policy on adaptation actions to combat the impacts of climate change.

The National Policy Position on Climate Action and Low Carbon Development 2014 restated the policy position of the NCCAF, 2012. Greenhouse gas mitigation and adaption to the impacts of climate change were to be addressed in parallel national plans under an evolving climate policy to 2050.

The Climate Action and Low Carbon Development Act 2015 was a landmark national milestone in the evolution of climate change policy in Ireland. It provides the statutory basis for the national transition

objective laid out in the National Policy Position (as per above). Further to this, it made provision for and gave statutory authority to both the **National Mitigation Plan** (NMP), published in 2017 and the **National Adaptation Framework** (NAF) published in 2018. This Local Adaptation Strategy forms part of the National Adaptation Framework.

The Local Authority Adaptation Strategy Development Guidelines 2018 provides guidance to Local Authorities to develop their own Climate Action Adaptation Strategy. In developing this Adaptation Strategy Roscommon County Council has been consistent with these guidelines.

Declaring a Climate and Biodiversity Emergency

In June 2019 the elected members of Roscommon County Council resolved a motion, with the agreement of all members to declare a climate and biodiversity emergency. The members, in doing so, showed their commitment to taking action on climate change including reducing the risks of climate change impacts on council operations and services, promoting and ensuring biodiversity throughout the county, as well as mitigating against the causes of climate change. This follows the decision by the Irish government and opposition parties to declare a climate and biodiversity emergency, becoming only the second country in the world to do so.

1.7.4 Sustainability Development Goals:

In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). The SDGs are a blueprint to achieve a better and more sustainable future. They address global challenges related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The Goals interconnect and are interdependent. Goal No. 13 addresses Climate Action with an objective to: ***Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy***

The Goal recognizes Climate Change as a global challenge that does not respect national borders and requires solutions that need to be coordinated at the international level to help developing countries move toward a low-carbon economy.

1.8 Climate Action Plan 2019 – To tackle Climate Breakdown

The all of government Climate Action Plan 2019 - *To Tackle Climate Breakdown* was published on Monday 17th June 2019. The plan sets out 183 individual actions over 12 sectors and charts an ambitious course towards decarbonisation. It acknowledges the failure to meet emissions targets to 2020, failure to address efforts to decarbonise particularly during the period of the economic downturn and failure in breaking the link between emissions and economic growth. In light of this, the ambition is clearly set out to deliver a step-change in emission performance over the coming decade to meet 2030 targets and to set a trajectory to meet 2050 objectives. There is strong commitment under new governance arrangements to update the plan annually, to track performance of targets and revise or update the actions as necessary. To drive the successful and practical implementation of Climate Action towards achieving 2030 and 2050 targets, the Minister for Communications, Climate Action and Environment will bring forward a legislative framework through a new Climate Action Act.

13.2 Targets

To meet the required level of emissions, by 2030 we will:

- Reduce CO_2 eq. from the sector by 30%
- Improve the energy efficiency of public sector buildings by 50%
- Set a target to demonstrate leadership in the adoption of low emission transport options
- In 2019, have a Climate Mandate adopted by every Public Body, making the sector a catalyst for climate action
- In 2019, agree a Climate Action Charter with Local Authorities
- All Public Buildings to reach BER 'B' Rating

Within the 12 Sectors described in the Plan, the Public Sector is identified as having a significant role in '*Leading by Example*'[6] to not only just reduce their own emissions but to inspire climate action across communities and society. Local Government in particular is recognized for its pivotal role in stimulating climate action at community level. The Plan speaks also to the role of the Climate Action Regional Offices (CARO) in assisting local authorities in building capacity to engage effectively with climate change. There are a range of actions that are specific to and/or relate to local authorities as well as the CAROs.

Local authorities will be required to undertake an annual programme with measurable impact particularly with actions to focus on, inter alia;

- Reducing emissions by 30% and Improve energy efficiency of local authority buildings by 50% under the guidance of a new Public Sector Decarbonisation Strategy.
- Setting a target to demonstrate leadership in the adoption of low emission transport options
- Developing and implementing a Climate Action charter
- Public buildings (all) to reach BER 'B' Rating
- Building capacity through upskilling and knowledge dissemination

[6] Chapter 13 "Climate Action Plan 2019"

- Supporting and delivering projects that include strong ambition on climate action through funding resources from Project Ireland 2040
- Developing robust community engagement on climate action by linking to existing and new networks and clustering initiatives using the National Dialogue on Climate Action and local authority structures.
- Working with communities to expand Sustainable Energy Communities.
- Continue to implement Adaptation Planning with emphasis on building Climate Resilience and delivering the objectives of the National Adaptation Framework.

On Climate Change Adaptation, the Plan is very strong on the need *to address the current and future risks posed by a changing climate…* Adaptation is *both urgent and essential to successfully transition to a climate resilient economy and society by 2050*[7]. It cites examples of extreme weather events to explain that the cost of inaction to the effects of climate change are simply too significant to discount.

It is acknowledged that much of the focus for the local authority sector to date, has been on Adaptation Planning. Local authorities are now prescribed to widen their scope and act as a catalyst for much wider change. Since 2018 Climate Action Regional Offices (CAROs) have been co-ordinating the Local Authority response to Climate Change. The structures deployed have proved highly effective and can be utilised to direct local authority actions within the Climate Action Plan. The CAROs will lead a step up in climate action within local authorities to pursue mitigation measures to reduce emissions, activate meaningful citizen engagement, encourage community leadership and capacity building using the National Dialogue on Climate Action linking in with existing and new local authority structures.

The Climate Action Plan is notably focused on mitigation measures to achieve emission targets to 2030. However, there is full commitment to provide clear leadership in promoting Adaptation. Recognising that Climate Change is a hugely complex issue that requires a range of responses from every sector in society <u>all</u> measures <u>collectively</u> represent a coherent approach to dealing with the challenges ahead.

Local Authorities, through the process of Adaptation Planning are gaining a clear understanding of the risks presented by climate change and the current levels of vulnerability to such risks. Actions identified in the Adaptation Strategies are aimed at building climate resilience and integrating adaptation into effective local level decision making. This is crucially important. Building on this work, local authorities will undoubtedly need to expand their role to take on actions and measures from the Climate Action Plan to respond to and meet obligations set out.

It is important that the Roscommon County Climate Change Adaptation Strategy recognizes the purpose of the Climate Action Plan and the role intended for Local Authorities to meet targets and contribute to the national climate ambition.

[7] Chapter 16 "Climate Action Plan 2019"

1.9 Methodology

Roscommon County Council have prepared this Climate Change Adaptation Strategy as required by The Climate Action and Low Carbon Development Act 2015, and closely following the Department of Communications, Climate Action and Environment guidelines "Local Authority Adaptation Strategy Development Guidelines" December 2018.

Methodology and resources used in developing this Strategy included:

- internal adaptation team meetings,
- attending all Climate Ireland and CARO workshops,
- sourcing information from
    - RCC County Development Plan,
    - web based tools like Climateireland.ie, met Éireann.ie etc.

As part of the preparation process the draft Strategy will be placed on display for Public Consultation, submissions are invited from all interested parties during this time.

Consultation with prescribed environmental authorities for the purposes of Strategic Environmental Assessment will be undertaken in accordance with the provisions of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011).

2.0 Environmental Assessment:

Screening Overview for SEA: Under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011), all plans which are likely to have a significant effect on the environment must undergo screening to determine whether a Strategic Environmental Assessment (SEA) is required. "Screening" is the process for making a determination as to whether a particular plan, would be likely to have significant environmental effects, and would thus warrant SEA. This strategy has been screened for SEA and it is determined that full SEA is not required. The screening report accompanies this strategy.

Screening overview for AA: Screening of this draft strategy has been undertaken in accordance with the requirements of Article 6(3) of the EU Habitats Directive (directive 92/43/EEC) to determine if the Climate Change Adaptation Strategy is likely to significantly affect Natura 2000 sites (i.e. Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) within or surrounding the Strategy area. It is determined that stage 2 Natura Impact Report is not required. The draft screening report accompanies this Strategy.

***

Chapter 2

The Regional and Local context

2.1 Roscommon in Context

Roscommon County Council is located within the Eastern and Midlands Climate Action Region (CARO) and is one of 17 Local Authorities in the region. Roscommon County Council is located to the northwest, within the Eastern and Midlands Climate Action Region.

The Eastern and Midland CARO has assisted and supported Roscommon County Council in the development of this Climate Change Adaptation Strategy.

2.2 Background to the Eastern and Midland Climate Action Regional Office

The Eastern & Midland CARO is one of four regional climate action offices set up in 2018 in response to Action 8 of the 2018 National Adaptation Framework (NAF) – *Planning for a Climate Resilient Ireland*.

The four CAROs have been established to drive climate action at both regional and local levels. In recognition of the significant obligation to develop and implement climate action measures, the four regional offices are mandated to co-ordinate engagement across the varying levels of government and help build on experience and expertise that exists in the area of climate change and climate action.

The composition of the four Climate Action Regions has been determined by the geographical and topographical characteristics, vulnerabilities and shared climate risks experienced across local authority areas. The climatic risks associated with the Eastern and Midlands Climate Action Region include Fluvial Flooding, Pluvial Flooding, Groundwater Flooding and Coastal Flooding.

The four CARO regions and constituent local authorities are illustrated on the map in table 2.1 as follows:

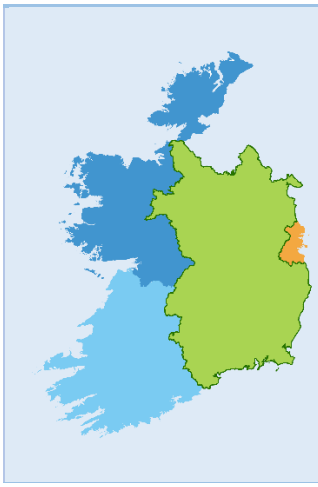
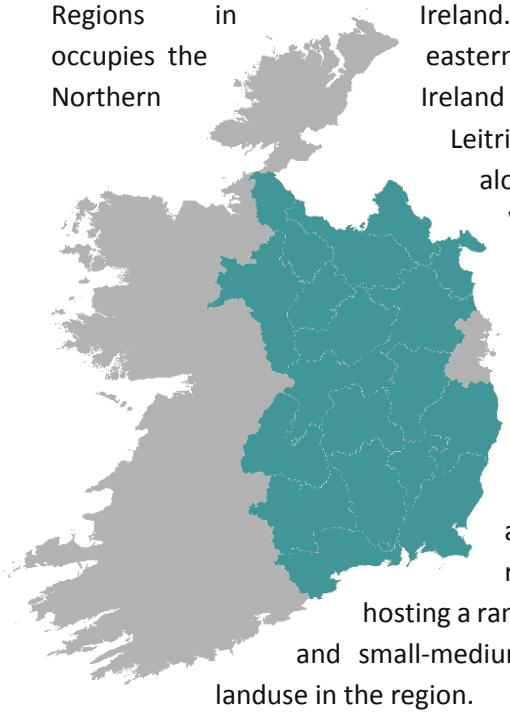
	Climate Action Region	Local Authority function area	Lead Authority
	**Midlands and Eastern**	Carlow, Cavan, Kildare, Kilkenny, Laois, Leitrim, Longford, Louth, Meath, Monaghan, Offaly, Roscommon, Tipperary, Waterford, Westmeath, Wexford, Wicklow	**Kildare County Council**
	Atlantic Seaboard North	Donegal, Sligo, Mayo, Galway City & County	**Mayo County Council**
	Atlantic Seaboard South	Clare, Limerick, Kerry, Cork City & County.	**Cork County Council**
	Dublin Metropolitan	South Dublin, Fingal, Dun-Laoghaire-Rathdown, Dublin City	**Dublin City Council**

Table 2.1

2.3 Profile of Eastern and Midland Climate Action Region

With 17 local authority areas, the Eastern and Midland region is the largest of the four Climate Action Regions in Ireland. The region, exclusive of the Dublin Metropolitan Area, occupies the eastern and central aspects of the country. The Region borders Northern Ireland to the north with counties Louth, Cavan, Monaghan and Leitrim. The River Shannon flanks the western aspect bounding along its course, counties Leitrim, Roscommon, Longford, Westmeath, Offaly and Tipperary. The Irish Sea bounds the region to the east. Counties Louth, Wicklow, Wexford and Waterford are located to the east and south east of the region all with extensive coastlines along the Irish Sea.



The region with its extensive pattern of settlement areas and rural areas and has a population of almost 1.8 million people accounting for 37.7% of the total population of the state[8] and at 32,542 sq.km occupies 46.3% of the area of the state[9]. The region plays a significant role economically to the country hosting a range of sectors inclusive of multinationals, public service, private and small-medium enterprises. Agriculture remains the prevailing sectoral landuse in the region.

There is a rich variety of landscapes and topographies across the region. A mostly flat low lying landscape sweeps through the midland counties. Significant areas of raised bogs occupy this central location in the country as well as the Curragh Plains extending towards the Curragh Plains in County

[8] Total population of E&M Region is 1,796, 923 persons. The state population is 4,761,865 persons (CSO, 2016).
[9] Total area of state is 70,282 sq.km

Kildare. The Drumlin Belt across the northern aspect of the region, the Wicklow Mountains, Galtee Mountains and Slieve Bloom Mountains offer variation and punctuation in the landscape of the region.

21 prominent Rivers rise and flow (with tributaries) through the Region. The most prominent of these include the River Shannon, River Barrow, River Suir, River Nore, River Liffey and River Boyne. Counties Louth, Wicklow, Wexford and Waterford occupy coastal locations to the east and south east of this region while County Leitrim extends to occupy a distance of 4.6km along the western coast of the country.

The region offers an extensive and crucially important network of critical infrastructure. The road network in the region typically radiates from the metropolitan Dublin Region. The Rail Network is significant with the Dublin-Cork, Dublin-Limerick, Dublin-Waterford and Dublin-Galway/Mayo lines. Rosslare Europort in Wexford is a gateway to Wales and greater Europe through France. Electricity and communications infrastructure is widespread throughout the region.

The Ireland's Ancient East proposition best represents the vast array of tourism products on offer in the region as a cultural and tourist destination.

2.4 Profile of County Roscommon

County Roscommon is centrally located in the heart of Ireland with a population of over 300,000 within a 60km radius. It is a county rich in natural resources of agricultural land, forestry, scenic areas, rivers and lakes including the majestic Shannon. The county has a strong culture and heritage with renowned people, traditional industries, historical houses, prehistoric archaeology, visitor attractions and a wide range of festivals and events. It has a highly educated population and skilled workforce and a vibrant and engaged community and voluntary sector. It has the potential to capitalise on the clean, green rural image of the county, in which people officially live longer. With high quality social, economic, recreational, cultural and environmental infrastructure, Roscommon can offer a high quality-of-life and wellbeing. The county is well positioned as a strategic central hub to capture spill over potential from more industrialised areas such as Galway, Sligo, Castlebar, and Athlone. The county must be positively and actively promoted as an attractive place to live, work, visit and locate business. With the right leadership, Roscommon can implement strategies to maximise technology and knowledge based enterprises, build on the existing nucleus of medical technology companies, capitalise on tourism potential, proactively achieve growth in the agriculture and food sector, develop economic potential in the green energy sector, including biomass and support the rural economy with rural and social enterprise initiatives.

Geography and Population Profile

Spread over an area of 2,547km^2, Roscommon is the 9th largest county in Ireland. However, with a total population of 64,544, it has the fifth lowest population in the State. In the national context, Roscommon has 1.4% of the national population and 3.6% of the landmass, illustrating the predominantly rural nature of the county and its landscape.

Population Growth

The population of County Roscommon has increased by approx. 24% in the period 1996-2016, largely as a result of net migration. Despite this growth, the current population of 64,544 (Census 2016), gives a population density of just over 25 persons per square km, behind neighbours Leitrim and Mayo. In line with national trends, significant population growth was recorded in the main urban areas in the county. The highest growth rates were recorded in the main urban hinterlands of Monksland (Athlone West Rural), Roscommon Town Rural, and Boyle Environs. However, the census figures also show that Roscommon remains as the third most rural county in Ireland with 73% of the population still living in rural areas.

Population Migration

Roscommon is amongst those counties which consistently records high levels of out-migration of the native population born in the county. After neighbouring county, Leitrim, Roscommon has the second highest level of out-migration of its population to other counties, at 40.4%, compared to the State average of 30.5%[10]. In recent times, this has been particularly evident amongst the younger adult population (18-39 years), generally in search of education and work opportunities. On the positive side, this gives rise to a large diaspora with Roscommon roots, nationally and worldwide, which, if harnessed correctly, can prove useful for promoting the local region and attracting businesses to locate in the county. Also of note, almost 13% of the local population is non-Irish nationals. These, along with the migration of other Irish residents into Co. Roscommon, generally account for the recent population increases recorded. Of these non-Irish nationals, 4.2% were UK nationals and a further 2.1% were Polish. There is also a strong Brazilian community and Eastern European population amongst the remaining non-national cohort.

Broadband and Energy Infrastructure

Broadband coverage is becoming ever more important as business models evolve, with increased online activity and new businesses emerging in knowledge and technology sectors. According to the latest Census data (2016), 59.7% of households in the county had broadband connectivity, compared with 70.5% nationally. This reflects the rural nature of the county, with broadband access lagging behind urban areas. Hi-speed Fibre-Optic Broadband infrastructure is available through the Metropolitan Area Network (MAN) in Roscommon town and in parts of Monksland which is connected to the Athlone MAN. These networks run near industrial and commercial building in these areas, which have potential for easy connection. The Programme for Government has committed to facilitating the provision of faster broadband to every home and business in the State.

On 7 May 2019, Government approved the appointment of a "Preferred Bidder". This is the final step in the National Broadband Plan (NBP) procurement process before a Contract is awarded and deployment begins. The company will be required to build, maintain and operate a new high speed broadband network in the NBP State intervention area over a 25-year contract.

[10] CSO, Census 2016 data

The High Speed Broadband Map is updated by the Department every quarter. The latest update shows progress in the deployment of high speed broadband in the BLUE areas on the Map up until the end of December 2018, including those premises passed under the eir Commitment Agreement. A total of 225,176 premises have been passed since eir commenced work in late 2016.

Energy costs, reliability, ensuing security of supply, including reducing reliance on imported fossil fuels and increasing use of renewable energy sources remain an important issue for enterprise development. The availability of natural gas in Ireland has assisted some industries to control energy costs. However, locally, access to gas is limited and only available in the south of the county in the Monksland area. Improving environmental sustainability, including improving efficiency and usage as well as focusing on delivery renewable energy capacity (wind, biomass, geothermal), and opportunities in the Green Economy can also lead to new business opportunities.

Age Profile

The age profile of people living in County Roscommon (2016) is summarised as follows:

Age Category	**Number**
0-4 years (Pre-school)	4,360
5-14 years (Primary School)	9,302
15-19 years	4,008
20-39 years	14,497
40-64 years	21,634
65+	10,743
TOTAL	**64,544**

Table 2.2 Age Profile County Roscommon (Source: CSO, Census 2016 data)

There are less people in the younger working age categories living in County Roscommon (20-39 years), largely as a result of out-migration of those seeking suitable work opportunities, including graduates. There are comparatively more people in the older working age categories (40-64 years). There are an increasing number of people in the older age categories (65+) which is set to rise further.

Education and Skills

A good standard of education is a prerequisite for enterprise to become established and flourish, whilst research shows that there is a direct link between levels of innovation and the employment of graduates. In County Roscommon, the standard of education across the population is improving.

Third Level Participation and Graduate Retention

Roscommon has produced a consistently high number of students that proceed to third level education. Whilst this is a positive trend, there are some significant challenges in retaining this graduate population locally. This needs to be addressed to increase innovation capacity into the local

economy, as well as ensuring that the county has a suitable workforce profile to attract and retain new enterprise in the area.

Physical Characteristics of County Roscommon

The County is bordered along the east and west by the River Shannon and the River Suck respectively which meet to the south of the county. The River Shannon is the main waterway that flows through the county with its many harbours and amenities that offer significant tourism and environmental potential. Lough Key Forest Park is an important tourist and ecological habitat in the county. Most of the County is flat with the main elevated lands located in the northern fringe of the county. The land of County Roscommon is largely underlain by limestone and forms part of the central plain of Ireland. Up to 73% of the public drinking water supply is from groundwater.

The built heritage in County Roscommon consists of a range of areas of special interest. Roscommon has 557 buildings on the Record of Protected Structures (RPS) and there are over 4,400 recorded monuments in the County. Roscommon is located two hours from Dublin and Shannon Airports and adjacent to Ireland West Airport Knock. The county is positioned immediately adjacent to the Midlands Gateway of Athlone, Mullingar and Tullamore and Hub Town of Cavan to the east, the Galway Gateway and Hub Towns of Tuam, Castlebar and Ballina to the west and the Sligo Gateway in the Northwest. The county towns of Carrick-on-Shannon and Longford are also adjacent. Roscommon has built a strong agriculture and primary food processing industry. Strong manufacturing industries also exist in the county and there are plans for the expansion and clustering of biopharma industries here. The transport, communication, energy and environmental infrastructure have been significantly developed recently making Roscommon a very attractive location for business and industry with Athlone Institute of Technology on our doorstep. These adjacent assets combined with the vibrancy of our own indigenous towns, villages and rural communities serviced with three national primary radial roads and an equal number of radial railway lines render Roscommon in a pivotal position to grow its economy and social services within a culturally and archaeologically rich environment.

***

Chapter 3

Adaptation Baseline Assessment

3.1 Baseline Assessment

Roscommon County Council (RCC) Climate Change Adaptation Team held a number of workshops and meetings with key personnel when carrying out a baseline assessment. Key vulnerabilities, impacts and risks associated with severe weather events were recorded during this process. The affect these events have on the operations and resources of the Local Authority as well as the landscape and inhabitants is documented below. The findings of the assessment have shown the local scale impacts and vulnerabilities considered a priority for RCC and are listed below.

- Extreme Rainfall
- Strong Wind
- High Temperature - Drought
- Low Temperature - Snowfall

EXTREME RAINFALL

IMPACTS	CONSEQUENCES	RISKS
FLOODING OF PROPERTIES	1. DAMAGE TO PROPERTY 2. AREAS CUT OFF	INFRASTRUCTURE HEALTH & SAFETY COSTS / RESOURCES ENVIRONMENTAL ISSUES
FLOODING OF INFRASTRUCTURE I.E. ROADS / TREATMENT PLANTS ETC.	1. INCREASED MAINTENANCE COST 2. INABILITY TO MEET STATUTORY DEADLINES 3. SERVICE DISRUPTION 4. POLLUTION	
EXCEEDANCE OF SURFACE WATER DRAINAGE CAPACITY	INCREASE IN POLLUTION FROM OVERFLOW OF COMBINED STORM WATER SYSTEMS	
WATER QUALITY	DISRUPTION OF SERVICES	
ENVIRONMENTAL IMPACTS	SECURITY CONCERNS	
FLOODING OF LANDS	EMERGENCY SERVICES SLURRY RUNOFF LAND POACHING	
LANDSLIDES	COST OF CLEAN UP	
SAFETY CONCERNS	PREVENTION MEASURES	
RESOURCES	1. LITIGATION 2. INSURANCE COSTS	

STRONG WIND

IMPACTS	CONSEQUENCES	RISKS
TREES DOWN	1. BLOCKED ROADS 2. EMERGENCY RESPONSE	PUBLIC HEALTH FINANCIAL IMPLICATION SERVICE DELIVERY MODELS DUTY OF CARE REPUTATIONAL DAMAGE
PROPERTY DAMAGE	1. REPAIR COSTS 2. POSSIBLE INCREASE IN INSURANCE COSTS 3. POSSIBLE CLOSURE OF FACILITIES	
BLOCKED DRAINS	1. POSSIBLE FLOODING 2. EMERGENCY RESPONSE	
POWER LINES DOWN	1. POWER CUTS AT TREATMENT PLANTS 2. OFFICE CLOSURES	
VEHICULAR ACCIDENTS	1. POSSIBLE ROAD CLOSURES 2. EMERGENCY RESPONSE	
STAFF ACCIDENTS	1. IMPACT ON RESOURCES 2. DUTY OF CARE	
TURBIDITY	POOR WATER QUALITY	

HIGH TEMP - DROUGHT

IMPACTS	CONSEQUENCES	RISKS
LOW WATER LEVELS	1. POOR QUALITY WATER. (WATER FRAMEWORK DIRECTIVE) 2. POLLUTION 3. SHORTAGE - NO WATER 4. DEMAND ON STAFF TO WORK OUTSIDE OF CORE HOURS	ENVIRONMENTAL PUBLIC PERCEPTION PUBLIC SAFETY RESOURCES / COSTS WATER POLLUTION
FIRE	IMPACT ON FIRE SERVICES & PEOPLE - RESOURCE ISSUE	
ROADS	1. ACCIDENTS 2. ROAD DAMAGE 3. ROAD SHRINKAGE 4. DAMAGE TO PIPES DUE TO SHRINKAGE 5. ROAD CLOSURES/DIVERSIONS	
PUBLIC PARKS	1. MORE STAFFING RESOURCES REQUIRED - GRASS CUTTING & LITTER CLEARING 2. MAINTENANCE - WATERING & PROTECTING PLANTS	
STAFF	1. SUN RELATED SICKNESS 2. HEALTH AND SAFETY	
RESOURCES	COOLING PUBLIC BUILDINGS & OFFICES (COST)	

LOW TEMP - SNOWFALL

IMPACTS	CONSEQUENCES	RISKS
ROAD CLOSURES	1. STAFF CLEARING ROADS (H&S) 2. SERVICE LEVEL DISRUPTION 3. DISCONNECTION OF COMMUNITIES AND ACCESSIBILITY ISSUES	INJURIES & FATALITIES - H&S (PUBLIC HEALTH) REPUTATIONAL DAMAGE ECONOMIC TO BOTH COUNTY COUNCIL & GENERAL PUBLIC
STAFF UNABLE TO GET TO WORK	REDUCED PRODUCTIVITY / NO ECONOMIC ACTIVITY	
FROZEN PIPES (INSURANCE + COSTS)	INCREASED CAPITAL & OPERATIONAL COSTS	
INCREASED DAMAGE	INFRASTRUCTURE DAMAGE POTHOLES ETC / HOUSING STOCK	
INJURIES & FATALITIES	1. PL CLAIMS 2. NEED FOR ADDITIONAL EXPENDITURE 3. TOLL OF OVER TIME ON RESOURCES & STAFF 4. CLOSURES (OFFICES/LIBRARIES)	
POST-EVENT FLOODING	1. LACK OF CLARITY WITH OTHER AGENCIES 2. DAY TO DAY WORK (NEGLECTED) 3. DESIGN ISSUES	

EXTREME WEATHER EVENT – ANY/COMBINATION

IMPACTS	CONSEQUENCES	RISKS
• CHANGES IN SPECIES	1. CHANGES TO SURFACE WATER HABITATS 2. SPREAD OF PATHOGENS AND OTHER CONTAMINANTS	ENVIRONMENTAL PUBLIC PERCEPTION PUBLIC SAFETY RESOURCES / COSTS WATER POLLUTION
• NEGATIVE IMPACT ON CONSTRUCTION PROJECTS AND PROGRAMMES	TIME DELAYS IN DELIVERING NEW CRITICAL INFRASTRUCTURE	
• LOSS OF BIODIVERSITY • SHIFT IN DISTRIBUTION OF PLANT SPECIES	1. NEGATIVE IMPACT ON COMMUNITY HEALTH AND WELLBEING 2. ECONOMIC IMPACT – LOSS OF TOURISM	
• DAMAGE TO COMMUNITY ASSETS • DAMAGE TO CULTURAL AND HERITAGE ASSETS AND CULTURAL LANDSCAPES	1. DISRUPTION TO COMMUNITIES 2. NEGATIVE ENVIRONMENTAL CONSEQUENCES 3. INCREASED PRESSURE ON STAFF RESOURCES 4. NEGATIVE IMPACT ON TOURISM 5. INCREASED PRESSURE ON MAINTENANCE RESOURCES 6. INCREASED FUNDING REQUIREMENTS FOR REPAIR AND MAINTENANCE OF COMMUNITY ASSETS	
• INCREASED UNCERTAINTY FOR LONG TERM LAND USE PLANNING • EARLY RETIREMENT OF CAPITAL INFRASTRUCTURE • LOSS OF PROPERTY AND COMMUNITY ASSETS	1. INCREASED PRESSURE ON DISASTER MANAGEMENT AND EMERGENCY RESPONSE 2. INCREASED INSURANCE COST FOR LOCAL COMMUNITIES 3. NEGATIVE IMPACTS ON QUALITY OF LIFE	

Listed below in table 3.1 are broad categories of service disruption for use in determining how to characterise the consequences of climate risks for Roscommon County Council (Edinburgh Sustainable Development Partnership, 2016)

Consequence	Level	Description
Catastrophic	5	Widespread service failure with services unable to cope with wide scale impacts. Irrecoverable environmental damage. Large numbers of serious injuries or loss of life
Major	4	Services seen to be in danger of failing completely with severe/widespread decline in service provision and quality of life. Severe loss of environmental amenity. Isolated instances of serious injuries
Moderate	3	Service provision under severe pressure. Appreciable decline in service provision at community level. Isolated but significant instances of environmental damage that could be reversed. Small number of injuries
Minor	2	Isolated but noticeable examples of service decline. Minor environmental damage
Negligible	1	Appearance of threat but no actual impact on service provision

Table 3.1 Broad Categories of Service Disruption

Climate Hazard (Event):	Extreme Rainfall (November 2009)
Meteorological/ Climatological Conditions:	Rainfall totals for November 2009 were the highest on record at most stations, including the long-term station at Valentia Observatory, where records extend back over 100 years. Valentia's total of 360mm was its highest of any month since observations began in the area in 1866.

Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Habitats Parks and Green Spaces	Increased pressure on resources resulting in increased upkeep and maintenance costs, due to increased frequency of extreme rainfall	Public Parks	Post event assessment and prioritisation/scheduling of necessary remedial works	1	Loss of priority habitats and species.	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
Buildings and Infrastructure	Increased occurrence of flooding related damage	Local Authority dwellings and assets	Emergency response by Local authority Staff	2	- Increased maintenance costs and staff overtime. - Reputational damage, poor service provided to tenants	Department of Housing, Planning and Local Government
Health and Wellbeing	Staff travelling to and from work and outdoor staff endangered. Programme of work delayed.	Staff Programme of work	Staff advised to stay at home during red alert weather warnings issued by Met Éireann	1	Increased costs	Department Met Éireann
Emergency Services	Increased occurrence of road traffic accidents resulting in increased callout of Fire Services due to extreme rainfall	All roads	Emergency response by Fire Services.	3	Increased callout of Fire Services.	Fire Services, HSE

Climate Hazard (Event):	Strong Wind (October 2017)
Meteorological/ Climatological Conditions:	The intensity of extreme weather events, e.g. storms, is expected to increase. The overall number of North Atlantic cyclones is projected to decrease by approximately 10 %. Results also indicate that the paths of extreme storms will extend further south, bringing an increase in extreme storm activity over Ireland, although the number of individual storms is projected to be quite small. Storm Ophelia caused almost €70 million worth of damage after it tore across Ireland on October 16th last year.

Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Habitats Parks and Green Spaces	Increased pressure on tourism resources resulting in increased upkeep and maintenance costs, due to damage caused by severe winds	Tourist attractions and parks	General checks by LA staff on known areas sensitive to wind damage prior to event	2	Increased callout of staff out of hours	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
Buildings and Infrastructure	Buildings damaged by fallen trees and flying objects	Local Authority Assets	Staff advised to stay at home during red alert weather warnings issued by Met Éireann	2	- Increased maintenance costs and staff overtime.	Government Departments, Emergency Services
Health and Wellbeing	Staff travelling to and from work and outdoor staff endangered, abandonment of core duties thus increasing cost to the authority	Indoor and outdoor Local authority Staff	Staff advised to stay at home during red alert weather warnings issued by Met Éireann	1	- Increased costs due to staff absence	Met Éireann
Emergency Services	Fire service staff inundated with calls to deal with emergencies	All areas	Emergency response by Fire Services.	2	- Increased callout of Fire Services.	Fire Services, HSE

Climate Hazard (Event):	Heatwave (Summer 2018)
Meteorological/ Climatological Conditions:	On a national basis, temperatures were above normal with heat wave conditions recorded at various times and stations between the 24th of June and 4th July. Absolute drought conditions were reported at 21 stations (May 22nd to 14th July) with partial drought conditions being reported for some stations between the 18th of June and the 14th of July (Source: Met Éireann).

Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Habitats Parks and Green Spaces	Increased frequency of wild fire due to prolonged periods of high temperatures and below average rainfall.	Upland areas comprising of gorse, forest and bog.	Emergency response by Fire Services. Fire breaks.	3	- Loss of priority habitats and species. - Increased callouts of emergency services.	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
Buildings and Infrastructure	Deterioration of road surfaces (rutting) due to prolonged exposure to high temperatures.	Local roads situated across the county, comprising of tarred and chipped surfaces.	Chipping and emergency works.	2	- Increased maintenance costs and staff overtime. - Reputational damage of transport disruption.	Department of Transport, Tourism and Sport, National Roads Authority
Health and Wellbeing	Increased levels of sunburn and heat stress (heat stroke/dehydration) as a result of prolonged exposure to high temperatures.	Outdoor (particularly in urban areas due to UHI), Council Staff	Water and sunscreen stations.	2	2 Increased costs for protection of staff from heat stress. 3 Staff fatigue.	HSE
Emergency Services	Increased frequency of wild fire due to prolonged periods of high temperatures and below average rainfall.	Upland areas comprising of gorse, forest and bog.	Emergency response by Fire Services.	2	- Increased callout of Fire Services.	Fire Services.

Climate Hazard (Event):	Low Temp - Snow (Winter 2009/2010)
Meteorological/ Climatological Conditions:	Mean air temperatures for the season were around two degrees lower than average for the 1961-90 period and it was the coldest winter since 1962/3 everywhere. The season's lowest temperatures were measured in the periods December 24th to 25th and January 7th to 9th, when air temperatures fell below -10°C in places and several stations recorded their lowest winter values for more than 20 years. There was a total of between 70 and 80 ground frosts during the season at inland stations, while Valentia Observatory's total of 62 ground frosts was almost three times its average winter figure of 22.

Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Habitats Parks and Green Spaces	Deterioration of walkways through parks due to prolonged exposure to low temperatures	Public Parks	Assessment of Parks. Repairs as necessary.	1	- Loss of priority habitats and species. - Increased callouts of emergency services.	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
Buildings and Infrastructure	Deterioration of road surfaces due to prolonged exposure to low temperatures	Local roads situated across the county.	Assessment of roads. Repairs to worst affected roads	2	- Increased maintenance costs and staff overtime. - Reputational damage of transport disruption.	Department of Transport, Tourism and Sport, National Roads Authority
Health and Wellbeing	People affected by hypothermia (elderly and fuel poor)	Elderly and people living in fuel poverty	Emergency response by government to provide additional fuel allowance to social welfare recipients	2	4 Increased costs for protection of health	HSE
Emergency Services	Increased frequency and intensity of road accidents due to driver inexperience on travelling on icy roads	All roads	Emergency response by Accident and emergency	3	- Increased callout of emergency services.	Emergency services, HSE.

3.2 Profile of climate Hazards that have affected Roscommon County Council

Extreme Weather Events – Non Exhaustive List											
Year	Date	Event Type / Name	Outline Description	Climate Event							
				Strong Wind	Extreme rainfall	Heavy Snowfall / Low Temp	Sea Level Rise	Low rainfall / Drought	High Temp		
2018	September	Storm Ali	Orange Wind Warming – gale force winds of up to 120km/h, stormy conditions								
2018	Summer	High Temperatures, Heat wave & Drought	High Temperatures, Heat wave and drought – distribution to water supply, issues with road maintenance etc...								
2018	February / March	Storm Emma & Beast from the East	Blizzard / Heavy Snowfall / widespread heavy snow drifting. Disruption to business, emergency services, power cuts etc...								
2017	16th October	Storm Ophelia (Ex-Hurricane Ophelia)	Red warning – gale force winds, heavy rain and storm surges along some coasts (flooding). Disruption to business, power cuts etc...								
2016	January	Heavy Rain	Wettest January of record – 126% of monthly long term average								
2014	12th February	Storm Darwin	Orange warming for strong winds – classified as a 1 in 20 year event								
2013/14	Winter	Winter Storms	Winter storms – serious coastal damage and widespread, persistent flooding								
2011	24th October	Heavy rain and flooding	Heavy rain in the east. 66mm in 9 hours at Casemont Aerodrome approaching 1 in 100 year probability event. Extreme flooding caused								
2010	Nov / Dec	Winter Cold Spell	Lowest temperatures on record in Dublin Airport (-8.4^{0}C) and Casemont Aerodrome (-9.1^{0}C)								
2009/10	Winter	Winter Cold Spell	Coldest winter in almost 50 years (Met Éireann)								
2009	November	Severe flooding	Rainfall totals were highest on record, extensive flooding								
2008	August	Heavy Rain and Flooding	Heavy rain and extensive flooding								
2006	Summer	High Temperature / Heat Wave	Warmest summer since record breaking 1996 (may have been exceeded by 2018)								
2002	14th November	Heavy Rain and Severe Flooding	Severe flooding in eastern areas. Wettest month on record at Casemont Aerodrome								
2002	1st February	Coastal Flooding	Eastern and southern coasts – highest tide in 80 years								
2000	5th November	Severe Flooding	11-142mm rainfall Wicklow/Dublin & 70-98mm rainfall Tipperary / Waterford								
1997	24th December	Windstorm	Windstorm								
1995	Summer	High Temperatures, Heat wave & Drought	Warmest Summer on record. Mean temperatures over 2^{0}C above normal. Temp rises to 30^{0}C over a number of consecutive days								
1993	11th November	Severe Flooding	In excess of 100mm of rain in 24 hour period in eastern and midlands								
1987	12-13th January	Heavy Snowfall	12-19cm snow in the east and midlands								
1986	August	Hurricane Charley	Strong winds and rain, worst flooding in 100 years								

Table 3.1 Timeline of severe weather events

3.3 Local Level vulnerabilities to the impacts of climate hazards

During periods of strong winds Local Authority assets including dwellings, communities and commuters are among the most vulnerable.

Fallen trees can cause damage to overhead power lines and block roads thus leaving Local Authority Housing tenants and businesses without power, and commuters delayed/stranded. Diversions can place extra pressure on already overcrowded commuter routes.

Staffing and financial resources are strained as a result of prolonged spells of low temperature. Core daytime duties are neglected as a result of staff working out of hours treating roads.

Periods of extreme rainfall, flooding and increased temperatures can cause disruption to the general public. Dealing with the clear up after a severe weather event, potential evacuations during times of flooding and supplying water where the need arises increases the pressure on local authority services.

Lake Levels and Areas

Lakes provide drinking water, supply to industry and agriculture, recreational opportunities and ecosystem maintenance. Their level, area and temperature are impacted by regional climate.

Geological Survey Ireland (GSI)

Groundwater is important as a source of drinking water, and it supports river flows, lake levels and eco systems and can be contaminated by human actions on the land surface and the effects of climate change. Geological Survey Ireland provides free, open and accurate data and maps of Irelands subsurface to landowners, the public, industry and all other stakeholders. These datasets are readily available through the Map Viewer on the GSI website.

3.3.1 Agricultural Activities and Landuse

Climate Change is expected to impact on agricultural activities and landuses. The inland aquaculture industry depends on freshwater resource to function, contamination would put this industry under significant pressure.

Due to wetter winters issues with slurry storage and land spreading have been identified as an impact from the changing climate. Timing of slurry spreading has also been impacted, this may lead to nutrient loss and run off causing water quality issues for the Local Authority. Soil quality/condition will be impacted by both wet and dry conditions, soil sediment runoff will also adversely impact water quality.

Under the National Adaptation Framework in addition to local authorities, 12 sectors are required to undertake adaptation plan by 30th September 2019. The work that local authorities do is a key consideration of the sectoral adaptation plans to ensure appropriate coordination and translation of action to local level. There will be strong collaboration between Roscommon County Council and the sectors involved in developing adaptation strategies including for example, agriculture, forestry, biodiversity and flood risk.

3.4 Flood Risk Management

Climate Change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change a precautionary approach is always advised with respect to landuse planning and development, building flood alleviation measures and ensuring longer term resilience of critical infrastructure. It is important to consider that the increase in the frequency and/or severity of flood events may impact the delivery of services of the council and in particular may necessitate more frequent and resource intensive emergency responses.

The OPW led the extensive research and development of Catchment Flood Risk Assessment and Management (CFRAM) Studies for the country in the last decade. The aim of these studies was to assess flood risk, through the identification of flood hazard areas and the associated impacts of flooding. The flood hazard areas have been identified as being potentially at risk from significant flooding, including areas that have experienced significant flooding in the past. Importantly, they take account of issues such as climate change, land use practices and future development. These studies have been developed to meet the requirements of the EU Directive on the assessment and management of flood risks (the Floods Directive). The CFRAM Studies have produced Flood Risk Management Plans (FRMP) to manage flood risk within river catchments. Flood maps are one of the main outputs of the studies. The maps indicate modelled flood extents for flood events of a range of annual exceedance probabilities (AEP). The flood event maps and future scenario maps are a crucially important mechanism that will support and assist in planning appropriate adaptation strategies and measures for local authorities.

Roscommon town

Proposed Measure: Progress the development of a Flood Relief Scheme for Roscommon

Outline: Progress the project-level development and assessment of a Flood Relief Scheme for Roscommon, including environmental assessment as necessary and further public consultation, for refinement and preparation for planning / exhibition and, if and as appropriate, implementation.

Shannon – Upper and Lower Catchment measures

Existing Measure: Maintenance of Arterial Drainage Schemes

Outline: The OPW has a statutory duty under the Arterial Drainage Act, 1945, and the Amendment of the Act, 1995, to maintain the Arterial Drainage and Flood Relief Schemes constructed by it under those Acts.

Existing Measure: Maintenance of Drainage Districts

Outline: The statutory duty of maintenance for 4,600 km of river channel benefiting from Drainage District Schemes rests with the relevant Local Authorities.

Existing Measure: Ongoing Operation and Maintenance of Infrastructure Associated with Hydro-Power Generation on the River Shannon.

Outline: Continue to operate in accordance with the regulations and maintain in good working order the infrastructure along the River Shannon related to power generation at Ardnacrusha hydro-power station.

Proposed Measure: Improve Long-Range Forecasting on the River Shannon to Optimise Operation of Water Level Management Infrastructure

Outline: The introduction of a long range flood forecasting system to allow, within current water level requirements, the optimisation of the sluices at Athlone weir and storage within Lough Ree in advance of forecasted Summer flood events

Proposed Measure: Coordination of water level management on the River Shannon

Outline: The close co-ordination of water level management activities that could assist in reducing flood risk should continue into the future.

Measures applicable in all areas

- Sustainable Planning and Development Management
- Sustainable Urban Drainage Systems (SUDS)
- Adaptation Planning
- Land Use Management and Natural Flood Risk Management
- Maintenance of Channels not part of a Scheme
- Flood Forecasting and Warning
- Emergency Response Planning
- Promotion of Individual and Community Resilience
- Individual Property Protection
- Flood-Related Data Collection
- Voluntary Home Relocation

Roscommon County Council have committed to implementing any recommendations from the FRMPs and will work in conjunction with the OPW to deliver any proposed flood alleviation schemes that are deemed appropriate and viable.

3.5 Consequences of the impacts of climate hazards and the delivery of services

Responsibility for emergency response to and the clean-up required after a severe weather event usually rests in part with the Local Authority, this puts extra pressure on resources and finances. The knock on effects include planned projects not commencing due to depletion of resources and finances while dealing with such unpredicted weather extremes.

Municipal District Offices (MD's) are put under extra pressure during times of severe weather, particularly with regard to winter maintenance. As a result of an extended cold spell, the staff tasked with ensuring the roads are treated and safe to travel are working through the night and not available for core duties during the day. This has an effect on scheduled works not being completed as planned.

It has been and may be necessary to close Local Authority Headquarters to ensure the safety of the staff and also to discourage unnecessary travel by members of the Public. Core Services of the Local Authority are affected by this, for example planning decisions must be made within a specific timeframe to avoid planning permission being granted by default.

Local Authority resources have been strained due to costs incurred in the aftermath of severe weather events. In recent years' substantial monies were spent on treating and clearing roads during an extended period of low temperature, and on another occasion repairing damage caused due to unprecedented flooding during a period of heavy rainfall.

3.6 Actors relevant to the management of identified climate impacts

Other actors relevant in managing the impacts of a severe weather event along with the Local Authority include but are not limited to the following:

- Transport Infrastructure Ireland (TII)
- National Transport Authority
- Gardaí
- HSE
- NPWS
- Coillte
- OPW
- Relevant Government Department

***

Chapter 4

Climate Risk Identification

4.1 Overview of projected climate changes and their impacts

Although the Earth's climate has changed throughout history, the last century has seen unprecedented changes and these changes have been attributed to increased atmospheric concentrations of GHGs. The impacts of these changes are already being felt across the world's oceans, continents and atmosphere. Moreover, these changes are also being observed for Ireland where temperatures are increasing, spatial and temporal patterns of precipitation are changing and sea levels are rising.[11]

The evidence of human induced climate change is clear and 97% of scientists agree that recent climate warming trends are due to human activities. [11]

- Global temperature reconstructions show that the earth's climate has been warming since 1880. The majority of this warming has occurred since the 1970s with the 20 warmest years occurring since 1981;
- The Greenland and Antarctic ice sheets have decreased in mass while the extent and thickness of Arctic sea ice has declined rapidly over the last seven decades;
- Glaciers are retreating almost everywhere around the world, including in the Alps, Himalaya, Andes, Rockies, Alaska and Africa;
- Between the period 1901-2010, global sea level has been rising at a rate of 1.9mm/year;
- Temporal and spatial patterns of precipitation are changing;
- Changes in the frequency and intensity of many extreme weather events have been observed since the 1950s. Some of these changes have been linked to human influences and these include a decrease in the occurrence of cold temperature extremes, an increase in the occurrence of warm temperature extremes, rising sea levels and an increase in the occurrence of heavy precipitation events in a number of regions.[11]

The extreme weather events that we have seen in recent years have made it clear that Ireland's climate is changing and will continue to undergo change in the years to come. It is vital that the Local Authority now positions itself to put in place measures to plan for the negative effects of climate change and take suitable action to limit potential damage from the impacts of climate change and their associated environmental, economic and social costs. [12]

Ireland's population is projected to increase to between 5.58 and 6.69 million people by 2051 with a substantial rise in our older populations (aged 65 years and older) which is expected to increase from 13.3% of the population in 2016 to between 23.9% and 27.4% by 2051 (CSO, 2018). This will result in

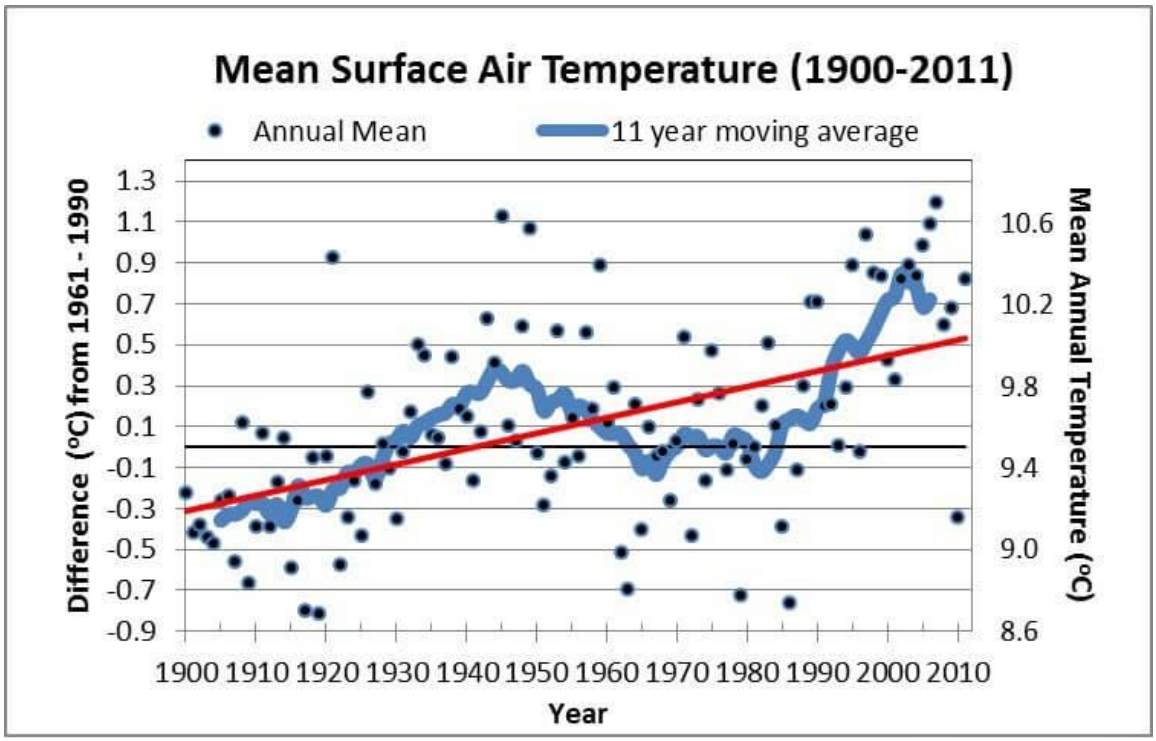
[11] Climate Ireland.ie
[12] Local Authority Adaptation Strategy Development Guidelines December 2018

a higher level of sensitivity to climate hazards such as heatwaves and associated impacts (heat-related illness).

Surface Air Temperature

For Ireland, the annual average surface air temperature has increased by approximately 0.8°C over the last 110 years.

In the period 1961-2010, there has been an increase in the number of warm days (over 20°C) and a decrease in the number of frost days (below 0°C). [13]



(Dwyer, 2013)

Average surface air temperatures are expected to increase everywhere and across all seasons.

An increase in the intensity and duration of heatwaves is expected.

[13] The Status of Irelands Climate, 2012 Ned Dwyer

Observed Change

- Observations indicate an increase in the surface temperature for Ireland of 0.8°C since 1900. In addition, the number of warm days has increased while the number of frost days has decreased.

Projected Change

- Mean air temperatures are expected to increase everywhere and for all seasons relative to the present.
- With increasing air temperatures, an increase in the intensity and duration of heat waves is expected, with a coincident decrease in the occurrence of frost days likely.
- For example, projections indicate that the warmest 5% of daily maximum summer temperatures (TMAX 95%) are expected to increase more strongly than those of average seasonal temperatures with most regions experiencing an increase in TMAX 95% of 0.7-2.6°C.

Season	Projected Increase
Summer	0.9-1.7°C
Autumn	1.3-1.7°C
Winter	1.0-1.7°C
Spring	1.0°C

Table 4.1 Season Projected Temperature Increase (2041-2060)[14]

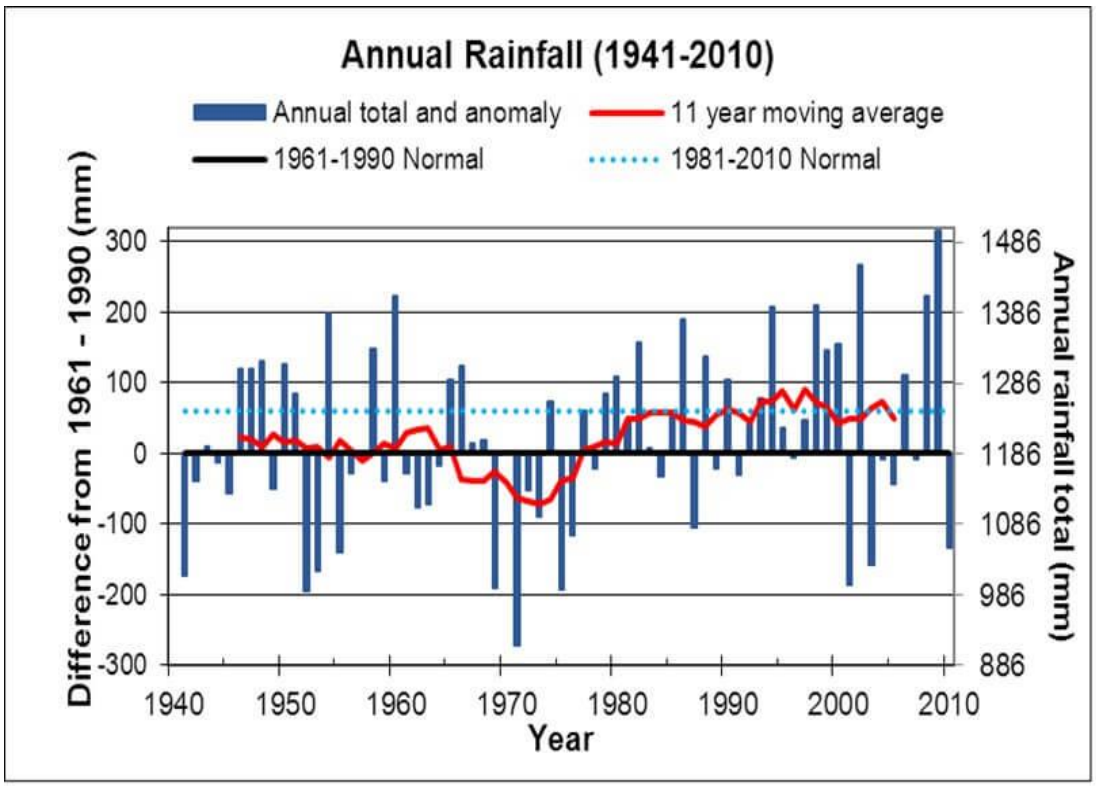
Projected increases in temperature for Ireland for the period 2041-2060 relative to 1981-2000. Projected changes account for low-medium and high emissions scenarios.

Precipitation

Rainfall plays a vital role in the water cycle and water balance, and is essential for the maintenance of life.

- For Ireland, there has been an increase in average annual national rainfall of approximately 60mm (5%) in the period 1981-2010, compared to the period 1961-1990;
- The trends for both wet (greater than 0.2mm) and heavy rain days (greater than 10mm) for the period 1961-2010 show regional variation with some conflicting trends from stations that are geographically relatively close.[11]

[14] Climate Ireland.ie Local Authority Wizard and Met.ie



(Dwyer, 2013)

An increase in seasonality 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.

Observed Change

- Over Ireland, annual average rainfall amounts have increased relative to the 1961-1990 baseline period with this increase observed across all seasons. However, spatially, rainfall intensity and amounts vary with no clear direction of change yet apparent.

Projected Change

- Projections of precipitation are less certain than those for temperature and when examined on an individual basis, climate models indicate differing temporal and spatial patterns. However, the ensemble projection provides a robust signal of increased seasonality with wetter winters and drier summers likely.
- For spatial variations, there is a level of disagreement between individual climate models and as a result spatial details are not deemed reliable.
- As global temperatures increase, the hydrological cycle is expected to become more intense and result in more extreme precipitation events. For Ireland, projected changes in the

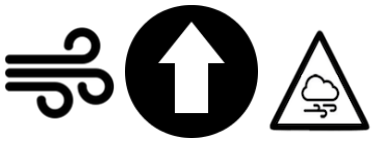
frequency of very wet days (>20mm of precipitation) indicate a marked increase for winter (approximately 20%).

Season	Projected % Change in Precipitation
Summer	0-20% reduction
Winter	0-14% increase

Table 4.2 Season Projected % change in precipitation (2041-2060)[11]

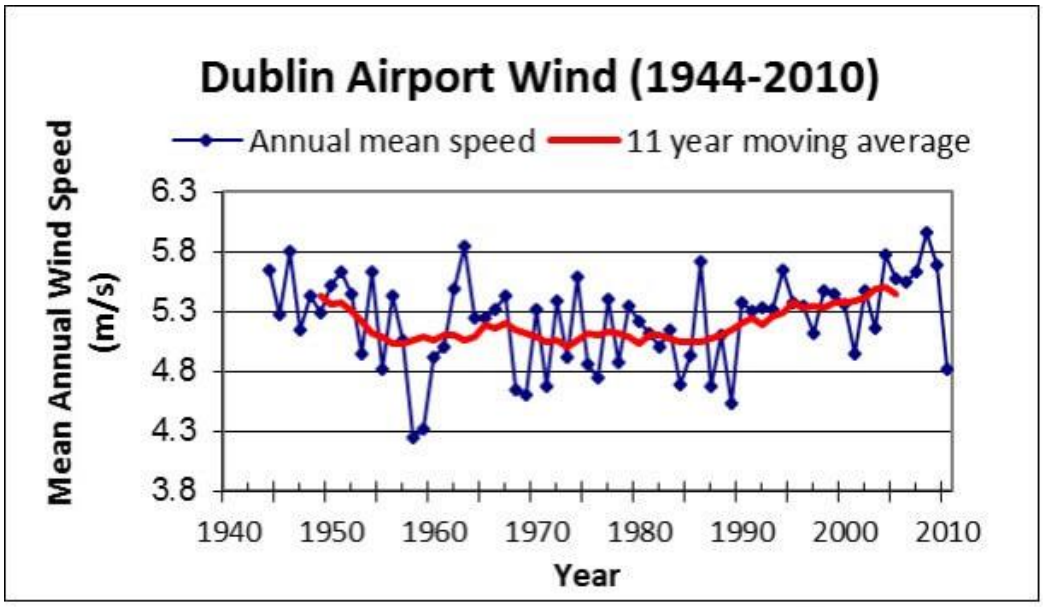
Projected % change in precipitation for Ireland for the period 2041-2060 relative to the period 1981-2000. Projected changes account for low-medium and high emissions scenarios.

Surface Wind



Measurements of wind include speed and direction and provide information on the strength and frequency of weather systems as they move across Ireland. Accurate information on wind is essential for planning in areas such as wind energy, forestry, and infrastructural development and is used in storm surge prediction.

For Ireland, no long-term trend in wind speed can be determined with confidence based on the limited analysis carried out to date.



(Dwyer, 2013)

An increase in the intensity of extreme wind storms is expected.

Projections indicate a decrease in wind speeds for summer and increases for winter.

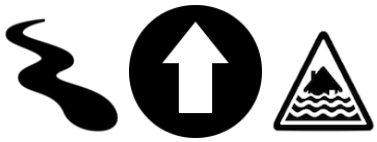
Observed Change

- For Ireland, observations indicate a high degree of inter-annual variability in wind speeds and due to inhomogeneities in the available data, analysis of long term trends cannot yet be determined with confidence.

Projected Change

- Due to a limited number of climate model projections for wind speed, projections remain uncertain and further work is required to increase confidence in their outputs. Nonetheless, available projections which focus on 60m wind speeds, the typical height of wind turbines, indicate an increase in wind speeds during winter and a decrease during summer (3-15% reduction)
- Due to changes in development region and tracks of tropical cyclones, a decrease in the frequency of extreme wind storms affecting Western Europe is expected. However, projections indicate an increase in the intensity of extreme wind storms.[11]

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 Change

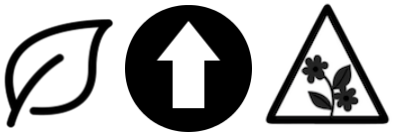
- The analysis of river flows is complex and subject to large variability and as a result it is difficult to extract signals of climate change. For Ireland and during the period 1954 to 2008, summer mean flows are dominated by increasing trends while for winter, there is a tendency for increases in mean flows. Annual and winter high flows are also dominated by increasing trends.

Projected Change

- Projected changes in temperature and precipitation will affect hydrological response. Due to the uncertainties associated with projected changes in precipitation, projected changes in hydrological response remain subject to a high level of uncertainty.

- The response of individual catchments will be determined by individual catchment characteristics (e.g. groundwater versus surface water dominated catchments). For example, summer reductions for groundwater dominated catchments are not as severe as those projected for surface water dominated catchments.
- Using impact models (conceptual runoff models), a robust signal of increasing seasonality in hydrological regimes is evident with increases in winter and spring streamflow likely and a decrease in summer. A 20% increase in the amount of water flowing through rivers are expected for the majority of catchment by mid-late century while for summer decreases of over 40% (those with little groundwater storage in particular) have been simulated for the end of the century.
- Projected increases in winter flows coupled with likely increases in extreme precipitation events are likely to lead to an increased flood risk. However, catchment response time will be critical in determining the changing nature of extremes and those catchments with fast response times are likely to be most at risk.

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.

Observed Change

- Observations at the Valentia phenological garden, Co. Kerry, indicate that the beginning of the growing season is occurring approximately 10 days earlier now than when compared to the early 1970s. This has led to an extension of the growing season.

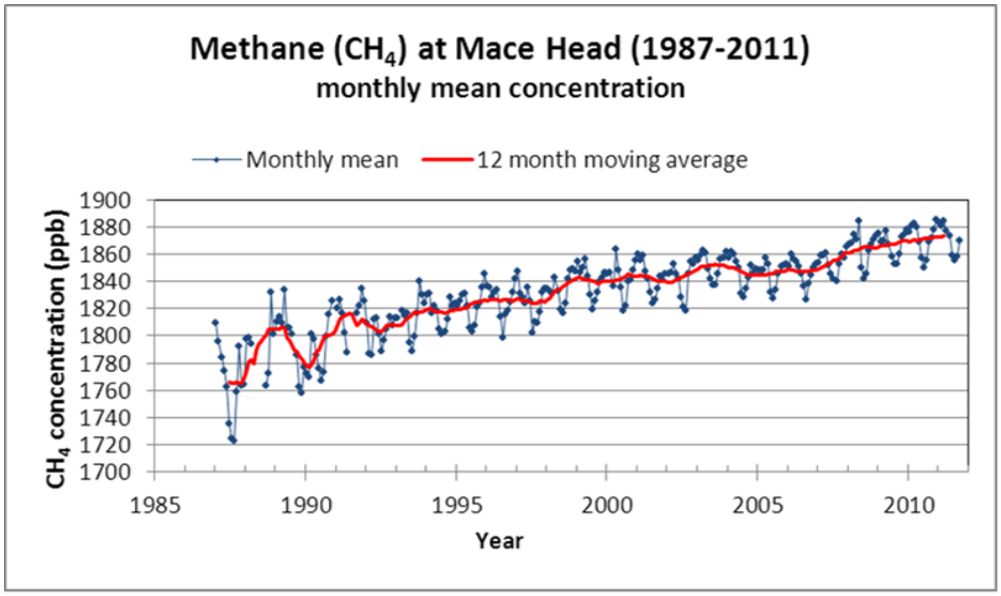
Projected Change

- Projected changes in temperature are expected to result in a lengthening of the growing with spring occurring earlier. This is particularly the case for the northeast of the country where the timing of birch bud burst is expected to occur 10 days earlier in the 2080s than when compared to the 1990s.

Methane

Methane (CH_4) is the second most important greenhouse gas. In Ireland, over 80% of reported CH_4 emissions are due to agricultural activities, with the remainder caused by waste disposal (e.g. landfill) and the energy sectors.

- Current average global CH_4 concentrations of more than 1800 ppb are 140% higher than pre-industrial concentrations.



(Dwyer,2013)

Monthly mean methane concentration observed at Mace Head Research Station (1987-2011).

Other Gasses

A number of other gases have been identified as contributing significantly to the enhanced greenhouse effect. The most important is nitrous oxide (N2O), and in Ireland, one of the main sources is the agricultural sector.

Nitrous Oxide concentrations have shown a steady increase with levels now above 320 parts per billion (ppb). Gases which replaced those depleting ozone are increasing steadily and are contributing significantly to the enhanced greenhouse effect.

4.2 Key Operational areas Roscommon County Council

Due to provisions in the Climate Action and Low Carbon Development Act 2015, Local Authorities must have regard for the National Adaptation Framework and the National Mitigation Plan in the delivery of services and operations, and produce adaptation plans in accordance with guidance provided in the Local Authority Adaptation Strategy Development Guidelines 2018. In addition, they are asked to assume a leadership role within their local communities to encourage appropriate behavioural change. However, compared to other countries, local authorities in Ireland are limited in their service delivery and direct legal capacity, and key decisions are often made at the national rather than the local level. Nonetheless, local planning authorities play an important coordinating role through the formulation and implementation of development plan policies and objectives, and particularly by influencing private sector development through the development management process. In effect, this process helps address adaptation requirements, as policies and objectives are implemented in new

developments on foot of permissions. County development plans, local area plans and planning schemes can address climate change issues at a local level.

The goals in this plan have been gathered based on this remit. Roscommon County Councils (RCC) focus is on climate-proofing the areas for which it has direct responsibility. In areas outside its remit, RCC will work to support the implementation of the sectoral adaptation and mitigation plans developed by, but not limited to, the Department of Housing, Planning and Local Government (DHPLG), the Department of Transport, Tourism and Sport (DTTAS), the Office of Public Works (OPW), the Department of Agriculture, Food and the Marine (DAFM), and the Department of Communications, Climate Action and Environment (DCCAE), thereby supporting the whole of government approach to climate action.

Responsibilities of Roscommon County Council (RCC)

RCC is responsible for the provision of an extensive range of public services. In addition, RCC promotes the interests of local community, including the social, economic, environmental, recreational, cultural, community and general development of Roscommon.

Public Services are typically broken down into the following broad categories:

- Housing
- Planning
- Roads and Infrastructure including Municipal District Offices
- Water Services
- Environment
- Fire Services
- Community and Enterprise including Recreation facilities, amenities and Arts

In addition to the functions outlined above, a fundamental role of democratically elected local government is the representation of local communities, voicing local concerns and responding to local needs.

Housing

RCC provides and maintains housing in Roscommon. The housing need for the area is assessed and properties are built, bought or leased based on need. Loans are also provided through the Repair and Lease, and the buy and renew schemes.

Planning

One of the core functions of the planning department is to decide whether to grant or refuse planning permission for building and development in Roscommon. It also creates a Development Plan every 6 years, which sets out its planning policies.

Essential Services

Essential services such as roads and bridges, Fire Services and drainage are provided by RCC. Irish Water is responsible for water and wastewater services.

Dangerous places and buildings are also controlled by RCC along with abattoirs. Graveyards and burial grounds are provided and maintained.

Environmental protection

An important function of the LA in relation to pollution control and animal control is the issue of licenses for waste disposal and for emissions into the air from industry in the area. Collection or arrangement for the collection of domestic and other waste and monitoring the environment for signs of pollution also falls under the remit of RCC. Licenses are also issued for keeping dogs.

Recreation facilities and amenities

As well as the above list of services RCC also provides amenities, facilities and services related to:

- artistic and cultural activities,
- sports and games,
- general recreational and leisure activities,
- libraries,
- civic improvements such as monuments,
- environmental and heritage protection.

4.2.1 Architectural Heritage

Architectural Heritage is becoming more vulnerable with Climate Change. The Department of Culture Heritage and the Gaeltacht have prepared a report of all buildings, settlements and designed landscapes that are of special interest. It also includes historic infrastructure such as bridges, railways, harbours and canals. Climate change can alter and accelerate decay or can overwhelm the capacity of older structures to deal with severe weather events or increased extremes of wetting and drying, or cold and heat.

4.3 Key Vulnerabilities

The initial focus of this analysis was on impacts which have occurred due to observed changes in Ireland's climate and recent extreme weather-related events that affected delivery of services by the Local Authority. Below is a detailed list of the impacts of climate change on the delivery of services by the Local Authority.

Key Vulnerabilities - Impacts for the delivery of services/functions of local authorities in E&M Region (non exhaustive)

Services/Functions	Climate Hazard Impacts	Consequences
Business operations/continuity		
Business efficiency, effectiveness and emergency response	• Building Closures – **storm, snow, extreme rainfall**. • Building damage, impacts on servers – **storm events**. • Electricity supply affected – **storm events** • Risks to staff welfare, public safety, local business and tourism assets - **storm, snow, rainfall events**.	• Service disruption to customers: motor tax, housing applications, scheduled meetings, arts/cultural events etc. • Inability to meet statutory deadlines e.g. planning applications – financial/reputational consequences. • Resources stretched to deal with various impacts from extreme weather events above and beyond the performance of daily duties. • Increased pressure on emergency response and recovery operations. • Consequence to local/regional economies • Financial implications to local authority in clean-up operations, staff overtime, unable to perform normal duties. • Economic impacts – longer term consequence to local economy and local authority in terms of rate collection.
Business operations	• Capitalising on opportunities arising from addressing the impacts of climate hazards.	• Positive
Infrastructure & Built Environment		
Roads/footpaths, bridges, project construction and maintenance	• Changes in rates of deterioration - faster rate of deterioration in areas subject to **flooding, sustained high temperatures, combination events**.	• Nuisance • Risk to public safety • Financial implications for unscheduled maintenance, repair, upgrade, new construction, staff overtime costs.

	• Infrastructure collapse, significant damage – **sustained duration and frequency of extreme events**. • Blocked roads – **storm, snow, rainfall events** • Impact on construction projects – **all extreme weather events.**	• Reduced economic efficiency of road network for commuting traffic and emergency transport routes disrupted. • Time delays and cost implications in delivery of infrastructure.
Surface Water Drainage	• Exceedance of drainage capacity – localised and larger scale flooding - **storm surge, rainfall, combination events**. • Reduction in drainage capacity – **storm surge.** • Inflow/infiltration into wastewater networks – **extreme rainfall event** • Reduced pressure on surface water drainage systems - **drought conditions**	• Blocked roads, flooding/damage to roads properties/business – impact on insurance costs. • Operating challenges of waste water infrastructure – knock on effects for wider community. • Stretch on staff resources. • Financial implications for increased maintenance, repair
Building Stock – LA Buildings and social housing stock	• Damage and deterioration of housing stock – **Storm, rainfall, snow and heatwave events (combination events)** • Increased need for heat – **extreme cold events** • Closure of Local Authority buildings – **storm, snow, rainfall events** • Need for mechanical ventilation systems and cooling systems – **Heatwave events**	• Cost of maintenance, safety implications to public, possible rehousing of tenants • Cost of fuel (negative or positive) • Service disruption • Pressure on housing staff to rectify reports issues.
Flood defences	• Exceedance of existing flood defences – **storm surge, rainfall events** • Increased frequency or permanent inundation of infrastructure & utilities i.e. water, sewerage, gas, communications, electricity, transportation routes – **storm surge, rainfall events**	• Loss of capital infrastructure – cost of replacement. • Damage/loss of properties/lands take – displacement or isolation of communities • Disruption to commuting traffic, and utilities – economic impact.

	• Destruction, damage, disturbance to council managed marinas and boat ramps - **storm surge, wind events.**	• Increased cost to local authority – repair, replacement.
Community Infrastructure	• Deterioration of community infrastructure e.g., playgrounds, public parks, swimming pools, public realm spaces - **sustained weather extreme events**. • Impacts on recreation amenities and tourism activities – **storm, rainfall, snow events**. • Reduced water for swimming pools, irrigation of open spaces, parks etc. - **drought conditions**. • Risk to public safety in times of **high temperatures** for unsecured lakes, water spots (quarries).	• Cost of maintenance/upgrade. • Loss of revenue locally/regionally – tourism. • Closure of community infrastructure – short term. • Injury, illness or potential loss of life.
Cultural/Heritage	• Damage to cultural and heritage assets and cultural landscapes – **storm and rainfall events**.	• Negative impact on tourism – economic consequence locally/regionally. • Loss of assets of intrinsic historical importance.
Water and Sewerage Services		
Storm water /Sewerage	• Inundation of storm water and sewerage infrastructure – **storm surge, rainfall events**. • Increased peak flows – **rainfall events** • Changes in groundwater levels – **drought conditions** • Changes in floodplains – **rainfall events** • Reduced dry weather sewerage flows • Reduced/unreliable power supply for pumping and treatment – **storm events** • Changes in mean and peak stream and river flows – **rainfall and drought events**. • Uncertain water availability – **drought conditions**.	• Disruption to communities • Negative Environmental consequences - draw on staff resources to investigate/rectify. • Local surface water flooding events.

Wastewater	• Inflow and infiltration to wastewater network – **rainfall events.** • Interruption to anaerobic process – **heatwave events** • Interruption to process – **freezing events.**	
Water Supply	• Increase in water demand and reduction in receiving water assimilative capacities during drought conditions – **drought events** • Flooding and inundation of wastewater treatment and water abstraction plants – **rainfall events** • Reduced availability of water supply sources during **low rainfall and drought events** • Loss of power supply during intense **storm events** • Increased potential for water contamination – **rainfall and drought events** • Changes in availability of groundwater – **drought events** • Quality of water diminished – **rainfall, drought, heatwave events**.	• Nuisance to householders. • Impact on economic development i.e. businesses and tourism. • Health consequences with inadequate water quality. • Additional demand on LA staff working under the SLA with Irish Water • Requirement for hose pipe bans and impacts on local communities including Local Authority parks and sports facilities • Water pollution issues relating to reduction in surface water flows • Network disruptions due to loss of power supplies.
Water Quality	• Ground movement, in **high temps**, resulting in cracking of old wastewater pipe networks • **Increased flooding** mobilising runoff from land, incl. contaminants into surface waters • Changes in species distribution and phenology of river systems – **heatwaves, rainfall and cold events.** • Low flows resulting in deterioration of water quality – **low rainfall/drought events**	• Increased discharges from drainage systems to ground-waters • Increased pollution of surface water systems • Changes to surface water habitats • Spread of pathogens and other contaminants

Natural Resources and Flood Management		
Biodiversity	• Shift in distribution of plant and animal species from heat and cold stress- **heatwaves and cold events.** • Loss of bio-diversity - **all sustained extreme weather events**. • Increased risk of disturbance to population and species leading to extinction – **heatwave events** • Reduced ecosystem resilience to stress – **all extreme weather events** • Increased ecosystem and species heat stress – **heatwave events**. • Increased bog and sand dune fires – **heatwave and drought events.**	• Inability to meet objectives to protect and conserve important habitats. • Negative consequence on health and wellbeing of communities. • Stretched emergency services in dealing with bog fires, fires on sand dune areas. • Economic impact – reduced tourism.
Weed/pest Management – Municipal District Offices	• Changes in rate of coverage and spatial distribution of invasive species – **change in average mean temperatures**	• Cost and staff resources required to manage and deal with invasive species.
Landuse and development policy		
Spatial Planning and landuse	• Inappropriate location of urban expansion areas • Increased uncertainty in long term landuse planning and infrastructure design i.e. location of future developments, suitability of infrastructure designs to cope with impacts of weather events. • Loss of private property and community assets – **extreme rainfall events, storm surge.** • Early retirement of capital infrastructure - **all extreme weather events**	• Increased insurance costs • Increased pressure on disaster management and response resources • Long term economic cost to area and to general public. • Impact on quality of life

Community Health and Wellbeing		
Community and Enterprise	• Increased isolation and disconnect of communities through inaccessibility – **rainfall, snow, heatwaves i.e.** bog, gorse, commonage fires) • Damage to properties, streetscapes and community assets – **storm and rainfall events** • Contaminants to waterways and drinking water supplies – **rainfall (flooding), and storm surge** • Pressure on drinking water supplies – **heatwave and extreme cold events** • Land/property take – **storm surge.**	• Abandonment of vulnerable rural areas • Impact on local economies, reduced interest in settlement • Cost of repair, replacement of street surfaces, public realm • Disadvantaged communities.

4.3.1 Non climatic factors

Roscommon County Councils County Development Plan, Local Economic Plan and Tourism Strategy have projected that the population of Roscommon will grow. Provision of housing and infrastructure to meet the needs of the growing population will have an adverse effect on Climate Change. The same increase in population and associated effects on climate change have been projected at Regional and National level.

There is little existing information to support future impact and vulnerability assessment.

4.4 Register of Climate risks and prioritisation

Climate Hazard:			**Extreme Rainfall**		
Observed and Projected Information:			Climate Projections indicate decrease projected for spring and summer and increases for winter. An increase in the occurrence of extreme rainfall events is likely.		
Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Habitats, Parks and Green Spaces	Increased frequency of extreme rainfall leading to increased flooding of public parks and open spaces resulting in increased upkeep and maintenance costs.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low
Health and Wellbeing	Increased frequency of extreme rainfall leading to increased road traffic incidents resulting in increased pressure on emergency services as well as LA staff	Short, medium and long term.	Increase	Health and Safety. Roads maintenance programmes.	Medium
Health and Wellbeing	Increase in frequency of extreme rainfall and flooding leaving isolated Local Authority Housing tenants trapped in their homes	Short, medium and long term.	Increase	Health and Safety and Housing policies	High
Buildings and Infrastructure	Increase in frequency of extreme rainfall and flooding events leading to road damage (potholes, edge damage) resulting in increased roads maintenance costs.	Short, medium and long term.	Increase	Roads Maintenance Programmes.	High

Emergency Services	Increase in frequency of extreme rainfall events leading to the increased occurrence of road traffic incidents resulting in increased callout of Fire Services and associated costs to the authority.	Short, medium and long term.	Increase	Emergency Plan.	High
Water Services	Increased occurrence of flooding of water and wastewater systems	Short, medium and long term.	Increase	Emergency Plan.	High

Climate Hazard:			**Strong Wind/Storms**		
Observed and Projected Information:			Climate Projections indicate Storms affecting Ireland will decrease in frequency, but increase in intensity, with increased risk of damage.		
Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Habitats, Parks and Green Spaces	Increased frequency of strong wind/storms leading to increased pressure on tourism resources resulting in increased upkeep and maintenance costs.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low
Health and Wellbeing	Increased frequency of strong wind/storms leading to increased danger to staff travelling to and from work, and outdoor staff resulting in abandonment of core duties thus increasing cost to the authority	Short, medium and long term.	Increase	Health and Safety.	Medium

Buildings and Infrastructure	Increased frequency of strong wind/storms leading to damage to LA assets resulting in increased maintenance costs.	Short, medium and long term.	Increase	Housing Maintenance Programmes.	High
Emergency Services	Increased frequency of strong winds/storms leading to the increased occurrence of fallen trees resulting in increased callout of Fire Services and associated costs to the authority.	Short, medium and long term.	Increase	Emergency Planning, Parks Policy.	High

Climate Hazard:			**Heatwaves**		
Observed and Projected Information:			Climate Projections indicate an increase in average summer temperature and with an increase in the frequency of heatwaves by mid-century.		
Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Habitats, Parks and Green Spaces	Increased frequency of high temperatures leading to increased pressure on tourism resources resulting in increased upkeep and maintenance costs.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low
Health and Wellbeing	Increased frequency of high temperatures leading to increased staff discomfort resulting in increased mechanical cooling costs.	Medium and long term.	Increase	Health and Safety. Energy Use Policy.	Low

Buildings and Infrastructure	Increase in frequency of prolonged exposure of road surfaces to high temperatures leading to road damage (rutting of tarred and chipped surfaces) resulting in increased roads maintenance costs.	Short, medium and long term.	Increase	Roads Maintenance Programmes.	High
Emergency Services	Increase in frequency of above average and extreme temperatures leading to the increased occurrence of wildfire resulting in increased callout of Fire Services and associated costs to the authority.	Short, medium and long term.	Increase	Emergency Planning, Parks Policy.	High

Climate Hazard:			**Low Temperatures**		
Observed and Projected Information:			Climate Projections indicate a reduction in the number of frost and ice days in the future. In the short term low temperatures pose a risk		
Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Habitats, Parks and Green Spaces	Increased frequency of low temperatures leading to increased pressure on resources resulting in increased upkeep and maintenance costs.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low
Health and Wellbeing	Increased frequency of low temperatures leading to increased	Medium and long term.	Increase	Health and Safety. Energy Use Policy.	Low

	staff discomfort resulting in increased heating costs.				
Buildings and Infrastructure	Increase in frequency of prolonged exposure of road surfaces to low temperatures leading to road damage (cracks, water ingress and potholes) resulting in increased roads maintenance costs.	Short, medium and long term.	Increase	Roads Maintenance Programmes.	High
Buildings and Infrastructure	Increased frequency of low temperatures leading to increased occurrence of frozen/burst water pipes in LA owned assets resulting in increased maintenance costs.	Short, medium and long term.	Increase	Housing Maintenance Programmes.	Medium
Emergency Services	Increase in frequency of below average and extreme temperatures leading to the increased occurrence of road traffic accidents resulting in increased callout of Fire Services and associated costs to the authority.	Short, medium and long term.	Increase	Emergency Planning Policy.	High

**

Chapter 5

Adaptation Goals, Objectives and Actions

Strategic Vision for Climate Adaptation

Roscommon County Council will fulfil a leadership role in learning about and responding to the impacts of Climate Change, be fully engaged with the risks and opportunities of a changing climate and build a resilient future for and together with, the communities of County Roscommon.

Thematic Areas – High level Goals

This Adaptation Strategy is based around six thematic areas that are developed further as High Level Goals. These goals identify the desired outcomes anticipated through the effective implementation of the Climate Change Adaptation Strategy. They are supported by specific objectives and adaptation actions to achieve their desired outcomes.

Thematic Areas and High Level Goals

Theme 1: Local Adaptation Governance and Business Operations **Goal: Climate change adaptation considerations are mainstreamed and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change**
Theme 2: Infrastructure and Built Environment **Goal: Increased capacity for climate resilient structural infrastructure is centred around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society**
Theme 3: Land use and Development **Goal: Sustainable policies and measures are devised and implemented to influence positive behavioural changes, support climate adaptation actions and endorse approaches for the successful transition to a low carbon and climate resilient society.**
Theme 4: Drainage and Flood Management **Goal: Greater understanding of risks and consequences of flooding and successful management of a co-ordinated approach to drainage and flooding**
Theme 5: Natural Resources and Cultural Infrastructure **Goal: Fostering and implementing meaningful approaches to protecting natural and key cultural assets through an appreciation for the adaptive capacity of the natural environment to absorb the impacts of climate change.**
Theme 6: Community Health and Wellbeing **Goal: Empowered and cohesive communities with strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level**

Aims of High Level Goals

Through its six thematic areas and high level goals, the local authority Climate Change Adaptation Strategy is designed to guide a planned and coherent response to the effects of climate change. However, four principle aims (guiding principles) thread through and underpin these goals:

1. **Mainstream Adaptation**: That climate change adaptation is a core consideration and is mainstreamed in all functions and activities across the local authority. In addition, ensure that the local authority is well placed to benefit from economic development opportunities that may emerge due to a commitment to proactive climate change adaptation and community resilience.

2. **Informed decision making**: That effective and informed decision making is based on reliable and robust evidence base of the key impacts, risks and vulnerabilities of the area. This will support long term financial planning, effective management of risks and help to prioritise actions.

3. **Building Resilience**: That the needs of vulnerable communities are prioritised and addressed, encourage awareness to reduce and adapt to anticipated impacts of climate change and promote a sustainable and robust action response.

4. **Capitalising on Opportunities**: Projected changes in climate may result in additional benefits and opportunities for the local area and these should be explored and capitalised upon to maximise the use of resources and influence positive behavioural changes.

Action Plan

Timeframe defined: i.e. Short term 1-3 years, Medium Term, 4-5 years, Long Term 5+ years.

Lead and Partner: role of 'partner' as considered appropriate and necessary by the local authority to fulfil implementation of action.

Ensure objectives are relevant to and feed back to the achievement of the high level goals i.e. through their emphasis and wording.

Adaptation Actions may involve a mixture of grey, green and soft measures.

G1 Local Adaptation Governance and Business Operations

Objective: To ensure that climate adaptation is mainstreamed into all activities and operations of the Local Authority.

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Establish an Adaptation Steering Group with representatives from across key functions of local authority to ensure the successful implementation of the actions of this Climate Change Adaptation Strategy and to report on progress.	Management Team	Short
2	Mainstream Climate Action policy as an integral consideration in the Corporate Plan objectives providing for all local authority activities and the delivery of functions and services across the administrative area.	Corporate Services	Short
3	Undertake and implement a Business Continuity Plan to identify and address specifically, the impacts associated with extreme weather events on all functions/services of the local authority including: • Preparing for critical services disruptions, • Mitigating/Minimising the impact of service disruption and, • Improving the capacity/ability to recover.	Management Team	Short
4	Building on adaptation planning actions set out in this strategy, support and compliment the practical implementation of actions arising from the National Climate Action Plan – to Tackle Climate Breakdown (as revised and updated annually), across the broad range of functions of the local authority to achieve	Management Team	Medium - Long

	the national climate ambition i.e. decarbonisation targets to 2030 and objectives to 2050.		
5	Ensure that Climate Action is listed as a standing Management Team item on the agenda of the Management Team meetings.	Management Team	Short
6	Arrange training for Adaptation Steering Group representatives	Corporate Services, Human Resources	Short - Medium
7	As part of the *Local Authority Staff Climate Action Training Framework* produced and organised by the *CAROs*, build expertise, capacity and increase knowledge base through relevant training programmes on Climate Change and its implications on the operations/functions of Roscommon County Council	All Departments	Short - Medium
8	Medium to long term forward budget planning to provide funding for severe weather events.	Management Team	Medium
9	Integrate Climate Change into County Development Plan and Local Area Plans.	Planning	Short
Objective: To implement an appropriate response in addressing diversity of Climate Change impacts			
10	Develop a staff communications protocol for extreme weather events.	Management Team, IT	Short
11	Develop a digital transformation programme to record extreme weather events.	Stakeholders, IT	Short
12	Carry out a survey of roads on soft ground to determine possible impact caused as a result of extreme dry weather.	Roads	Medium
13	Initiate a survey of roadside trees along public roads.	Roads	Medium
14	Initiate a survey of roadside hedgerows along public roads.	Roads	Medium
15	Collaborate with Irish Water in developing an accurate digital map of entire water and wastewater network compatible with GIS mapping system.	Irish Water, IT	Medium
16	Train staff in the use of hand held devices for recording issues and defects that may contribute to damage caused during periods of severe weather.	Roads, Water Services, Housing, Planning, Environment and IT	Medium

	17	Liaise with adjoining counties and collaborate in relation to cross border initiatives.	All Departments	Medium
	18	Identify and protect sources of potable water for domestic use during times of water shortages.	Water Services and Roads	Short
	19	Review the Council's Risk Register and embed climate-related risks where appropriate.	All Departments	Short - Medium
	20	Promote good practice amongst Group Water Schemes (GWS) and rural water sector.	Water Services	Short
	21	Liaise, collaborate and work in partnership with the sectors identified in the NAF, subject to funding, 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/in local communities.	Management Team, All Departments	Short - Medium

G2 Infrastructure and Built Environment

Objective: To ensure and increase the resilience of infrastructural assets and inform investment decisions

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Apply a robust risk assessment and management framework to Local Authority owned buildings and properties to identify and protect against the key vulnerabilities to the impacts of climate change and mitigate against service disruption.	Corporate Services	Short
2	Integrate climate considerations into the design, planning and construction of all roads, footpaths, bridges, public realm and other construction projects. Make provision to incorporate green infrastructure as a mechanism for carbon offset and microclimate benefits such as providing shade to alleviate heat stress, support for urban biodiversity, water retention and flood alleviation.	Road Design, MD Offices, NTA	S/M/L
3	Undertake a Risk Assessment of road infrastructure in the area to identify the severity of climate change risks on their function and condition. The risk assessment should provide for an understanding and quantification of risks	Roads, NTA, local communities.	Medium

	posed. The findings should be integrated into decision making processes, road infrastructure programmes and investment strategies.		
4	Develop a scheme to insulate all pipework in attics of Local Authority owned properties to avoid potential damage caused by frozen/burst pipes.	Housing	Short
5	Develop a programme and support policies to Increase the climate resilience of the built environment through natural greening measures in new developments, such as the use of natural features (e.g. street trees, green roofs, rain gardens etc.) and other materials such as permeable paving.	Roads, Planning	Short - Long
Objective: To work towards the objective for a low carbon society			
6	Plan for transfer of all Local Authority activities to sustainable fuels and materials.	Corporate Services, Assets, Climate Action and Energy Management	Medium - Long
7	Promote and support the introduction of Electric Vehicles to Roscommon County Councils fleet	Assets, Climate Action and Energy Management, Roads, Management Team	Short
8	Promote availability of cycle bays and shower facilities at Áras an Chontae to encourage cycling/walking to work.	Corporate Services, Green Team	Short
9	Investigate the feasibility of a Work from Home Policy during extreme weather events and all year round.	Management Team, IT	Short - Medium
10	Investigate viability of replacing all storage heaters in Local Authority properties and offices with a more energy efficient heating solution.	Assets, Climate Action and Energy Management, Housing	Short
11	Promote schemes aimed at improving energy efficiency in Local Authority owned assets.	Green Team	Short

G3 Landuse and development

Objective: To Integrate climate action considerations into landuse planning policy and influence positive behaviour

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Identify and integrate climate change as a critical consideration and guiding principle informing core strategy, strategic objectives, policy and development control standards of the County Development Plan.	Planning	Short
2	Integrate and promote climate-smart building and urban design performance outcomes in development standards through the development management process.	Planning, Housing, Project Office	Short
3	Promote the integrated planning, design and delivery of green infrastructure (including urban greening) through appropriate provisions in planning policies, development standards, infrastructural, public realm and community projects.	Planning, Community and Enterprise, Tourism, Economic Development, Project Office, MD Offices, Heritage, Housing.	Short - Long
4	Research and incorporate, in the content of the County Development Plan, measures in accordance with section 10 (n) of the Planning and Development Acts 2000 (as amended) for: (*n*) the promotion of sustainable settlement and transportation strategies in urban and rural areas including the promotion of measures to— (i) reduce energy demand in response to the likelihood of increases in energy and other costs due to long-term decline in non-renewable resources, (ii) reduce anthropogenic greenhouse gas emissions, and (iii) address the necessity of adaptation to climate change; in particular, having regard to location, layout and design of new development;	Planning in consultation with external Agencies and key Stakeholders including E&M CARO.	Short
5	Consider flood extents and depths when planning and designing new Local Authority Infrastructure.	Planning, Project Office, Housing, MD Offices	Short

	6	Stipulate the requirement for all new developments to avoid current/future flood risk areas, and to incorporate flood resistance and resilience into design.	Planning	Short
	7	Examine and pursue projects that seek to work towards the key objectives of the National Mitigation Plan and actions of the Climate Action Plan to decarbonise electricity, promote sustainable landuses and reduce energy consumption	Assets, Climate Action and Energy Management, Roads, Project Office	Short
	8	Consider and include climate change elements in developing urban and rural regeneration projects.	Community and Enterprise	Short
	Objective: To Increase awareness			
	9	Develop a communications strategy to raise awareness, facilitate communication and showcase adaptation in County Roscommon and encourage people to engage through the Local Economic and Community Plan (LECP).	Adaptation Steering Group, Stakeholders	Short
	Objective: To determine appropriate use of Local Authority owned land			
	10	Integrate the requirements of the National Planning Framework into the regeneration of town centre areas and consider zoning lands to cater for areas of population increase only taking account of the Spatial and Economic Strategy prepared by the Northern and Western Regional Assembly and Roscommon County Councils County Development Plan.	Planning,	Medium

G4 Drainage and Flood Management

Objective: To manage and mitigate the risk and impact of flooding through a variety of responses

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Undertake and implement a surface water management plan for the assessment and management of flood risks with the aim of reducing the adverse consequences of flooding, to prioritise projects to reduce surface water flood risk and provide for detailed mapping of areas prone to surface water and groundwater flood risk. Use future scenario flood maps to assist in the identification of potentially vulnerable communities and assets.	Water Services, MD Offices	Short
2	Stipulate the requirement for the design and specification of urban stormwater drainage systems for new development to take account of the potential future impact of climate change.	Planning	Short-Long
3	Incorporate the requirement for Sustainable Urban Drainage Systems where appropriate in local authority projects and private development sites.	Project Office, Planning	Short-Long
4	Initiate a survey of roads affected by flooding in order to prioritise expenditure.	Roads	Medium
5	Initiate a condition survey of rivers to determine risks associated with extreme weather events.	Roads, OPW	Medium
6	Incorporate considerations of the impact of climate change into proposals submitted for all infrastructural works to ensure that measures proposed are adaptable to future changes.	Project Office, OPW	Short-Long
7	Incorporate considerations of the impact of climate change when developing minor works schemes to ensure that measures proposed are adaptable to future changes.	All Departments	Short

	8	Continually review flood risk data and take into account increased flood extents and depths in the design, planning and build/delivery of new infrastructure by the Council to avoid potential/future flood prone areas and ensure that new infrastructure is resilient to climate change risks.	Planning, Water Services, Roads	Long
	9	Ensure that potential future flood information is obtained/generated by way of a Flood Risk Assessment (FRA) and used to inform suitable adaptation requirements within the Development Management process in line with the Guidelines for Planning Authorities on Flood Risk Management (DoECLG & OPW, 2009).	Planning	Short-Long
	10	Consider and explore the use of natural water retention measures in certain suitable areas as a method of managing flood risk, improve water quality, enhance biodiversity, management of soil and sediment and to provide for the creation of new or additional amenity areas. Liaise and collaborate with the OPW and other stakeholders engaged in research and pilot projects to develop knowledge and capacity on such measures.	Planning, Water Services, Roads	Short-Long
	11	Provide budget funding for cleaning and clearing storm water gullies bi-annually.	Roads, Finance	Medium
	12	Carry out a condition survey of all culverts and map digitally for future use.	Roads	Medium

G5 Natural Resources and Cultural Infrastructure

Objective: To provide for enhancement of natural environment to work positively towards climate action.

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Develop a strategy to undertake and implement an active native Tree Planting programme in the context of climate adaptation in conjunction with an awareness campaign that informs of the benefits to communities in improving air quality, offsetting carbon emissions, promoting biodiversity, limiting flood risk, reducing urban heat, as well as aesthetic value.	Environment, Community and Enterprise, Project Office, Planning	Short
2	Integrate natural borders/buffers to be included as an integral component of the design of greenways/blueways, tracks and trails and amenity areas to promote natural enhancement. 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.	Project Office, Roads, Heritage, Community and Enterprise, NPWS	Short
3	Identify non designated bogs and peatland areas within the county and examine the potential for their protection through appropriate designation(s) recognising their significant contribution to enhancing bio-diversity and as strategic and integral mechanisms (by way of sequestration) for the long term storage of carbon to mitigate the contribution of fossil fuels emissions and combat climate change. In collaboration with the NPWS, to work with landowners and communities to: • Identify non-designated bogs/peatlands in the County that may be suitable for restoration, re-wetting and conservation with an emphasis on positive contribution to climate action and carbon sequestration. • Explore opportunities with the NPWS, landowners and communities to investigate appropriate restoration options through research and thorough examination of the characteristics of the bog/peatland i.e.	Environment, Roads, NPWS, Community and Enterprise	Short

	condition, depth of drainage, historical disturbance, geographical location, ownership, maintenance etc.		
4	Undertake a Green Infrastructure Strategy and promote ways that the natural environment can adapt to climate change by for example strengthening habitat networks, reducing habitat fragmentation and providing opportunities for species to migrate.	Planning, Roads, Environment	Medium – Long
Objective: To promote effective bio-diversity management and enhance protection of natural habitats and landscapes			
5	Review Bio-diversity Plans / habitat conservation strategies, plans and projects to ensure that: • all risks from adverse climate change have been identified; • future changes are assessed and measures employed to address issues identified • carbon capture within habitats is considered.	Heritage, NPWS	Short-Long
6	Research and map areas considered beneficial for use as local carbon offset through carbon sequestration, promote conservation and regeneration of bogs and include in Green Infrastructure strategy.	Heritage, Planning, Stakeholders	Short-long
7	Support the implementation of the Pollinator Plan in County Roscommon.	Environment, Heritage	Medium-Long
8	Support the Establishment of an all-island invasive species programme to monitor the spread of terrestrial and aquatic invasive species in a changing climate and control, invasive species where their spread is considered problematic.	Heritage	Short
Objective: To protect Heritage and Cultural Infrastructure			
9	Undertake a risk assessment of the Heritage and Cultural Assets in the county to assess the vulnerability and the risk to the historical environment from the impacts of climate change and to help build resilience to these important assets.	Heritage, Heritage Council, Government Department	Medium

G6 Community Health and Wellbeing

Objective: To build capacity and resilience within communities

No.	Action	Lead & Partner(s)	Timeframe S/M/L
1	Through Public Participation Network raise awareness of the impacts of climate change and means for communities to increase response and resilience to these impacts.	PPN, Community and Enterprise	Short
2	Assess communities across the county in the context of their vulnerability to the impacts of climate change. Identify vulnerable communities and the risks to the community.	MD Offices, Community and Enterprise	Short
3	For identified vulnerable communities, develop and implement a programme to enhance their capacity to respond to and recover from extreme weather events with specific aims to: • help the vulnerable community to develop a stronger facilitating role for mitigating risks • provide advice on the risk of extreme events affecting their locality • Devise mitigating actions to enhance preparedness • provide support to develop appropriate resilience arrangements to enable response and recovery	MD Offices, Community and Enterprise, Community.	Medium
4	Work with Public Participation Network (PPN) to implement strategy/Actions at local level with communities.	Community and Enterprise, PPN	Short-Medium
5	Utilise Leader programme funds to promote climate change actions.	Community and Enterprise	Short
6	Promote best practice in climate change with Local Enterprise Office (LEO) clients engaging with RCC.	LEO	Short-Medium

	7	Promote climate change actions in awareness & green schools programmes with schools.	Environment	Short
	8	Support the education of Businesses around climate change	Community and Enterprise, LEO, Environment	Short
	9	Encourage innovation and adoption of a plan in each business.	Community and Enterprise, LEO	Short-Medium
	10	Provide a platform for businesses to learn from each other, promote environmentally friendly businesses.	Community and Enterprise, LEO, Environment	Medium
	11	For projects subject to funding and investment of public money, integrate 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.	Community and Enterprise, Project Office, Planning, Environment, Finance, Municipal District Office	Medium
	12	Liaise with the CARO and the EPA on the implementation of the National Dialogue on Climate Action to engage with communities, develop awareness initiatives, motivate changes in behaviour and create structures at local level to support the generation of ideas and translate into appropriate cost-effective action.	LEO, Community and Enterprise, Assets, Climate Action and Energy Management	Short
	13	Support 'hot desking' facilities in various locations to facilitate start-up businesses/remote working and allow businesses to continue to operate in times of severe weather.	IT, Community and Enterprise	Short-Medium

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Chapter 6

Implementation, Monitoring and Evaluation

Goal one, *Local Adaptation Governance and Business Operations* endeavours through its first objective to establish a framework within Roscommon County Council to support the successful and practical implementation of Adaptation actions. Given that this Strategy represents all functions and operations of Roscommon County Council, it is important that the Climate Action Steering Group brings together representatives from all key functional areas with various technical, operational and management expertise who can successfully carry out the necessary tasks and implement the actions contained within the Strategy. The Management Team will nominate representation to the Climate Action Steering Group and assign its Chair and the Group will meet quarterly.

Adaptation Strategy development process can be described as schematic diagram below:

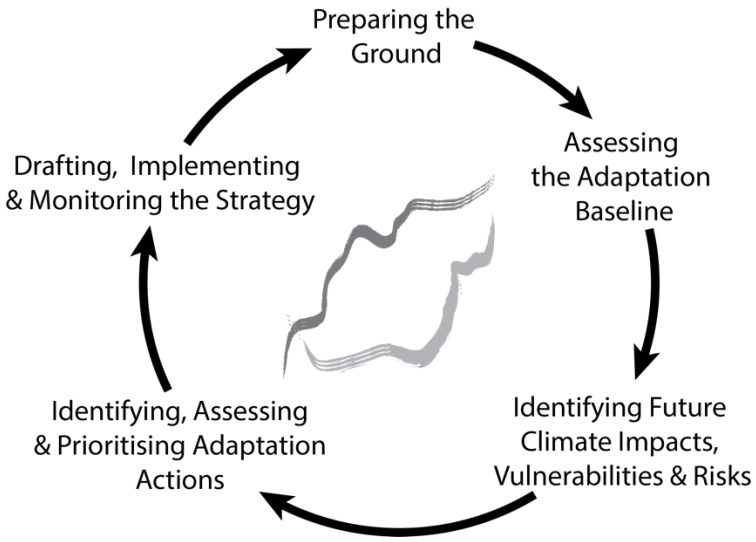

Figure 6.1 Schematic diagram of the Adaptation Strategy development process with the five steps

Drafting an Adaptation Strategy

The information gathered through the steps of the Strategy development process can now coalesce to provide a framework for the Adaptation Strategy. The Strategy must focus on the achievement of high-level, long-term Adaptation goals and objectives. The final stages of the process involve bringing together the outputs of the Adaptation baseline assessment, future climate impact and vulnerability assessment, the risk register and Adaptation Action plans to develop a draft Strategy.

The aim is to provide a relatively brief, broad and long-term strategic guide to operational decision-making processes taking place over shorter timescales. As a result, much of the more detailed information collated through the Strategy development process (e.g. vulnerability assessment) will be used as supporting evidence with a detailed analysis of each Adaptation action to be undertaken at the time at which a decision is taken to implement it.

Explore opportunities to maximize co-benefits and consider cumulative/in-combination environmental effects

In implementing the actions of this strategy Roscommon County Council will seek to ensure that any potential environmental impacts are minimized. Actions will be examined in the context of potential co-benefits including measures such as human health, biodiversity enhancement and protection, improvement in water quality, management of areas at risk of flooding and sustainable landuse zoning and development practices. It would be important that actions yielding multiple environmental and societal benefits are prioritised.

Likewise, consideration of potential adverse cumulative and in-combination environmental effects must be accounted for in selecting and implementing specific actions. Consideration of environmental sensitivities under the Habitats Directive and Water Framework Directive for example are important in the context of potential adverse cumulative or in-combination effects.

For the purposes of monitoring and reporting on progress, maladaptation will be identified and approaches to counter this will be explored thoroughly and put in place.

Moving from a working Draft to a Plan of Action

A working draft of the Strategy will be circulated for discussion and assessment by the Adaptation Team. At this stage, the focus should be on ensuring that the Strategy as it stands can form a coherent basis for subsequent actions to be taken. With this in mind, the Team will come together to set out a clear plan for the implementation, monitoring and review of the Strategy in advance of presenting it for finalisation.

Finalising the Draft Strategy

The Strategy will be presented in draft form to key Stakeholders, Management Team, etc. for amendment and validation, with the schedule of implementation, monitoring and review appended and will be put forward for adoption by the Elected Members of Roscommon County Council

SEA/AA

The work undertaken to develop an Adaptation Strategy should inform Development Plans and other statutory plans of the local authority. It will be a matter for Roscommon County Council to decide whether or not the Adaptation Strategy needs to undergo a Strategic Environmental Assessment (SEA) or Appropriate Assessment (AA).

The SEA Regulations, S.I. No. 435 of 2004 as amended by S.I. No. 200 of 2011, set out the relevant SEA procedures and notifications. Information on SEA pre-screening checks and the SEA screening process are provided in the EPA report *Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland - Synthesis Report.* Screening of this Strategy will be undertaken in accordance with the requirements of Article 6(3) of the EU Habitats Directive (directive 92/43/EEC) to determine if the Climate Change Adaptation Strategy is likely to significantly affect Natura 2000 sites (*i.e.* Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) within or surrounding the strategy area. An AA Screening Report is being prepared and will be finalized post consultation and will accompany the final Strategy.

Next Steps

The tasks of the Steering Group are as follows:

- Prioritise actions within the short, medium and long term delivery timeframes
- Develop an approach and initiate implementation of the actions
- Liaise with other Stakeholders and Sectors, both locally and regionally, where required for the implementation of actions,
- Monitor and evaluate implementation of the actions and
- Report on progress to the Climate Change and Environment SPC and subsequently to the Elected Members of the Council.

The Eastern and Midland Climate Action Region Offices (E&M CARO) will continue to assist and provide guidance where possible in the practical implementation of the actions of this Strategy. Roscommon County Council will continue the positive relationship, collaborate and engage with the E&M CARO as necessary throughout the lifetime of this Strategy and this will include submitting the Annual Progress Report to the E&M CARO as required. Roscommon County Council will also, in conjunction with the E&M CARO, regularly engage with the "Local Authority Adaptation Wizard" as developed by Climate Ireland (www.climateireland.ie) and specifically the provision of:

- Tailored information to continue to support awareness and understanding of climate Adaptation;
- Essential climate information (observed and projected) to continue to support impact and risk assessment;
- Decision making frameworks and tools to support local authority planners.

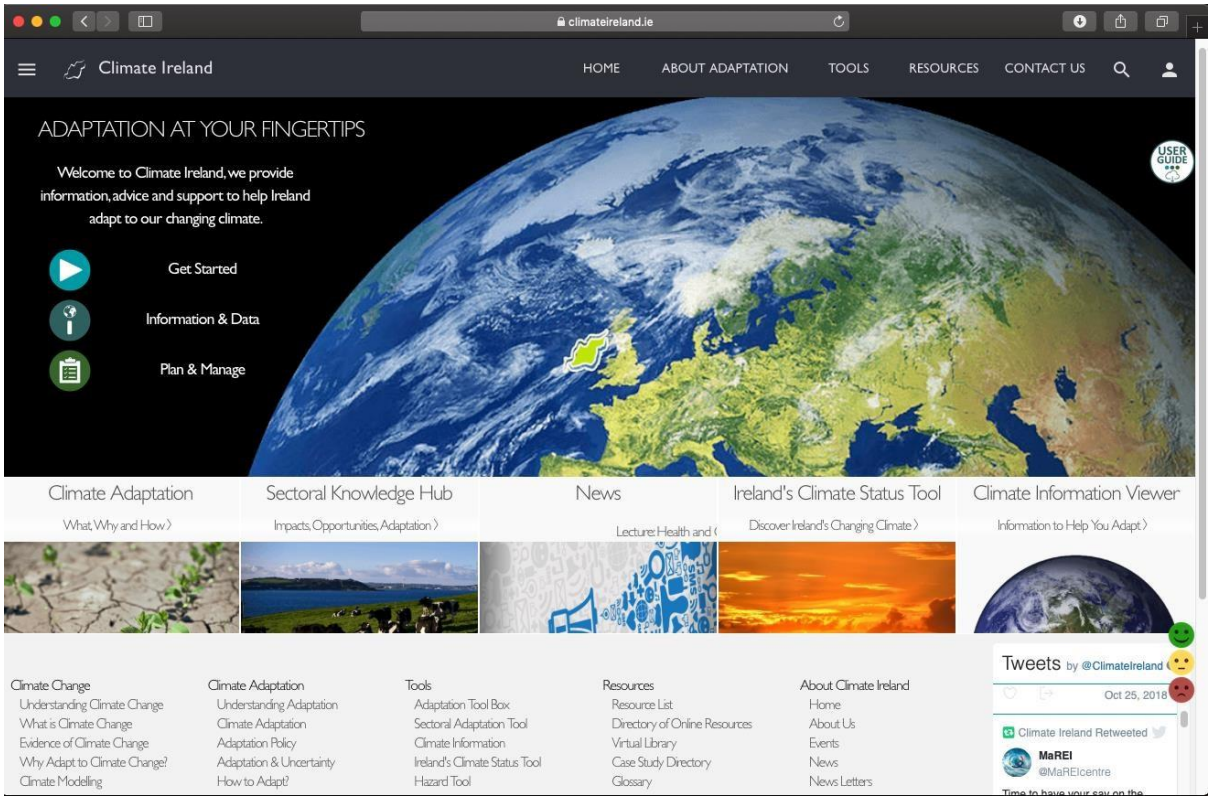

Figure 6.2 Climate Ireland Web Resource

Prioritise Actions

The purpose of this task is to prioritise Adaptation actions for delivery within the short, medium and long term timelines as defined in the Strategy document. Actions are to be assigned timeframes for implementation and furthermore assigned owners for delivery. Progress reporting will be aligned to this prioritisation.

Develop an approach and initiate implementation

The purpose of this task is to break down the Adaptation framework into what actions will be taken and when, and who will carry out the actions by way of an Implementation Plan. The Steering Group will devise a methodology for implementation that includes:

- Who is responsible for implementing the Adaptation actions?
- Identify funding required for the Adaptation measures
- Identify/establish key indicators or targets as mechanisms for measuring outcomes
- Collaboration required with other Stakeholders
- Identification of where Adaptation measures could be incorporated into existing Plans, Policies and Budgets
- Timeframe in which measures will be implemented
- Identify risks to the implementation of actions

Actions will be expanded out into the implementation plan and when complete, key personnel can assume responsibility and begin implementing the Adaptation actions.

Liaise with other Stakeholders/Sectors

At times, Roscommon County Council will be required, as considered necessary, to liaise with other key Stakeholders to provide for the delivery of actions. Conversely, the Sectors, as identified in the National Adaptation Framework, will engage and liaise with Roscommon County Council in the delivery of Sectoral Adaptation actions stemming from their respective Adaptation Plans. Roscommon County Council will also liaise with the Eastern and Midland Regional Assembly to ensure climate adaptation is integrated within Local Authority Planning in the Eastern and Midland region.

Monitor and evaluate implementation

Monitoring and evaluating the implementation of actions is critical to ensure the long-term success of Climate Adaptation actions. It is essential in tracking the performance of activities within the lifetime of this Strategy to determine whether planned outcomes from Adaptation actions have been achieved and whether new Adaptation actions should be undertaken.

The Climate Action Steering Group is encouraged to use results from the monitoring and evaluating program to:

- Revisit vulnerability and risk assessments conducted as part of Adaptation actions
- Make changes, where appropriate, based on monitoring results
- Update observed changes
- Include new climate science and recent extreme climatic hazards/events
- Factor in changes to exposure and/or adaptive capacity and
- Evaluate the success or outcome of completed actions

This ensures an iterative process and allows actions to be informed by latest climate change data and projections. In this way monitoring and evaluation can help improve the efficiency and effectiveness of Adaptation efforts in the Council.

Report on progress

The Climate Action Steering Group should develop and agree appropriate and continuous timeframes and mechanisms to report on the progress of the practical implementation of actions of this Strategy to the Management Team, Climate Change and Environment SPC and the Elected Members, as considered appropriate.

Reporting on progress i.e. Climate Change Adaptation Progress Report should be prepared **annually,** (based on the initial date of the adoption of the Strategy)**,** for input by the Management Team and SPC and review by the Elected Members.

The progress report should provide for, inter alia:

- Progress achieved on actions to that point (including key indicators as established)

- Extent to which actions have achieved and built new relationships with key Stakeholders, Agencies, Communities and identified new or emerging opportunities.
- Identification of funding streams used
- Inspired or encouraged positive Community engagement
- Report on the outcomes of efforts to change behaviour

Review/Updating of Strategy

The Adaptation Strategy is a living document and it is essential that this document will be updated to ensure that it stays up to date with evolving science, socio-economic considerations and experiences.

On the basis of a review of the National Adaptation Framework every 5 years the Roscommon County Council Climate Change Adaptation Strategy will be reviewed/updated as necessary and specifically based on:

- Specific circumstances
- National review/directives

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