Climate Change Adaptation Strategy

2019-2024

Foreword – Chief Executive and Cathaoirleach

Message from Tommy Ryan, Chief Executive

Climate Change is the defining issue of our time and we are at a defining moment. Climate change is happening, it is caused by human activities and there are significant consequences. People in Cavan are aware of the impact of climate change, as a result of the damaging weather events that have occurred in recent years.

In the face of climate change it is necessary and prudent to put in place adaptation measures that will allow Cavan County Council improve effectiveness and maintain staff welfare and allow for the continuing delivery of services and functions across the administrative and geographical area of County Cavan.

This strategy will allow for the continuing growth and development of the county by adapting to the changing climate and ensuring resilience going forward.

Message from Shane P. O'Reilly, Cathaoirleach

I welcome the publication of the Draft Climate Change Adaptation Strategy 2019 – 2024. Climate change is an issue that will effect everyone, where we have to think globally and act locally. We are all aware that Cavan has been effected by a number of major weather events as a result of climate change in the last few years, including floods and storms.

By producing this strategy Cavan County Council are preparing for the future and particularily for adapting to the future climate realities. In order to protect and ensure the continuity of our services we must adopt a pro-active role as outlined in this strategy. We need to commit to delivering this strategy into the functions and operation of the Council in order to ensure the best outcome for the people of Cavan

Table of Contents

Executive Summary

Climate change is happening now, and it will affect every part of the globe. This local authority adaptation strategy aims, to ensure a proper comprehension of climate change, to bring forward the implementation of climate resilient actions, and to ensure that climate adaptation considerations are mainstreamed and integrated into all functions of Cavan County Council

In the face of climate change this adaptation will allow Cavan County Council improve effectiveness and maintain staff welfare and allow for the continuing delivery of services and functions across the administrative and geographical area of County Cavan.

Understanding how well adapted as an authority we are to current weather extremes and climatic trends was a crucial step in developing this adaptation strategy. The focus was on identifying the complete range of hazard events to have affected Cavan. Following this it was considered that understanding how the impacts of climate hazards are likely to evolve in the future was a crucial element of adaptation strategy development. Therefore, a Climate Risk Register was created which summarises information gained through the baseline assessment and identifies future impact and vulnerability assessment through a series of climate risk statements, associated time frames and projections of future changes in these risks.

Having identified and prioritised the risks posed by climate change recurring thematic areas were identified in order to target Adaptation goals and objectives. Following the selection of thematic areas, adaptation goals and objectives were identified to support Cavan County Council in achieving climate resilience.

Perhaps the most important element of the Adaptation plan is the adaptation actions identified in order to enhance the capacity of Cavan County Council to adapt to climate change impacts and to address priority climate risks in the context of projected climate change.

Ultimately the success of this plan will depend on the implementation, monitoring and evaluation of those actions selected. It is expected that the actions within this plan will be reviewed and refined as monitoring and evaluation establish what is appropriate. Ultimately it is hoped that this plan demonstrates that Cavan County Council are planning proactively to take action and will make the required adjustments to minimise or avoid the existing and anticipated impacts from climate change.

1. Introduction and 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 Cavan Climate Change Adaptation Strategy is the start of the process of adaptation planning in Cavan County Council 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 Cavan County Council Adaptation Strategy forms part of the National Adaptation Framework (NAF) which was given statutory authority by 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, we here in Cavan County Council are uniquely placed to effect real positive change with respect to delivery of the national transition objective to 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 Cavan 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 Cavan

In accordance with the provisions of the Climate Action and Low Carbon Development Act 2015 this adaptation strategy is required to be adopted by members of Cavan County Council before the 30th September 2019.

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, 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.

[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: Hydrofuorocarbons HFCs), Perfluorocarbons (PFCs), Sulphur Hexaflouride (SF6), and Nitrogen Triflourise (NF3). Carbon Dioxide emissions in the atmosphere are the main greenhouse gas caused by human activity

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
- 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

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

- 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 Cavan 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].

1.4b The 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

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

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.

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


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

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
- 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.

[6] Chapter 13

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 Cavan County Council 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.

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

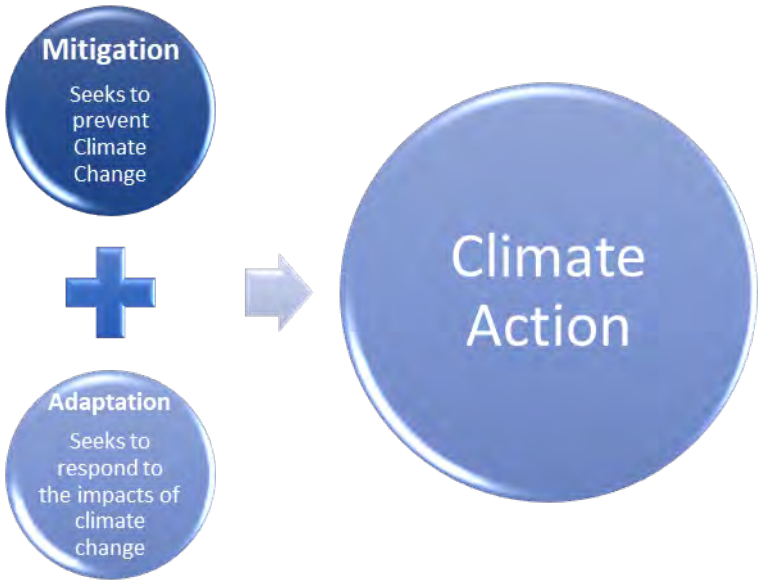
[7] Chapter 16

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 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



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 landuse.

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 adaptation but also some mitigation measures as a considered, relevant and integrated approach to combating the effects of climate change in County Cavan, mitigation is also considered in chapter 7.

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 Adaptation Plans.

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

1.7.2 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.

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 Adaptation 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 Cavan County Council has been consistent with these guidelines.

1.8 Methodology

To establish the content of this plan an internal Adaptation team was created. Initially individuals from the internal Adaptation team were interviewed to determine the Adaptation baseline assessment. Additional resources utilised in the development of this plan include the

- County Development Plan,
- The Local Economic and Community Plan (LECP) 2016-2021.
- Cavan County Council Corporate Plan 2015-2019
- Report to the National Directorate for Fire & Emergency Management Department of the Environment, Community & Local Government Flooding Events, Actions / Response by Cavan County Council December 2015 and January 2016
- EPA Research Programme 2014–2020 Ensemble of regional climate model projections for Ireland (2008-FS-CC-m) Prepared for the Environmental Protection Agency by Irish Centre for High-End Computing and Meteorology and Climate Centre, School of Mathematical Sciences, University College Dublin Author: Paul Nolan

As well as web based tools like Climateireland.ie and met.ie

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).

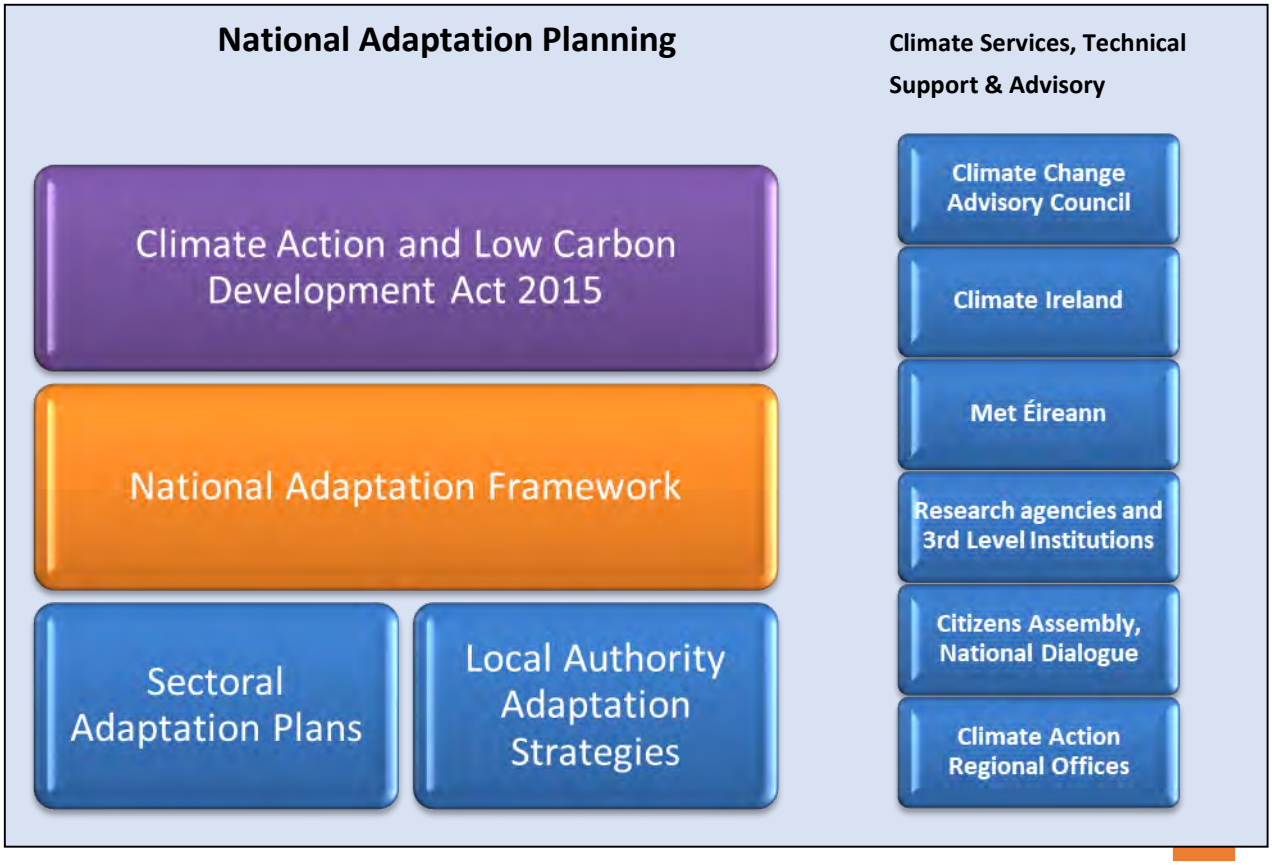
1.9 Environmental Assessment:

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 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 a stage 2 Natura Impact Report is not required. The draft screening report accompanies this draft strategy.

1.10 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.

2. Regional and Local Context

2.1 Cavan in Context

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

The Eastern and Midland CARO has assisted and supported Cavan County Council in the development of this climate change adaptation strategy.

2.2 Background to the Eastern and Midland Climate 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 map in table 2.1 as follows:

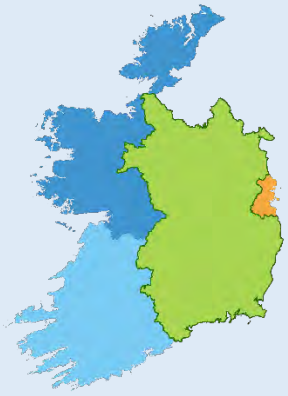
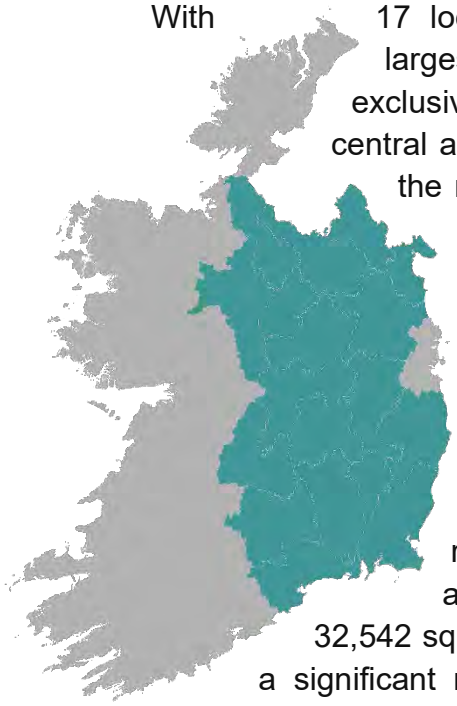
	Climate Action Region	Local Authority function area	Lead Authority
	**Midlands and Eastern**	Carlow, Cavan, Kildare, Kilkenny, Laois, Leitrim, Longford, Louth, Meath, Monoghan, Offaly, Roscommon, Tipperary, Waterford, Westmeath, Wexford, Wicklow	**Kildare County Council**
	Atlantic Seaboard North	Donegal, 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, Monoghan 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.

[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

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 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 Cavan Context

Cavan is a relatively small county of approximately 1932km2 making it the 19th largest of Irelands thirty-two counties. Cavan is bounded by counties Monaghan, Leitrim, Meath, Westmeath, Longford and Fermanagh.

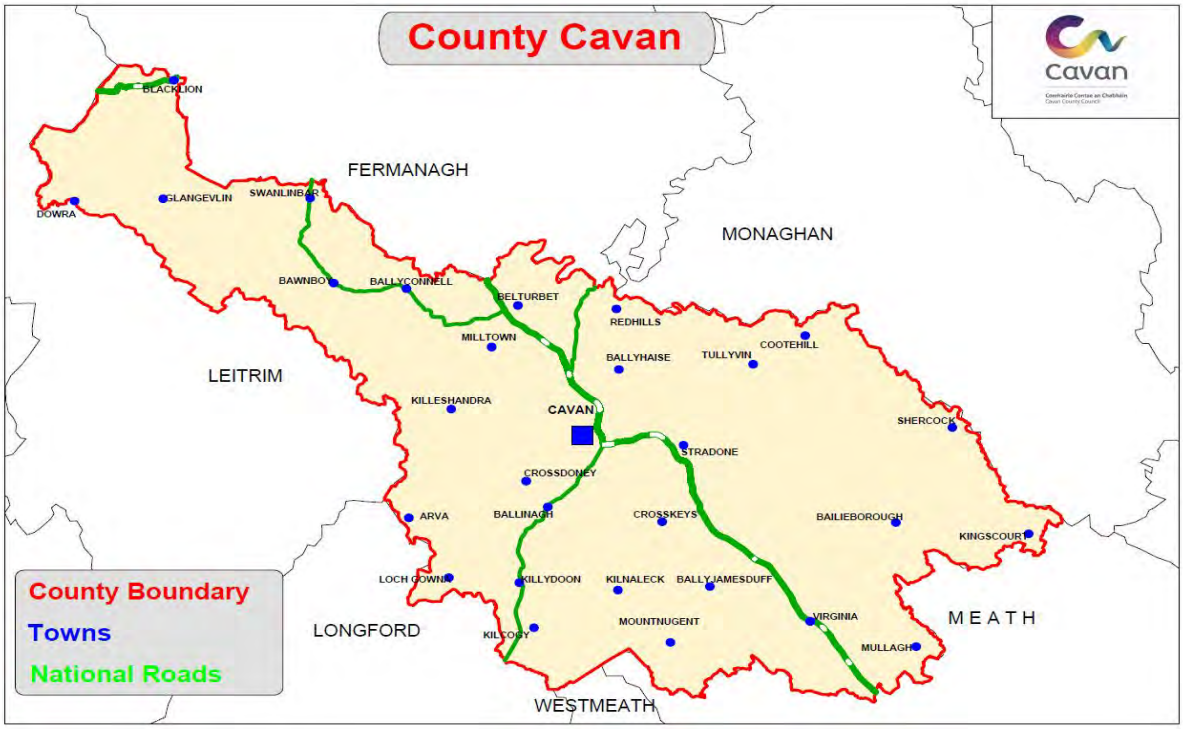
The county is characterised by drumlin countryside dotted with many lakes and hills. Cavan is known as the 'Lakeland County' and reputed to contain 365 lakes. However, there are a number of landscape types all of which contribute to the uniqueness and local distinctiveness of the county, from the Cuilcagh-Anierin Uplands of West Cavan to the Highlands of East Cavan. The range of landscape types found in County Cavan have varying visual and amenity values, topography and contain a variety of habitats .The north-western area of the county is sparsely populated and mountainous. Agriculture is the largest industry in the county especially dairy milk processing as well as pig and beef farming. There is a total farmed area of 144,269 hectares in the county, and there are approximately 219,568

cattle in Cavan. Cavan overtook Cork in 2016 as the most pig- populous county, recording 296,349 pigs, representing approx. 18.5% of the total population.
The county comprises of 3 municipal districts namely Cavan-Belturbet MD, Ballyjamesduff MD and Cootehill-Bailieboro MD. There are 9 larger towns in the county -Cavan Town, Bailieboro, Ballyjamesduff, Cootehill, Kingscourt, Virginia, Mullagh, Belturbet and Ballyconnell and there are 6 smaller towns -Killeshandra, Arva, Kilnaleck, Shercock, Ballyhaise and Ballinagh. The 2 largest employment sections in County Cavan are 'Commerce and Trade' and 'Professional Services' providing employment for 6,419 and 5,993 workers respectively. Reflective of the county's rural nature, 'agriculture, forestry and fishing' industry is particularly strong employing 11.32% of people.

2.4.1 Population

The population of the county increased by 4% between 2011 and 2016 and there has been almost continuous positive trend in population increase in the county since the 1970's. The population projections contained in the Implementation Roadmap for the National Planning Framework and the draft Regional Spatial and Economic Strategy predicts an increase of the county population, from its 2016 county population figure of 76,000, to a 2026 figure, of 83,000-84,500 and to a 2031 figure of 86,000-88,000. Cavan County Councils own research predicts an estimated population of 102,534 by 2040

2.4.2 Location



Cavan benefits from its strategic location, acting as a fulcrum between the Republic of Ireland and Northern Ireland, and functions as the main urban area within the sub-region (Cavan/Monaghan). It is positioned to act as the principle town in the sub-region in terms of housing, job and education delivery. In addition to being the largest population centre in the region, it contains strategic facilities such as a hospital, Cavan Institute, Cathedral and Sports Stadium, essential for sustainable growth. Cavan's strategic significance in further evident as within a 60-minute drive, a total working population of approximately 900,000 is within its catchment.

Cavan's Central location within the border region and the location of the county town as well as a number of other towns on national routes mean that the county links most places within the border region. The county also acts as a linkage between the border and other areas nationally as well as linking Northern Ireland with many parts of the south of the Country. Such a strategic location has attracted businesses and industry to the County providing employment. The west has maintained much of its rural character and with its higher concentration of natural amenities has seen a smaller population growth and correspondingly slower development.

2.4.3 Natural heritage

Cavan's natural heritage forms the rich tapestry of landscape bogs, drumlins, lakes, wetlands, farmland and mature hedgerow networks. This natural heritage is valuable for the social, educational and recreational benefits it provides.

There are a number of internationally and nationally designated sites within the county. Together, Special Protection Areas (SPAs) and Special Areas of Conservation (SAC's) make up a network of European Sites known as the Natura Network. These sites are designated to conserve habitats and species of European importance pursuant to the EU Habitats and Birds Directives.

Special Protection Areas (SPAs) are sites of importance for birds (and are often also important for other types of wildlife). The EU Birds Directive (79/409/EEC) requires designation of SPAs for listed vulnerable species, regularly occurring migratory species and wetlands, especially those of international importance, which attract large numbers of migratory birds each year. There are three SPAs in Co. Cavan,

Special Areas of Conservation (SACs) are the prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level. The EU

Habitats Directive (92/43/EEC) lists certain habitats and species that must be protected. There are six candidate SACs in County Cavan,

3. Adaptation Baseline Assessment

This chapter will provide an overview of climate hazards to have affected Cavan County Council and will provide a description of the local scale impacts and consequences for the delivery of services by the local authority. Information will include:

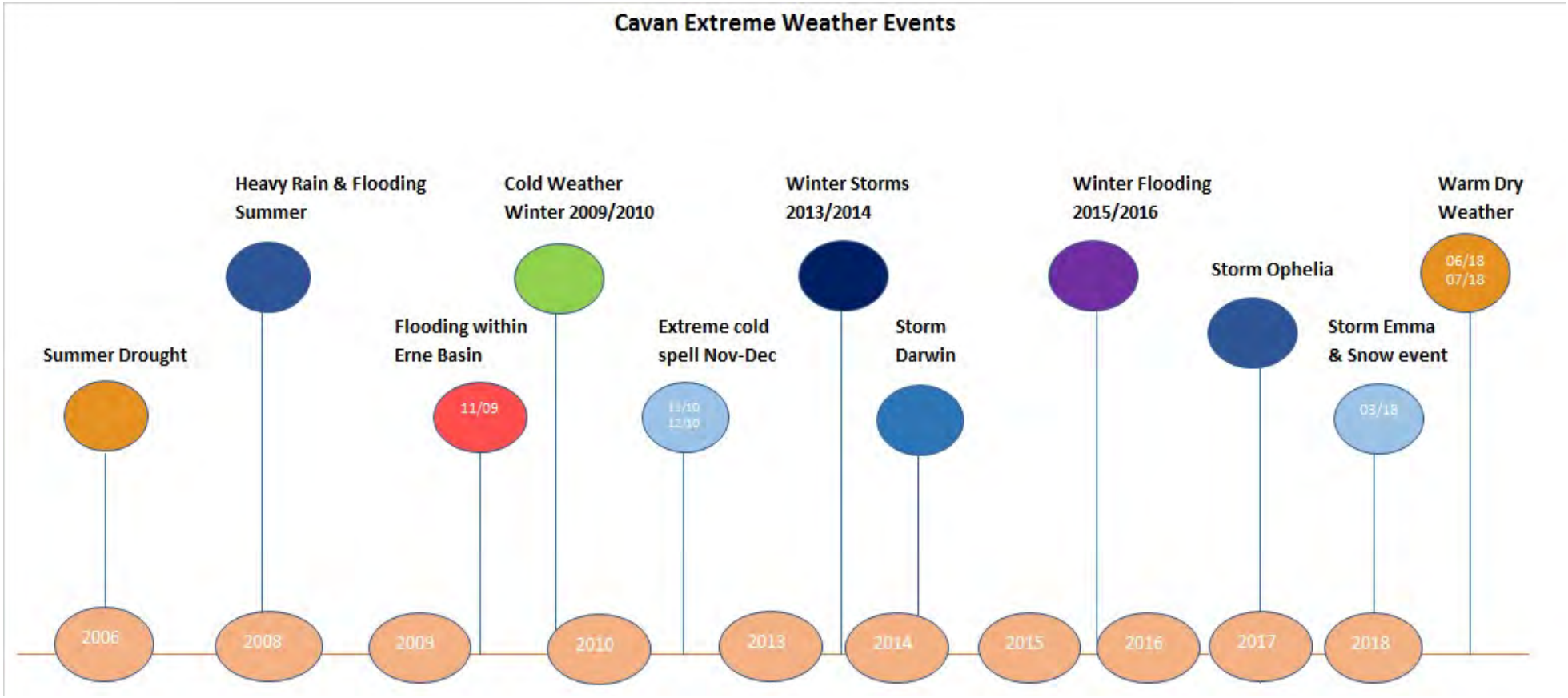
- A timeline of climate hazards to have impacted upon Cavan County Council;
- An overview of the impacts and consequences of these hazards. Including an assessment of vulnerability to the impacts of the identified climate hazards and an assessment of consequences for the delivery of services by Cavan County Council. Identify climate hazards (extreme weather events and periods of climate variability) that are relevant to the local area.

3.1 Past extreme weather events Profile of Climate Hazards that have affected Cavan County Council

In order to identify past extreme weather events and periods of climate variability and associated climatological and meteorological information, the Met Éireann website was used as a primary resource. This provides a comprehensive list of "Major Weather Events" to have affected Ireland, as well as detailed breakdowns of many of the key phenomena which in combination constituted the event. Local expert stakeholders, OPW and Climate Ireland (http://wwwclimateirelard.ie) were also used to identify past extreme weather events that affected County Cavan

Extreme weather events are identified below, from the previous 20 years, of local significance i.e. events that occurred over a long period or in combination which led to a notable level of disruption and/or drew on significant front line and emergency services.

A timeline of climate hazards to have impacted upon Cavan County Council



Warm Dry Weather of June and July 2018

Large blocking high pressure systems were the dominant feature of the summer of 2018. This kept the north Atlantic jet stream to the north of Ireland. High pressure persisted between the 21st June and the 14th July. This gave slack winds and very warm mainly dry conditions. June and July were significantly warmer and drier than average in 2018. An absolute drought lasting 20 days occurred between the end of June and start of July in County Cavan. This resulted in problems for agriculture and households. Problems included difficulties with water abstraction and stunted grass growth

Tullydermot gorse fire

Storm Emma wind and Snow event March 2018

Storm Emma resulted in widespread snow, ice and low temperatures A combination of high winds and snowfall overnight had led to snow drifts of up to 2m in places in County Cavan. A number of roads were completely blocked. The council advised drivers to stay at home during this period.

Case study cost of storm Emma for Cavan County Council

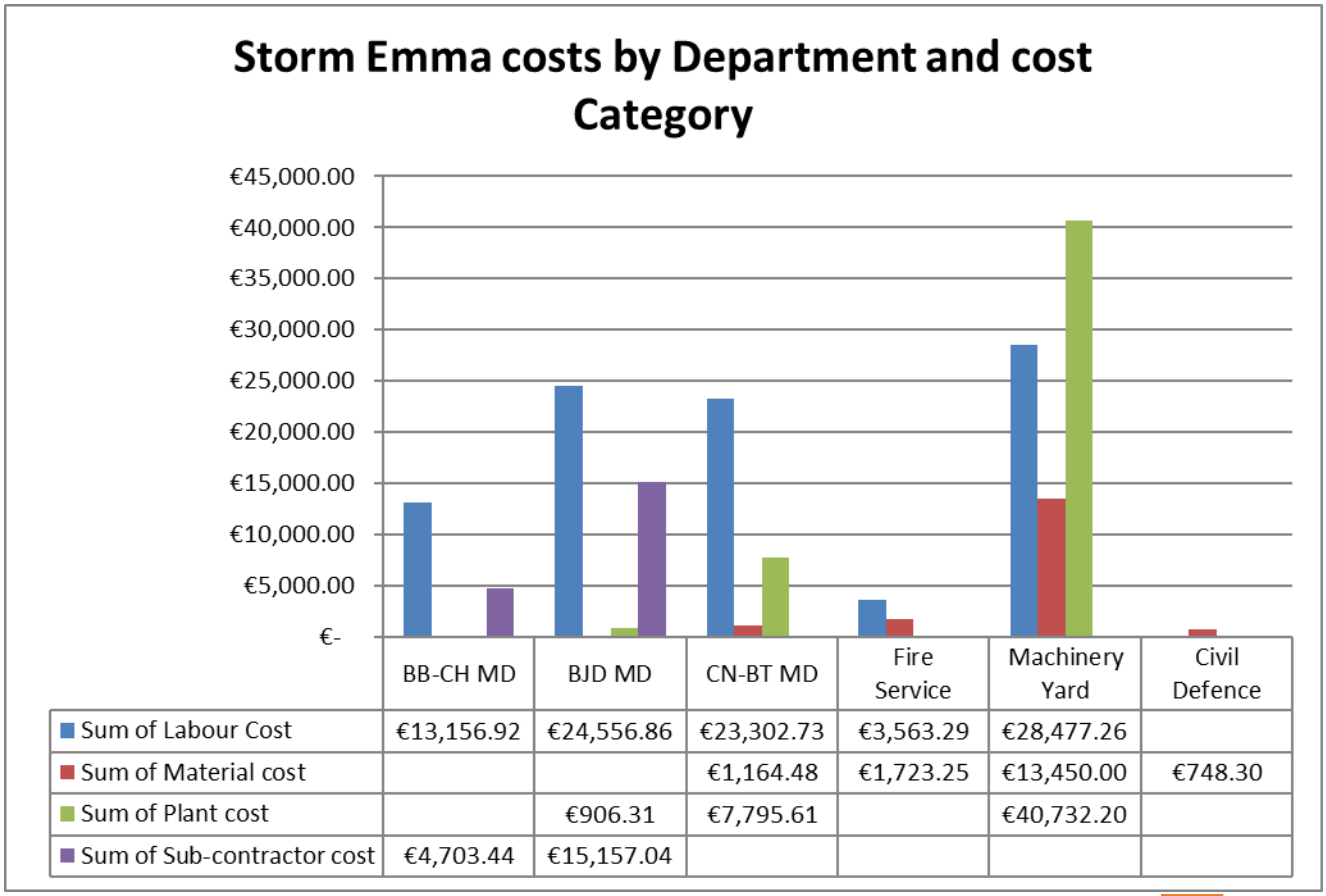
It is not possible to cost every past extreme weather event that has affected Cavan County Council. However as a detailed costing was done for this weather event it is useful to examine in this case. It is likely that similar future events will have costs proportional to this event. The charts are presented below in a costings case study for storm Emma. Some of the findings are perhaps unexpected, include the fact that the costings for Fire Service and Civil Defence are relatively low.

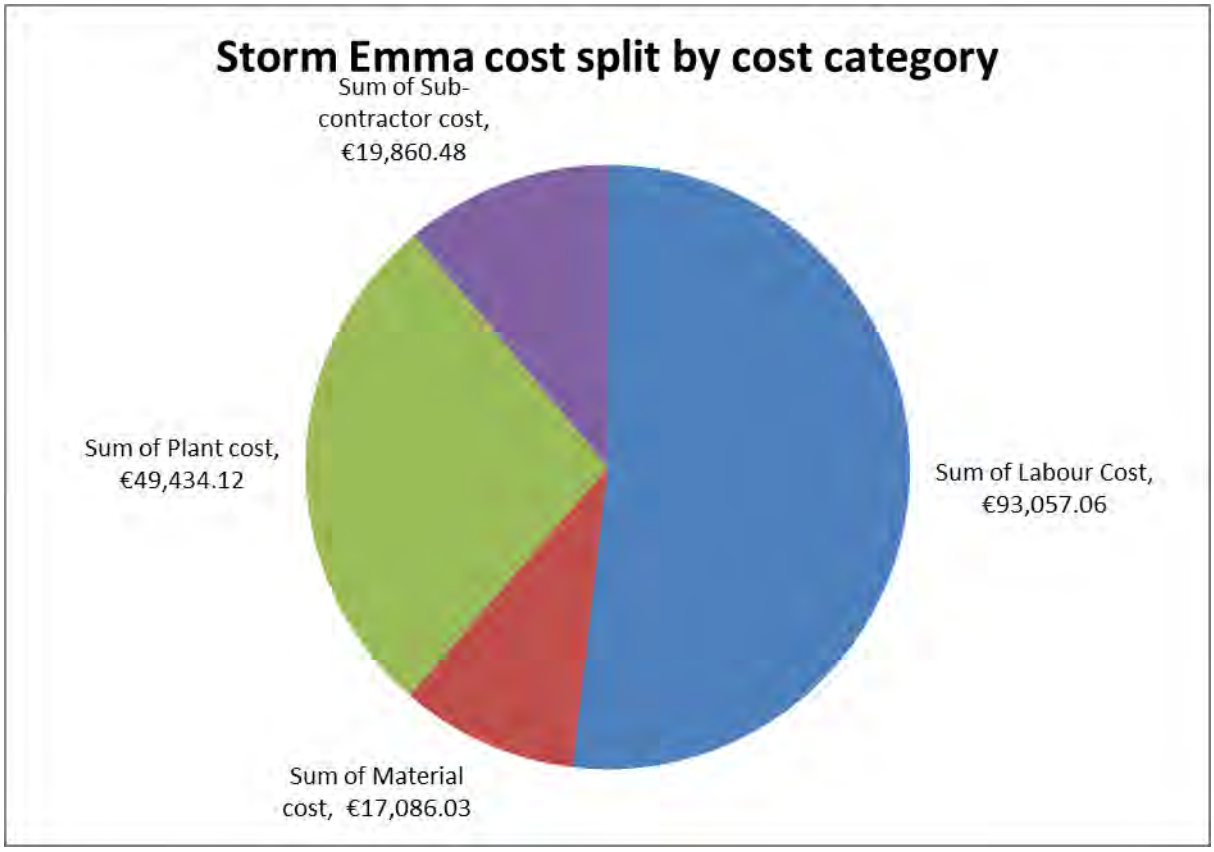
Labour was the leading cost category and the cost allocation, excluding the Fire Service and Civil Defence, is nearly evenly split between the machinery yard and the municipal districts

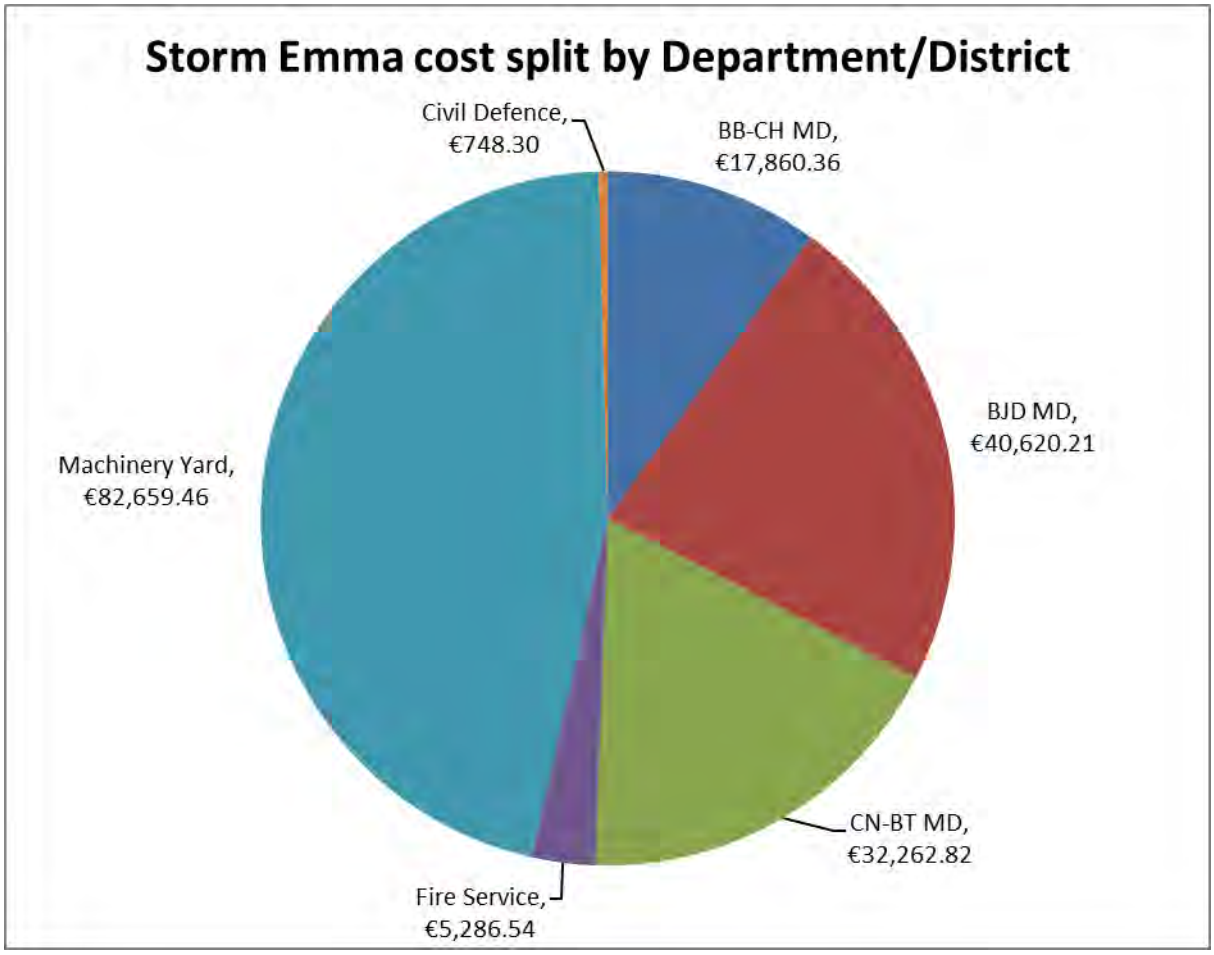
These costs are demonstrated below through the use of tables and charts to indicate the finance required to deal with storm Emma.

Department	Labour Cost	Plant cost	Material cost	Sub-contractor cost	Total
Machinery Yard	€ 28,477.26	€ 40,732.20	€ 13,450.00		**€ 82,659.46**
Fire Service	€ 3,563.29		€ 1,723.25		**€ 5,286.54**
BallyJamesduff (BJD) MD	€ 12,458.00	€906.31		€15,157.04	**€ 28,521.35**
Bailieborough CooteHill (BB - CH) MD	€ 13,156.92			€ 4,703.44	**€ 17,860.36**
Cavan Belturbet (CN-BT) MD	€ 23,302.73	€7,795.61	€ 1,164.48		**€ 32,262.82**
Civil Defence			€ 748.30		**€ 748.30**
Total	**€ 80,958.20**	**€ 49,434.12**	**€ 17,086.03**	**€ 19,860.48**	**€ 167,338.83**

Table 3.1: Summary of costs incurred - from February 23rd 2018 - Cavan County Council




Storm Emma cost split by cost category
Sum of Sub-contractor cost, €19,860.48
Sum of Plant cost, €49,434.12
Sum of Labour Cost, €93,057.06
Sum of Material cost, €17,086.03



Storm Ophelia wind event October 2017

Ophelia is the farthest east Major Hurricane (Category 3 or higher) on record in the Atlantic Basin. It made landfall over Ireland as an extra-tropical storm on the morning of the 16th October 2017 A nationwide Severe Weather Warning (see www.met.ie for criteria) was issued by Met Éireann, such a warning is only used in circumstances where the weather conditions are deemed severe enough to endanger life. A 'Status Red - Severe Weather Warning - Take Action' implies that recipients take action to protect themselves and their properties. The storm caused major power outages, lifted roofs, felled countless trees and caused coastal flooding in Ireland. The tragic loss of three lives was also attributed to Storm Ophelia. All schools and many businesses closed for the day while the nation weathered out the storm. Rainfall was not a feature with the bulk of the rain associated with the storm passing to the west of the country over the Atlantic Ocean. Warnings about the arrival of Storm Ophelia and advice on self-protection was disseminated to the public by the national and local response services. The aim was to prevent serious injury and loss of life during the storm. It resulted in the country shutting down almost completely on Monday the 16th October.

Ironically while this event did result in trees down and some disruption the winds that were recorded in the south of the country (violent storm force) were not felt in County Cavan the highest mean 10 minute wind speed was near gale force at Ballyhaise. The principal effect in County Cavan was the shutdown of schools and businesses. The principal effect for Cavan County Council was that the local authority closed for the day and so this impacted on operations of the organisation

Winter flooding 2015/2016

During December and January 2015/2016, Cavan experienced a significant flooding event that extended over a 7 week period. It commenced with Storm Desmond on Saturday 5th December resulting in damage across the county and flooding on roads. As rainfall continued over the following days water levels rose with the Annalee River and River Erne / Lough Lakes system being the worst affected. The fast flowing Annalee reached a peak on 7th December and the Lough Oughter lakes did so 3 days later on 10th December. In excess of 50 roads were closed due to flood damage or high water levels. Council Staff, Fire Service Civil Defence and volunteers provided access to isolated homes by way of trucks, tractors and boats. Water levels receded slowly with most roads being reopened by 23rd December.

From 26th December rainfall levels increased and the water levels began to rise again. On Monday 28th December Cavan experienced a deluge of rain resulting in significant damage to the road network, bridges and culverts. There was also a number of houses flooded in Crosskeys, Ballinagh and Kilnaleck. The Annalee reached a peak on 1st January 2016 and the Lough Oughter lakes again 3 days later on 4th January. These peaks were over 20cm higher than the December peaks. Again Council Staff, Fire Service, Civil Defence and volunteers were managing the relief effort during this second period of flooding.

- 17 Homes were flooded during the winter of 2015/2016.
- A further 14 homes were under threat and saved from flooding by sand bags.
- Many of these homes were previously flooded in November 2009 and 2006.
- 6 Business premises were affected by flooding
- 83 public roads were impassable during the winter flood of 2015/2016.
- 112 families were cut off by the flood waters with boat the only access for many.
- Cavan County Council and Civil Defence provided transportation through the floods.
- 5 families had to be evacuated and were provided emergency accommodation by Cavan County Council.

As water levels receded on the gradual basis all roads were free of floods by Sunday 17th January.

Flooded road 2015

Storm Darwin 2014/Winter storms 2013/14

These two past extreme weather events are incorporated together to demonstrate the effect of storms in Cavan. While Cavan suffered from high wind speeds and some trees and structures and power lines, were effected leading to road closures many of the effects were localised. The primary weather station in County Cavan is located in Ballyhaise and it indicated that winds recorded were not as strong as other parts of the country and therefore Cavan did not suffer wind damage to the same extent as other parts of the country. However more upland parts of the County were more affected. This is useful information because determining in detailed terms which climatic issues *are not* a concern or of lesser concern is vital given the limited resources available to enhance climate resilience. Of interest is that the wettest day of the winter season was at Ballyhaise on the 17th February with 34.5mm, its wettest winter day since 2008 (6 years).

The Extreme Cold Spell of November – December 2010 / The cold weather event of Winter 2009/10

Ballyhaise's mean monthly temperature of -1.4°C represents the lowest ever measured in the country for any month; the daily value of -9.4°C at the same station on the 21st December was the lowest daily maximum on record. The very low temperatures sustained over this duration allowed freezing conditions to penetrate into the ground. Soil temperatures below freezing point at a depth of 20cm were

recorded. In Cavan there was widespread disruption to transport due to snow and ice blocking roads, water disruption due to freezing and burst pipes and higher water usage to prevent freezing, creating excessive demands on water supplies. It appears that extreme cold effects County Cavan more that other parts of Ireland possibly as a result of its inland northerly location.

The cold weather event of Winter 2009/10 caused similar disruption in County Cavan

Glan Gap March 2010

Flooding within the Erne Basin November 2009.

Heavy intensive rain resulted in the flooding of Lough Oughter and the Erne Basin from Butlers Bridge, Cavan Town, Crossdoney, Milltown, Killeshandra and Belturbet.

The rising of rivers resulted in two Waste Water Treatment Plant being flooded along several private dwellings and a local primary school Several roads were impassable leaving some communities isolated with access only by boat.In Derries Lower the L-55683 was submerged necessitating the rescue of elderly and disabled residents by the Civil Defence. At Eonish homes were isolated with young families having to be rescued by Civil Defence. The National Route N3 was flooded at Kilduff and Bunn. It was closed to traffic for over 2.5 weeks. The impact of flooding was not just felt in small isolated pockets but across a large area surrounding the River Erne, Lough Oughter and its subsideries.

Flooding at Quivvy, Belturbet

Heavy rain and flooding summer 2008

In 2008 the summer's rainfall was caused by a succession of unstable low pressure centres moving slowly across the country. Climate change predictions for rainfall in the summer season are for a 10-15% decrease in rainfall in the 2020-2060 timeframe, which might seem at odds with summer 2008; there are also predictions of more frequent intense rainfall events. It is useful to be aware that the extreme rainfall experienced during the summer of 2008 cannot be attributed to climate change. The totals recorded fit within the range of natural variability. However the rainfall resulted in some flooding and the wet land presented considerable difficulties for the agricultural sector in County Cavan in 2008

Summer 2006

The summer of 2006 was the warmest, driest and sunniest summer since 1995 this resulted in drought conditions and difficulties for the agricultural community in particular. There was also some difficulties with water abstraction supplies.

Lough Naglare summer 2006

Case Study

Mountain Lodge group water scheme faced a crisis at the height of the 2006 summer heatwave,as the increasing demand for water tested the capacity of their source lake Lough Naglare, which came close to vanishing. The lake contracted into two small ponds. The Group scheme diverted water from a neighbouring lake Lough Asturall through a four-inch main, they managed to decrease the rapid reduction in Lough Naglare. Although there were some leaks on sections of the network and there had been an increase in demand as a result of the warm weather the rapid decrease was mostly as a result of the inability of the lake to recharge as a result of the drought conditions. The group scheme managed to get through the drought but at one stage the abstraction point was very close to the shore line and the source almost ended up being unviable.

An overview of the impacts and consequences of these Climate hazards

In order to assess the level of vulnerability of County Cavan to the impacts of climate hazards, and to identify the consequences of these impacts, a profile of climate events that have affected Cavan County Council has identified the following hazards.

- Strong Wind
- Extreme Rainfall
- Heavy Snowfall/Low Temperatures
- Low Rainfall/Drought
- High Temperatures

By conducting a baseline assessment it is possible to assess local level vulnerability to the impacts of climate hazards and identifying the consequences of these for the delivery of services and functions for Cavan County Council.

Broad categories of service disruption assist in determining how to characterise the consequences of climate risks for Cavan County Council. The table below (Edinburgh Sustainable Development Partnership, 2016) provides a relatively simple, high-level means of assessing the level of disruption caused for Cavan County Council

Consequence	Level	Description
Catastrophic	5	Widespread service failure with services unable to cope with widescale 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 3.2 Broad categories of service disruption that may assist in determining how to characterise the consequences of climate risks for your local authority (Edinburgh Sustainable Development Partnership, 2016)

A baseline assessment for each of the Hazards identified is listed below in table 3.4. In addition to a description of consequence, it is necessary to indicate the level of disruption associated with the hazard for the delivery of services by Cavan County Council. Specific elements of Cavan County Councils services and infrastructure are more affected than others. The section listed are the sections which have been most effected by these weather events

- Roads
- Emergency Services
- Housing
- Environment
- Water Services

Climate Hazard (Event):		Strong Wind				
Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Roads Section	Increased frequency of blocking of roads by fallen trees and debris. Increased frequency of closure of bridges. Increased road closures as a result of power lines down. Signage street furniture and public lighting may be affected	Roads situated across the county. Exposed Bridges. Roads adjacent to power lines	Emergency works. Mobilisation of road management staff Severe Weather Response Plan	3	- Increased costs and staff overtime. - Reputational damage of transport disruption.	Department of Transport, Tourism and Sport, TII ESB networks
Emergency services	Increased wind damage trees, electrical and telephone network. Damage to buildings, road accidents increase debris Increased fire spread	Likely to have a county wide effect	Emergency response Appropriately trained Staff	3	- potential for serious injuries or loss of life Increased costs and staff overtime.	ESB & Eircom networks Roads staff Neighbouring fire services
Housing Section	Slates blown from roofs Trees blown down on houses gardens Seperation fences damaged	Properties in more exposed locations	Trees removed or pruned	3	potential for serious injuries or loss of life Increased costs	External contractors
Environment	Boat sampling restricted	Boat sampling programme	Shore sampling	1	Rearrange sampling programme	EPA

Table 3.3 Climate hazard baseline assessment for strong wind

Climate Hazard (Event):		Extreme Rainfall				
Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Road Section	Increased frequency of roads closed by flooding, bridges becoming impassable. Flash floods can result in obliteration of road sections. Transport of people by boat required. Provision of sandbags required	Low lying roads situated across the county. Bridges. Council Staff families affected by flood	Severe Weather Response Plan Scrambling of area staff. Maintain drainage Sandbag stations Minor works undertaken	3	- Increased costs and staff overtime. - Reputational damage of transport disruption. - Increased repair costs	Department of Transport, Tourism and Sport, TII Civil Defence Army
Emergency services	Increased attendance at night time flooding events. Increased requirement for pumps and other equipment	Low lying roads and houses situated across the county.	Emergency response Appropriate maintained equipment	2	Increased equipment costs and staff overtime.	Roads staff Neighbouring fire services
Housing Section	Rehousing required for families affected by floods who declare themselves homeless	Low lying properties	Emergency accommodation Properties not purchased or built in flood plains	2	Increased costs and staff overtime.	Private landlords / hotels
Environment Water Services	Increased flash flooding resulting in sudden large increase in phosphorous in waterbodies and volumetric loading to wastewater plants	Rivers and lakes	Enforcement of Nitrates regulations Appropriate STW plant design	2	Reduction in waterbodies achieving good status	Water Services Department of communications Climate action and environment. EPA, LAWSAT.

Table 3.4 Climate hazard baseline assessment for extreme rainfall

Climate Hazard (Event):		Heavy Snowfall/Low Temperatures				
Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Roads Section	Increased frequency of roads closed by snow. Increased pothole formation as a result of freeze/ thaw cycle Damage to local road infrastructure as a result of weight of snow. Damage of water infrastructure may require road opening	Roads situated across the county.	Snowplough and salt treatments. Road repair Severe Weather Response Plan	2	- Increased costs and staff overtime. - Reputational damage of transport disruption. - Increased repair costs	Department of Transport, Tourism and Sport, TII and IW Civil Defense Army Water services
Emergency services	Increased vehicular accidents. Increased time to reach call out destinations or destinations may be inaccessible.Water hydrants and/or equipment frozen making it impossible to tackle fires	county wide effect	Emergency response. Snow socks , snow chains. Water checks on pumps. Hydrant maintenance. Ensuring water supply to stations	4	Increased costs and staff overtime. - Increased repair and maintenance costs	HSE Roads staff Neighbouring fire services
Housing Section Water Services	Increase in frozen/cracked pipes Increase in cracked tanks Potential risk of Carbon monoxide poisoning	Empty properties Properties with damaged or faulty heating systems	Drain down water in empty council houses Retrospectively fit carbon monoxide alarms	3	Increased costs and staff overtime. - Increased repair & maintenance costs	Irish Water External contractors
Environment	Low temperatures will result in an increase in polluting carbon sources being burned which will have a consequence for air quality and public health	Particularly urban conurbations throughout the county	Enforce smoky coal regulations	2	Increased costs and staff overtime.	HSE. Northern Ireland authorities. EPA

Table 3.5 Climate hazard baseline assessment for Heavy Snowfall/ Low Temperatures

Climate Hazard (Event):		Low Rainfall/Drought				
Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Roads Section	Increased deterioration of roads as a result of ground movement. Increased deterioration of ground support for signage, public lighting and verges	Roads situated across the county.	Use of geotextile binding to reduce effect of ground shrinkage/movement	2	Increased costs and staff overtime. - Increased repair costs	Department of Transport, Tourism and Sport, TII
Emergency services	Filling of on board tanks will require larger resources as water sources deplete. Increase in gorse wild fires particularly in April and May	Areas where lakes have dried up. Upland gorse areas	Emergency response	2	Increased costs and staff overtime.	Neighbouring fire services Coillte
Housing Section	Well water supply may be adversely affected	Small number of council houses with wells	Provide alternative water supply	2	Increased costs	IW , local GWS
Water Services	Public and Group water supplies Water supplies may be adversely affected	All water supplies	Hosepipe bans. Provide alternative water supply	3	Increased costs	IW , local GWS
Environment	Less assimilative capacity in waterways potentially restricting abstraction and discharge. Sampling programme may be difficult to achieve if access is not available. Stress on indigenous species	Abstraction lakes and discharge points. Sampling staff undertaking the WFD sampling programme. Flora and fauna effected	Alternative supply and discharge points. Only sample where it is safe to do so Liaison with NPWS	3	Increased costs Increased H&S risk for sampling staff Reduction in waterbodies achieving good status	IW, NFGWS, EPA, LAWSAT

Table 3.6 Climate hazard baseline assessment for Low Rainfall/Drought

Climate Hazard (Event):		High Temperatures				
Operational Area	**Impact**	**Exposure & Sensitivity**	**Existing Adaptive Response**	**Consequence**		**Other Relevant Actors**
				Level	**Description**	
Roads Section	Deterioration of road surfaces (rutting and bleeding of bitumen) a due to prolonged exposure to high temperatures. Increased levels of sunburn and heat stress (heat stroke/dehydration) as a result of prolonged exposure to high temperatures.	Local roads situated across the county, comprising of tarred and chipped surfaces. Outdoor Council Staff	Very fine chipping and emergency works. Water and sunscreen stations.	2	- Increased maintenance costs and staff overtime. - Reputational damage of transport disruption. - Increased costs for protection of staff from heat stress/ fatigue.	Department of Transport, Tourism and Sport, National Roads Authority
Housing	Minimal impacts	N/A	N/A	0		
Emergency Services	Increased frequency of outdoor fire events	Upland areas, comprising of gorse, forest and bog. Emergency staff heat stroke	Emergency response by fire services. Fire breaks. Lighter PPE	3	- Loss of priority habitats and species. - Increased callouts of emergency services.	Fire Services Coillte.
Environment	Increased invasive species better adapted to higher temperatures. Stress on indigenous species Warmer winters will result in an extension of the growing season and potentially greater intensification of farming activities	Indigenous flora and fauna effected throughout the county.River and lake water eutropication	Liaison with NPWS Good farming practice should result in appropriate Adaptation. Increased animal stocking, however animals will be housed for shorter periods	2	- Loss of priority habitats and species. - reduction in waterbodies achieving good status	NPWS, Department of Cultural, Heritage and the Gaeltacht, EPA, LAWSAT

Table 3.7 Climate hazard baseline assessment for High Temperature

4. Climate Risk Identification

Understanding how the impacts of climate hazards are likely to evolve in the future is a crucial element of Cavan County Councils adaptation strategy. Chapter 3 dealt principally with what is known about the present and recent past. This chapter will shift the focus towards what might occur in the future, with the aim of identifying potential future climate impacts, vulnerabilities and risks that are of greatest relevance to Cavan County Council.

This chapter presents an overview of the relevant projected climate changes and impacts according to the key operational areas of the local authority. This overview is done by undertaking.

- An assessment of future vulnerability to extreme weather events and periods of climate variability.
- A register of climate risks.
- A prioritisation of climate risks.

4.1 Assessment of future climate hazards, impacts and vulnerability

Any identification of the climate impacts that are likely to be of significance in the future should begin with those that are significant in the present. To understand how climate impacts might change into the future, it is useful to first consider how levels of vulnerability to climate hazards might change into the future - this involves assessing potential future levels of exposure and sensitivity to climate hazards. For the purposes of this plan, it is useful to assess levels of adaptive capacity based on current levels. This will allow us to identify additional measures to enhance adaptive capacity as part of adaptation planning.

It is important to examine available climate projection information to understand how the frequency and intensity of extreme weather events and periods of climate variability might change in the future. For the purposes of this adaptation strategy, fine scale climate information and data is not required and national statements of projected climate changes and impacts are considered appropriate. More detailed assessment and appraisal can be employed when specific plans or measures are to be implemented and more detailed information is necessary.

Projected impacts for Ireland include

- Projections indicate an increase of 1–1.7°C in mean annual temperatures,. There will be a significant decrease in the number of frost days (days when the minimum temperature is less than 0°C)

- For the agricultural sector the projections indicate an average increase in the length of the growing season by mid-century of 35 to 40 days per year

- Milder winters will, on average, reduce the cold related mortality rates among the elderly and frail but this may be offset by increases due to heat stress in the warmer summers

- There are significant projected decreases in mean annual, spring and summer rainfall amounts by mid-century.

- The frequencies of heavy rainfall events show notable increases during the winter and autumn months. Resulting in increased likelihood of flooding

- The number of extended dry periods is projected to increase substantially by mid-century during the summer.

- There will be a change in biodiversity composition in Ireland plants and animals that cannot adapt to the climate changes will not survive

A summary of projected climate impacts for Ireland is outlined in the table below (table 4.1)

Parameter	Observed	Projected	Example of Biophysical Impacts
Temperature	Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade. The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.	Projections indicate an increase in average temperatures across all seasons (0.9-1.7°C). The number of warm days is expected to increase and heat waves are expected to occur more frequently.	Incidences of cold stress are likely to decrease while incidences of heat stress will increase. The duration of the growing season will increase, occurring earlier and extending farther.
Percipitation	Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30year period 1961-1990. The largest increases are observed over the west of the country.	Significant reductions are expected in average levels of annual, spring and summer rainfall. Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%).	The increased occurrence of dry spells will result in increased pressure on water supply. An increase in the frequency of extreme precipitation events will result in increased fluvial and pluvial flood risk.
Wind speed and stors	No long-term change in average wind speed or direction can be determined with confidence. The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950. Increases in extreme wind speeds may impact on wind turbines and the continuity of power supply.	Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter. The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.	Infrastructure will be at risk due to the increased occurrence of intense storms (e.g. winter 2013/2014).

Table 4.1 Summary of projected climate impacts for Ireland -*Sea effects* have been removed (Source: National Adaptation Framework, 2018)

In order to assess potential future changes in sensitivity to climate hazards, vulnerability to climate hazards will be determined not only by future changes in exposure to climate hazards but also by changes in sensitivity to these.

4.2 Register of climate risks

We have developed a profile of current and potential future locally-relevant climate hazards, impacts and vulnerabilities and assessed the consequences for the delivery of services by Cavan County Council. The next step involves summarising this information through the development of a climate risk register and then prioritising these risks. This register summarises information gained through the baseline assessment and future impact and vulnerability assessment, through a series of climate risk statements, associated time frames, and projections of future changes in these risks. See Tables 4.2-4.6 for the Cavan County Council climate risk register.

4.3 Prioritisation of Climate Risks

Having developed a register of climate risk, the next step is to prioritise these risks. These risks are prioritised within the local authority climate risk register see tables below. When prioritising the climate risks, the following was considered:

- The timing of impacts
- The magnitude of impacts
- The impact on existing policies, plans and objectives

4.3.1 The timing of impact

It is important to differentiate between impacts that are of immediate concern (i.e: over the next 5 years) and risks that are more relevant to the authority over the medium to long term. When considering the immediacy of climate risks, the following timescales are employed: Short (<5 years), Medium (5-10 years) and Long (>10 years).

4.3.2 The magnitude of impacts

When considering the magnitude of current impacts and consequences for Cavan County Council now and into the future - The adaptation baseline and future impacts and vulnerability assessment undertaken in previous steps allows for a prioritisation of those risks based upon the assessed magnitude of current and future impacts on Cavan County Council. How the level of impact/consequence might increase/decrease under projected climate change is also useful considered

4.3.3 The impact on existing policies, plans and objectives

The impacts of climate change will have direct relevance to the achievement of the objectives and priorities of Cavan County Council. By applying a climate lens to existing local policy, aims and objectives, we will increase our understanding of how projected changes in climate, and their associated impacts and consequences, can either challenge or facilitate the achievement of local development policy, strategies and action plan

Climate Hazard:	Strong Wind 
Observed and Projected Information:	Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter. The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.

Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Health and Safety	More frequent and intense extreme events will impact the local authority in performing normal daily duties and statutory events and will increase staff costs in dealing with extreme events.	Short, medium and long term	Increase	Health and Safety Policy	Low
Roads, Housing, Water Services and critical infrastructure	Projected increases in storm intensity will see a higher risk of service disruption due to closure of local authority buildings, impact on road networks from debris and impact on utility networks eg. Electricity supply. Increased damage to housing stock	Short, medium and long term.	Increase	Roads Maintenance Programmes. County Development Plan, Local Development Plan.	High
Emergency Services	Increase in frequency of dealing with aftermath of increased extreme wind speeds	Short, medium and long term.	Increase	Emergency Planning,	High

Table 4.1 Climate risk register for strong wind

Climate Hazard:	Extreme Rainfall 
Observed and Projected Information:	Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%).

Operational Area	**Risk Statement**	**Timing of Risk**	**Projected change in level of risk (to 2050)**	**Relevant Policy, Plans and Objectives**	**Priority**
Health and Safety	Increased frequency of flooding and inundation, may give rise to general service disruption presenting difficulties for business continuity, the ability of staff to get to work and an impact on customers.	Short, medium and long term.	Increase	Health and Safety and HR Policy	Medium
Roads, Housing, Water Services and critical infrastructure	Flooding events could affect critical infrastructure such as water, sewerage, storm water, housing transport and communications. These changes may impact the economic function of transport routes, cost of insurance to business and the community and isolate rural communities for long durations.	Short, medium and long term.	Increase	Roads Maintenance Programmes. County Development Plan, Local Development Plan.	High
Emergency Services	Increase in frequency of flood related emergency events.	Short, medium and long term.	Increase	Emergency Planning,	High
Environment	Extreme rainfall events will increase the risk of impacting water quality and the ability of the local authority to meet the requirements of the WFD.	Short, medium and long term.	Increase	RMCEI, WFD	Low

Table 4.2 Climate risk register for Extreme Rainfall

Climate Hazard:	Heavy Snowfall/Low Temperatures 
Observed and Projected Information:	Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%). However milder winters expected

Operational Area	Risk Statement	Timing of Risk	Projected change in level of risk (to 2050)	Relevant Policy, Plans and Objectives	Priority
Health and Safety	Increased frequency of extreme snow events may give rise to general service disruption presenting difficulties for business continuity, the ability of staff to get to work and an impact on customers.	Short, medium	Increase in short to medium term	Health and Safety and HR Policy	Medium
Roads, Housing, Water Services and critical infrastructure	More frequent and intense extreme events i.e. snow events will damage local authority infrastructure giving rise to increased costs and staff resources.	Short, medium	Increase in short to medium term	Roads Maintenance Programmes. County Development Plan, Local Development Plan.	High
Emergency Services	Increase in frequency of snow related emergency events.	Short, medium	Increase in short to medium term	Emergency Planning,	High

Table 4.3 Climate risk register for Heavy Snowfall/Low Temperatures

Climate Hazard:	Low Rainfall/Drought 
Observed and Projected Information:	Significant reductions are expected in average levels of annual, spring and summer rainfall. The number of extended dry periods is projected to increase substantially by mid-century during the summer. This will result in Water shortages.

Operational Area	Risk Statement	Timing of Risk	Projected change in level of risk (to 2050)	Relevant Policy, Plans and Objectives	Priority
Roads, Housing, Water Services and critical infrastructure	longer dry seasons will impact on the integrity of road composition and will impact water supply. Increased costs and a stretch in staff resources in addressing these issues.	Short, medium	Increase in short to medium term	Roads Maintenance Programmes. County Development Plan, Local Development Plan.	High
Emergency Services	Decrease in average mean rainfall may result in more frequent bog fires impacting the staff resources of fire services, road closures, threat to public safety, and potential local economic impact.	Short, medium and long term.	Increase in short to medium term	Emergency Planning,	High
Environment	Significant and serious degradation of the natural environment and biodiversity with loss to important species/habitats, and reduction in water quality.	medium and long term.	Increase in short to medium term	Habitat directive, WFD	Low

Table 4.4 Climate risk register for Low Rainfall/Drought

Climate Hazard:	High Temperatures 
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**
Health and Safety	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
Roads, Housing, Water Services and critical 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. Water Services	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
Environment	More climate extremes and changes in rainfall variability and increased frequency of heatwaves could impact on native species, encourage diseases, weeds, pests and invasive species which will need to be managed appropriately.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low

Table 4.5 Climate risk register for High Temperatures

5. Adaptation Goals, Objectives and Actions

The risks posed by climate change have been prioritised for Cavan County in the previous chapter. In this chapter we;

- Identify recurring thematic areas, these are useful to identify, in order to target Adaptation goals and objectives
- Identify adaptation goals (long-term) and objectives (sequenced) to support Cavan County Council in achieving climate resilience.
- Identify a range of potentially appropriate adaptation actions to enhance the capacity of Cavan County Council and the community to adapt to climate change impacts and to address priority climate risks in the context of projected climate change.

5.1 Identification of thematic areas

In order to identify goals and objectives to support Cavan County Council in achieving climate resilience, it is first necessary to identify what thematic areas are most appropriate to target. These are developed from an assessment of Impacts and Risks done in previous chapters. There remains the requirement for effective implementation of relevant related regulations, policies, plans and strategies with a role in climate adaptation and environmental protection. The appropriate recurring thematic areas are identified as

- Local Adaptation Governance and Business Operations
- Infrastructure and Built Environment
- Landuse and development
- Drainage and Flood Management
- Natural Resources and Cultural Infrastructure
- Community Health and Wellbeing

5.2 Identifying adaptation goals and objectives

The thematic areas are developed further to create high levels goals within these areas. These goals identify the desired outcomes anticipated through the proper implementation of the climate change adaptation strategy. They are supported by specific objectives and adaptation actions to achieve their desired outcomes.

Theme 1: Local Adaptation Governance and Business Operations

Goal: Climate Change adaptation considerations are mainstreamed and integrated successfully into 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. In addition that

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: Landuse and development

Goal: Sustainable policies and measures are devised and implemented influencing positive behavioural changes, supporting climate adaptation actions and endorsing approaches for successful transition to low carbon and climate resilient society.

Theme 4: Drainage and Flood Management

Goal: To create an understanding of the risks and consequences of flooding and therefore progress the management of a coordinated 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: To empower communities with a strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level

5.3 Identifying adaptation actions

In order to achieve the adaptation goals outlined and associated objectives it is necessary to identify Adaptation actions. To achieve the objectives a portfolio of adaptation actions will be required that can be delivered over a range of timeframes (working in concert). The adaptation goals and objectives will call for a range of actions that will require varying levels of investment and resources in terms of time, finances, data and personnel requirements. These actions may involve a mixture of grey green and soft measures.

Actions are identified in the relevant action plans produced in tables 5.1-5.6. In these action plans the relevant actors responsible for the achievement of local level goals and objectives are identified under 'Lead and Partner': The role of partner is as considered appropriate and necessary by Cavan County Council to fulfil the implementation of the action.

Actions required to fulfil goals and associated objectives will also have varying timeframes. Timeframes are defined as Short term(S) 1-3 years, Medium Term(M), 4-5 years, Long Term(L) 5+ years

Goal 1 Local Adaptation Governance and Business Operations	Objective 1: To ensure the progression and implementation of local climate change adaptation actions in Cavan County Council.			
	No.	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	1	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 the national climate ambition i.e. decarbonisation targets to 2030 and objectives to 2050.	Senior Management Team	Short-Medium-Long
	2	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.	Senior Management Team	Short
	3	Mainstream Climate Action policy as integral consideration in the Corporate Plan objectives providing for the all local authority activities and the delivery of functions and services across the administrative area.	Corporate Services	Short-Medium
	4	Consider the appointment of a Climate Action officer	Management Team and Human Resources	Long term
	5	Include for Climate change in directorate role and title	Management Team and Human Resources	Short

Goal 1 Local Adaptation Governance and Business Operations	Objective 2: To ensure that climate change adaptation actions are mainstreamed into all activities of Cavan County Council.			
	No	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	6	Liaise, collaborate and work in partnership with the sectors identified in the National Adaptation Framework, 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.	Relevant government departments, Adaptation steering group	Short-Medium-Long
	7	Integrate Climate Action into the Service Delivery Programme and provide for its translation to Team Development Plans to enable actions to be directly pursued per operational area.	Senior Management Team Line Managers	Short-medium
	8	Promote green procurement in Cavan County Council such that services, goods, and works procured contribute to and support climate action objectives and wider environmental objectives whilst representing value for money.	Section Heads Procurement lead	Short (and ongoing

Goal 1 Local Adaptation Governance and Business Operations	Objective 3: To Build resilience in Cavan County Council to support service delivery..			
	No	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	9	Develop a Business Continuity Plan to identify and address specifically, the impacts associated with extreme weather events on all IT functions/services of the local authority and explore potential opportunities to increase resilience. This will involve: • Preparing for critical services disruptions, • Assessment of the Local Authority's back-up system's infrastructure and review of power outage back-up procedures to ensure resilience. • Developing a network access contingency plan for identified essential key staff to be able to access all essential council systems remotely due to a climate event to reduce or eliminate climate event impacts on statutory deadlines and backlog.	IT Dept.	Short
	10	Assess Cavan County Council's vehicle policy and undertake vehicle suitability assessments regularly to ensure timely and necessary maintenance for effective operation in challenging conditions.	Machinery Yard and individual depts	Short / Medium
	11	Cooperate with and ensure implementation of Guidance for National Local Authority Policy and Procedure for the Management of the Local Authority Response to specific weather events ie Storms	Senior Management Team, Health & Safety	Short/ Medium

Goal 1 Local Adaptation Governance and Business Operations	Objective 4: To build capacity within Cavan County Council to respond effectively to extreme weather events.			
	No.	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	12	Evaluate and document resources deployed for the management, maintenance, repairs and clean up operations after extreme weather events taking full account of hours and costs involved and impact on service delivery and including: • Increased operational costs • Increased maintenance costs • Increased contractor and out-of hours costs • Additional funding sought/received.	Road Department	Short-Long
	13	Build expertise, capacity and increase knowledge base through relevant training programmes on Climate Change and its implications on the operations/functions of Cavan County Council. Training programmes may include: ○ Climate Change awareness training to staff, Councilors and communities	Health & Safety Management Team LASNTG	Short-Medium

Goal 1 Local Adaptation Governance and Business Operations	Objective 5: To Identify and support opportunities that may arise from pursuing adaptation efforts through the functions of Cavan County Council.			
	No.	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	14	Identify and source funding streams for the active implementation of climate adaptation and mitigation actions and measures across County Cavan.	Director of Services / Heads of Section LEO CARO	Short
	15	Encourage and promote technologies, for example anaerobic digestion, that will contribute positively and grow the Circular and Bio-economy to promote sustainable rural and urban economic development as part of the overall aim of transiting to a low carbon economy with reduced green house gases.	Director of Services / Heads of Section WERLA	Short – Long

Goal 2 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	Identify asset manager and 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	Senior Management Team	Short-Medium-Long
	2	Integrate climate considerations into the design, planning and construction of all roads, footpaths, bridges, public realm and other construction projects.	Road Department, Municipal districts	Short-Medium-Long
	3	Undertake a Risk Assessment of road infrastructure 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 posed. The findings should be integrated into decision making processes, road infrastructure programmes and investment strategies.	Road Department, Municipal districts,	Medium
	4.	Explore ways to minimise the expected increase in maintenance requirements and costs to road infrastructure from climate stress: • Integrating climate change considerations at design stages. • Explore the climate resilience of materials used in road construction and maintenance. • Examine options to reduce road settlement due to severe weather events • Assessment of gulley clearing and maintenance plans with aim to become more proactive to reduce costs in the future	Roads Department	Medium

Goal 2 Infrastructure and Built Environment	Objective: To work towards the objective for a low carbon society			
	5	Energy engagement strategy adopted for the organisation to facilitate behavioural change relating to improved energy efficiency and associated reduction in carbon emissions.	Energy Officer, Energy team & all staff SEAI OPW	Medium
	6	Review of Cavan Co Co developments with a view to ensuring energy efficiency measures are being considering at the design stage and incorporated during construction and operation phases.	Energy Officer, Project Managers, Contractors SEAI	Short-Medium-Long
	7	Support the public lighting retrofits programme currently in operation.	Road Department and RMO	Short-Medium-Long
	8	Seek to participate in OPW programme *Optimising power @ Work* to effect staff energy awareness and behavioural change	OPW, Energy Officer	Short-Medium-Long
	9	Support Waste Management policies for the reduction of waste and other initiatives that promote the transition to a circular economy and as per the objectives of the Connacht Ulster Regional Waste Management Plan	Waste Management Section, WMPLA	Short-Medium-Long

Goal 3 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 strategies, strategic objectives, policy and development control standards of the County Development Plan.	Planning section	Short
	2	Integrate and promote climate-smart building and urban design performance outcomes in development standards through the development management process.	Planning Section, Housing section,	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. Some of the wider environmental benefits of green infrastructure, are microclimate benefits including providing shade to alleviate heat stress, supporting for urban biodiversity, water retention, and flood alleviation etc.	Planning, Community and Enterprise Municipal districts, Housing section,	Short - Long

Goal 3 Landuse and development	**Objective: To Integrate climate action considerations into landuse planning policy and influence positive behaviour**			
	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 Section in consultation with external agencies and key stakeholders including CARO.	Short
	5	Encourage the development of a policy to support and develop Electric Vehicle (EV) charging infrastructure on: • Sites owned and occupied by Cavan County Council owned and operated buildings • Private sites through supportive policies and development control standards of the County Development Plan	ESB, Energy Officer, Planning Section,	Short

Goal 4 Drainage and Flood Management	Objective: To promote flood risk mitigation measures and manage the risk of flooding through a variety of responses			
	No.	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	1	Work with CFRAM programme to prioritise projects to reduce flood risk and provide for detailed mapping of areas prone to flood risk. The outputs from the second cycle of CFRAMS will also help inform the implementation of the Strategy	OPW Road Department	Short
	2	Stipulate the requirement for the design and specification of urban stormwater drainage systems for new developments to take account of the potential future impact of climate change.	Planning section	Short
	3.	Incorporate the requirement for Sustainable Urban Drainage Systems where appropriate in local authority projects and private development sites.	Road Department, Housing Section, Planning Section	Short
	4	Assess the need for upgrades of drainage systems including separation of sewer and surface water required to reduce risk of capacity pressure on drainage systems.	Road Department, Water Services	Short - Long
	5	Incorporate considerations of the impact of climate change into proposals submitted under the OPW Minor Works Programme to ensure that measures proposed are adaptable to future changes.	CARO, OPW, MDs	Short-Long
	6	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 and for preparation of the County Development Plan, in line with the Guidelines for Planning Authorities on Flood Risk Management (DoECLG & OPW, 2009).	Planning Section, OPW,GSI	Short-long

Goal 4 Drainage and Flood Management	**Objective: To promote flood risk mitigation measures and manage the risk of flooding through a variety of responses**			
	7	Ensure that emergency response plans are reviewed annually to ensure the appropriate resource capacity is in place to provide an effective emergency response, to issues increasing as a result of climate change including floods and wildfire.	Road Department Fire Services.	Short
	8	Develop a gulley maintenance and cleaning plan to ensure that programs are in place in all towns and villages prone to flooding and that all gulleys are cleaned in advance of the Autumn and winter seasons.	MD offices, Road Department, Water Services.	Short - Long
	9	Cavan County Council will support the OPW schemes of Flood Relief Management Plans(FRMPs) and Flood relief schemes	OPW, MD offices, Road Department,	Short - Long

Goal 5 Natural Resources and Cultural Infrastructure	Objective: To promote effective bio-diversity management and enhance protection of natural habitats and landscapes			
	No.	**Action**	**Lead & Partner(s)**	**Timeframe S/M/L**
	1	Review Heritage Plan which incorporates the Biodiversity Plan. The actions within this plan will promote best practice in relation to the adverse impacts of climate change on historically important structures and the natural environment.	Heritage Section, NPWS	Short-Long
	2	Develop and implement an awareness campaign around the role of the natural environment and its positive contribution to Climate Action through green schools.	Waste section	Short-Long
	3	Encourage utilisation of the Waste Permitting Process to protect sensitive sites from inappropriate infilling activities	Waste management section	Short
	4	Integrate natural borders/buffers as an integral component of the design of greenways, tracks and trails, and amenity areas to promote natural enhancement. (NPWS to be consulted to ensure that buffer zones are provided, maintained, and protected to avoid potential impacts on designated habitats or protected species and habitats and to protect and enhance wider biodiversity)	NPWS, MD offices, Road Department, Heritage Officer,	Short-Long
	5	Develop a strategy to support an active native Tree Planting programme in the context of climate adaptation	NPWS, MD offices, Road Department, Heritage Officer, Waste section	Short-Long

Goal 6 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 ways for communities to increase response and resilience to these impacts.	PPN Community and Enterprise CARO	Short
	2	Encourage community groups particularly Tidy Towns groups to consider climate change adaptation in their multi annual plans and programs to reduce climatic risks in their communities	Waste Section Community Development PPN Tidy Towns	Short/Medium
	3	For any significant festivals / events in the County, integrate climate change considerations at the planning and development stage	Festival Organiser C and E Corporate services	Short-Long
	4	Encourage more communities to actively pursue projects to reduce energy consumption and reduce their carbon footprint.	Energy officer, Community Development, Environmental Services, PPN. Breffni Integrate	Short-Long
	5	Liaise and collaborate with the CARO and the EPA on the implementation of the National Dialogue on Climate Action.	Community and Enterprise EPA, CARO	Short-Long

6. Mitigation in Cavan County Council

6.1 Introduction

A Climate Action Adaptation Strategy while obviously focused on Adaptation it should also consider measures pertaining to climate mitigation. Mitigation refers to the efforts to reduce the emission of greenhouse gases and reduce the severity of future climate change impacts

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.

6.2 Energy Reduction Targets

The Government of Ireland has committed to wider climate change goals whereby one of these goals is to achieve a 33% energy efficiency improvement 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 Cavan County Council 17.3% energy savings in 2017 against its 2001-2005 energy usage baseline. 2018 provisional figures demonstrate 24.5% energy savings against the baseline period.

6.3 Cavan County Council Mitigation Activities

The Council is corporately committed to implementing a Strategic Energy Policy which will as a result mitigate the causes of climate change and decrease the organisations dependency on fossil fuels. This goal is defined in the strategic objectives, of the Cavan County Council Corporate Plan 2015 – 2019.

5. Planning for the Future b. Prepare and implement a Strategic Energy Policy for the County.

Through the Energy Officer, several projects and community initiatives have been developed in order to improve energy efficiency and therefore reduce the dependency on fossil fuel energy generation across the county.

These programmes include

- Cavan County Council Public lighting upgrades – replacement of SOX lighting to energy efficient LED lighting.
- Cavan County Council Housing Stock – energy efficiency upgrades.
- Implementation of Cavan County Council's Energy Engagement Strategy 2018-2021 – rolled out initially in the Cavan Courthouse, the Johnston Central Library & Farnham Centre and the Old Reference Library & Roads Design buildings.
- Cavan Town Multi-storey Carpark – Induction & LED lighting throughout 15 floors with sensor controls.

Mitigation in Action

Cavan County Council Public lighting upgrades – replacement of SOX lighting to energy efficient LED lighting.

Cavan County Council provides and maintains Public Lighting to a total of 29 towns and villages. There was a total of 6547 public lights across the County at year end 2018. The Council has ungraded 25% of the lighting infrastructure within each of the three Municipal Districts, including the use of LED technology which reduces the energy and maintenance costs and decreases carbon emissions. SSE Airtricity Utility Solutions Ltd is the Council's Maintenance Contractor for public lighting and Energia provide the supply of unmetered electricity. It is anticipated that approximately 1000 lights per annum will be upgraded until the entire inventory is completed.

Mitigation in Action

Cavan County Council Housing Stock – energy efficiency upgrades.

Energy Retrofit Programme, energy upgrade works within the Council's housing stock is ongoing at various locations throughout the county.

The scheme included for the following works;

• Attic and Wall Insulation

• Draught Proofing

• BER Certification

Mitigation in Action

Implementation of Cavan County Council's Energy Engagement Strategy 2018-2021.

The objectives of the programme are to raise employee energy awareness and to reduce the consumption of energy in the 3 building selected. This will compliment the national statutory requirement of public authorities improving their energy efficiency by 33% by 2020.The main activities involved in the programme are

- Senior Management Team support
- Establishing Energy Team
- Communicating steps staff can take to save energy in work and at home
- Improving current energy management practices
- Measuring improvements through bill comparison (energy usage) as well as behavioural changes
- Consider addition of energy management responsibilities to PDP form
- Staff competitions
- Linkages with Science Festival
- Cavan Energy Expo
- CPD presentation

The timescale for the roll out of the programme is from November 2018 to Dec 2021. The action plan will be reviewed periodically with amendments and additions as same are identified. It is hoped to eventually roll out the successful elements of the programme across the organization (Fire Services, Libraries, MD Offices, etc.). Photo below from the launch of the Strategy with Cavan County Council's Senior Management Team, the Energy Officer and the Cathaoirleach.

Mitigation in Action

Cavan Town Multi-storey Carpark – Induction & LED lighting throughout 15 floors with sensor controls.

Before the project, in order to cover operational costs, 204 cars needed to be parked for at least one hour per day. Now only 67 cars need to park for one hour per day.

The project provides a more natural lighting environment. This is more attractive to users of the car park. The new LED lights have reduced lamp maintenance requirements. Their brightness has also improved recognition of cars from CCTV.

The lighting upgrades have led to significant cost savings for the car park. 130,000 kWh of annual energy savings and €18,000 cost savings. The main objective of the project involved the replacement of 180 W High Pressure Sodium lamps with 70 W induction lamps. This was to reduce energy requirements and improve the lighting quality. IE Lighting was selected as the contractor for the project on a design and supply contract. The following were also carried out as part of the retrofit design:

- Install 20 W LED lights for stairwells and lobbies, replacing 36 W CFL 2D fittings
- Combine efficient lighting with effective lux level and timing controls
- Maintain health, safety and security requirements
- Promote car park use with a well-lit interior

7. Implementation, Monitoring and Evaluation

Goal one, *Local Adaptation Governance and business operations* endeavors through its first objective to establish a framework within the organisation to support the successful and practical implementation of adaptation actions. Given that this strategy represents all functions and operations of Cavan 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 strategy. The Management Team will nominate representation to the Climate Action Steering Group and assign its Chair.

The tasks of the 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

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. Cavan County Council will continue the positive relationship, collaborate and engage with the E&M CARO as is necessary throughout the lifetime of this strategy. This will include submitting the annual progress report to the CARO if required. Cavan County Council will also collaborate with the Eastern and Midland Regional Assembly to ensure that climate change adaptation is integrated within local authority planning in the Eastern and Midland region.

7.1: 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.

7.2: 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. 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 that measures will be implemented,
- Identify risks to the implementation of actions.

It is hoped to expand out the actions into an implementation plan. Once complete, key personnel can assume responsibility and begin implementing the adaptation actions.

7.3: Liaise with other Stakeholders/Sectors

At times, the local authority 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 Local Authorities in the delivery of sectoral adaptation actions stemming from their respective adaptation plans.

A critical challenge in the implementation and monitoring of this plan is data and actions not under the direct control of Cavan County Council. Presently, Cavan County Council is reliant on various stakeholders, sectors, state agencies and central government for data and actions such as OPW for flood risk data, LAWPRO for river basin management, SEAI for energy, the EPA for air quality and TII for transportation, etc. Data availability and the actions undertaken by these agencies can impact on the ability of Cavan County Council to monitor their progress and reach targets on climate change actions.

7.4: 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, in determining whether planned outcomes from adaptation actions have been achieved and in determining whether new adaptation actions should be undertaken.

It is hoped that the climate action steering group can use results from the monitoring and evaluating program to:

- Make changes where appropriate based on results,
- Allow for 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.

7.5 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, and Environmental SPC 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, progress achieved on actions to that point. The requirement to report on progress on an annual basis is also informed by the following:

Under section 15 of the Climate Action and Low Carbon Development Act 2015, local authorities may be required to report on progress in meeting the terms of the National Adaptation Framework and Sectoral Adaptation Plans.

Local Authorities have been identified by many national sectors under the National Adaptation Framework as a key stakeholder responsible for implementing adaptation actions in their local area and ensuring coordination and coherence with the sectors identified in the NAF. Cooperation and collaboration between Local Authorities and the sectors is encouraged strongly. Under Section 14 of the Climate Action and Low Carbon Development Act 2015, Sectors may be required report on progress made with adaptation actions and present annual sectoral adaptation statements to each House of the Oireachtas by the relevant Minister or by the Minister for DCCAE.

The National Adaptation Steering Committee, chaired by the DCCAE maintains a role to ensure a coordinated and coherent approach to implementing actions under the NAF. This steering committee with representation from Local Authorities and the CAROs has a role in promoting cross sectoral coordination.

The High Level Climate Action Steering Committee, chaired by the Minister for Communications, Climate Action and Environment has a role in monitoring progress by sectors and local authorities in delivering on climate change adaptation actions.

Under Section 13 of the Climate Action and Low Carbon Development Act 2015, the Advisory Council has a role, at the request of the Minister, in conducting periodic reviews of the implementation of the National Adaptation Framework and sectoral adaptation plans and to report on its findings and recommendations.