



CLIMATE RESILIENT KILDARE

Kildare County Council



Kildare County Council
Climate Change Adaptation
Strategy
2019 - 2024



Kildare
County
Council



Global temperatures have risen and are projected to rise further bringing changes in weather patterns, rising sea levels as well as 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 has come to the forefront of political and societal discussion in recent times. It poses a serious threat to humanity and our environment. The County is already experiencing climate risks including power outages, flooding, heat waves and drought conditions. Climate change will increase these risks going forward which will have considerable impacts on communities, businesses and on the Local Authority's ability to continue providing services to its customers.



Local government has a key role to play in building climate resilience in our communities through working with existing networks such as the Public Participation Network, Local Community Development Committees, Tidy Towns and the Chamber of Commerce. In addition, the role of the Strategic Policy Committees and the Corporate Policy Group provides a unique opportunity to help shape this council's response to the challenges and opportunities of climate change.

Along with reducing climate risks within its own council operations this Climate Adaptation Strategy is also a solid initial step in helping to reduce vulnerabilities and build adaptive capacity among the citizenry. We need to ensure our communities and businesses are supported in adapting to the impacts of climate change.

Suzanne Doyle
Cathaoirleach
Kildare County Council

Climate change is not something happening in the future, it is taking place right now. It is impacting on an international stage but also on society, both nationally and in County Kildare. This is resulting in an increased demand on the council's operations to provide services and requires change in how we plan for future extreme events. Planning for the effects of climate change is required now.



As the host of the Eastern & Midlands Climate Action Regional Office, Kildare County Council is the lead for coordinating the work of 17 Local Authorities in preparing their adaptation strategies and is also focusing on identifying job and business opportunities that may arise. This role fits well with its corporate objective of seeking to be an innovative and progressive county, which is host to a range of modern industries such as Intel, Kerry Group and Pfizer.

I welcome this Climate Change Adaptation Strategy as the first step in building the foundations required to enhance resilience to climate hazards. This strategy provides a fundamental tool for local authorities to address such challenges and for developing innovative and sustainable solutions that address adaptation and enhanced resilience to a changing climate. It aims to provide benefits at a relatively reduced cost when compared to the more common reactive approach. I wish to express appreciation to everyone who has contributed to the preparation of this strategy.

Peter Carey
Chief Executive
Kildare County Council

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Acknowledgements



This Strategy was developed through collaboration with and contributions from

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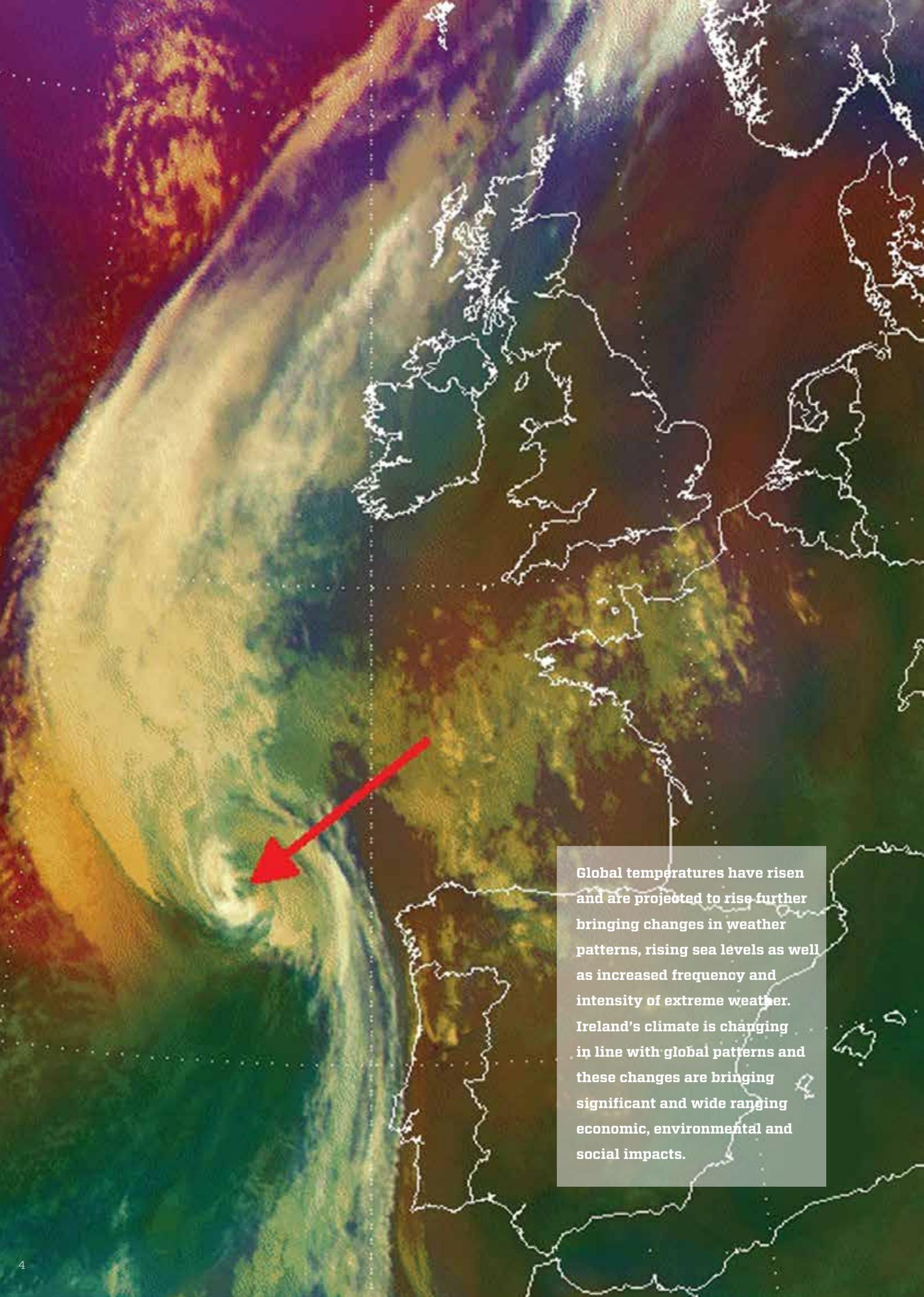
The Eastern & Midlands Climate Action Regional Office

Climate Ireland

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Global temperatures have risen and are projected to rise further bringing changes in weather patterns, rising sea levels as well as 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 and Adaptation Background

The Earth's climate is changing with global temperatures rising at a rate far greater than experienced in recent history. Changes in weather patterns have been observed around the world including changes in the frequency and intensity of extreme weather events. Ireland's climate is changing in line with global trends with temperatures expected to rise even further intensifying the changes already experienced at a local level. This in turn will have impacts on an environmental, economical and societal level.

Climate change is now accepted as a global challenge and requires policy responses in both:

- Mitigation to considerably reduce greenhouse gas emissions.
- Adaptation to ensure communities, and society as a whole, become resilient to the impacts and risks of climate change.

Purpose of this strategy

As the level of government closest to local communities and enterprise and as first responders in many emergencies, Kildare County Council is uniquely placed to be a leader in achieving the national objective of becoming a more climate resilient society and economy by 2050 with the capability to tackle the many challenges that climate change can present.

This Local Authority Adaptation Strategy takes on the role as the primary instrument at local level to:

- Ensure a proper comprehension of the key risks and vulnerabilities of climate change is grasped.
- Bring forward the implementation of climate resilient adaptation actions in a planned and proactive manner.
- Ensure that climate adaptation considerations are mainstreamed into all plans and policies and integrated into all operations and functions of the local authority.

Assessing Current Adaptation Baseline - Vulnerabilities, sensitivities and risks

The impacts of climate change experienced in County Kildare generally reflect the national pattern and trends of observed climate hazards. A review of extreme weather events over the past 35 years was undertaken using published Met Éireann data along with information from Kildare County Council. This assessment of climatic hazards identified four main climatic categories including:

- Wind storms.
- Extreme heat/drought events.
- Extreme rainfall events.
- Freezing conditions/snow events.

Combination events i.e. two extreme climatic events occurring simultaneously are also noted. Such combinations give rise to more severe and destructive impacts.

Future risks to projected climates changes

Climate change projections indicate that:

- Warming in Kildare will continue especially in the summer and winter.
- The County will experience more extreme weather conditions including rainfall events and storms.
- There will be an increased likelihood of fluvial flooding.
- Winters will be wetter and summers will be drier (which could lead to water shortages).
- These climate changes will impact the type, distribution and lifecycles of species.

These projections signal significant challenges for the Council and the people of the County. Climate Change will have further effect on land use including agriculture, forestry and peatlands, on biodiversity, on water resources, human health, the economy and society.



Vision - Goals - Objectives - Actions

As adaptation responses require collective responsibility within the organisation to develop capacity and build resilience, a framework is designed with appropriate objectives and actions that encompass all services, functions and operations of the Council. The adaptation framework is centred around six complementary high level goals. Each contains a suite of relevant actions directed by specific objectives, all working towards a clear vision.

Vision - Kildare County Council will be a leader in climate change adaptation taking an holistic all of local authority approach by mainstreaming climate change considerations into its functions and services, thereby building preparedness, responsiveness and resilience into both its operations as well as in the communities which it serves.

1 Local Adaptation Governance and Business Operations

2 Infrastructure and Built Environment

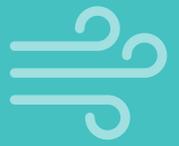
3 Landuse and development

4 Drainage and Flood Management

5 Natural Resources and Cultural Infrastructure

6 Community Health and Wellbeing





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 as well as increased frequency and intensity of extreme weather. Ireland's climate is changing in line with global patterns and these changes are bringing significant and wide ranging economic, environmental and social impacts.

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

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

As the level of government closest to local communities and enterprise and as first responders in many emergencies, Kildare County Council are uniquely placed to be a leader in achieving the national objective of becoming a more climate resilient society and economy by 2050, with the capability to tackle the many challenges that climate change can present.

This Local Authority Adaptation Strategy takes on the role as the primary instrument at local level to:

- Ensure a proper comprehension of the key risks and vulnerabilities of climate change is attained.
- Bring forward the implementation of climate resilient adaptation actions in a planned and proactive manner.
- 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 Kildare County Council in two respects:

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



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 changes in the Earth's climate are being overtaken by human-related activities which are negatively influencing climate variability and give 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 emissions³ 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 urbanisation, deforestation and desertification.

Emissions from these activities are entering the atmosphere, trapping more of the sun's radiation and reflecting back to the earth's surface giving rise to global warming. The term greenhouse effect has been coined to describe this occurrence.

The effects of global warming are observed through reductions in snow and ice in Polar Regions, increase in global mean surface temperatures, rise in sea levels and changes in some climate extremes i.e. weather events. Scientists and researchers state these changes are occurring rapidly, are considerable, and will have consequences for current 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 and requires immediate commitment to action.

1.4 The challenge for Ireland

There is evidence that Ireland's climate is changing in line with the global trends of climate change. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and the county has been impacted by frequent, intense and more extreme weather events. Temperatures have increased by 0.8°C 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 oceans⁴

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 (N₂O) and industrial gasses: Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF₆), and Nitrogen Trifluoride (NF₃). Carbon Dioxide emissions in the atmosphere are the main greenhouse gas caused by human activity*

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



The impacts of climate change are felt more acutely at the local level. County Kildare has experienced severe flooding from rivers bursting their banks that caused damage to property, vehicles and transport infrastructure most recently, and particularly in 2002 and in 2009.

High wind storms such as Storm Darwin in 2014 caused damage to buildings and forestry and led to issues around safe drinking water. Heavy snowfall in March 2018 during Storm Emma caused major disruption to transport networks, local businesses and schools, particularly in the north of the county. Hot and dry summers have impacted on food and water availability for livestock, adversely affecting the agriculture and equine industries in the county.

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:

- Increase in average temperatures across all seasons. Heat waves are expected to occur more frequently and increase in duration.
- Significant reductions are expected in average levels of spring and summer rainfall with a substantial increase in the frequency of heavy precipitation events in the winter.

- Decrease in average 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 first feel the impacts of these rises. Sea surface temperatures are projected to continue to warm for the coming decade.

This 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 Kildare County Council provide a wide range of services, many of which will increasingly be affected by the impacts of Climate Change. The local authority 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.⁵

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





1.5 What is Climate Adaptation?

Climate Adaptation can be best described as planning proactively to take action and make adjustments to minimise or avoid the existing and anticipated impacts from climate change.

The Intergovernmental Panel on Climate Change (IPCC), in 2014, defined climate adaptation as:

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

Climate adaptation aims to build climate resilient communities, to protect people, ecosystems, businesses, infrastructure and buildings from the negative impacts of climate change. The Local Authority plays a pivotal role in planning for, and responding to, emergency situations.

It is best placed to react faster and more effectively to local climatic 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 response to varying and more frequent extreme weather events.

As the climate is changing the local authority needs to ensure that it adapts to the various impacts. It is crucial that climate change adaptation is mainstreamed into our decision making processes and implemented proactively in the performance of functions. In addition, the benefits and opportunities that may arise must be capitalised upon in respect of cost savings as well as new and innovative ways to foster environmental sustainability.

Adaptation in Action – Case Study 1 **Sallins Flood Alleviation Scheme**

Approximately 40 houses in the Waterways Estate, Sallins, were flooded on the 29th of November 2009 causing major distress to the inhabitants and local community generally. The flooding event was caused by a severe rainfall event occurring after a prolonged wet spell. The event caused fluvial flooding from a watercourse to the east of the estate.

A number of alternatives were examined. However it became apparent, due to the presence of the Dublin – Cork railway line and the Grand Canal, that major civil engineering works would be required to protect the affected properties.

The chosen solution included construction of embankments along the watercourse, including deepening and widening new culverts beneath the Dublin – Cork Railway Line and upgrade works to the Grand Canal which is the receiving water for the watercourse.

The solution put forward was a multi agency solution led by Kildare County Council and involved collaboration among Waterways Ireland, the OPW, Irish Rail, National Parks and Wildlife and Inland Fisheries Ireland. The works were subject to a cost benefit analysis and have proven, upon completion, to significantly reduce the threat of future flood events in this area. A cost to benefit ratio of approximately 1 : 1.5 was achieved in the delivery of the works.





1.6 Adaptation and Mitigation Explained

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 adaptation over time into all functions, operations and services of the local authority. It seeks to inform or 'climate proof' existing plans and policies of 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 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 really 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 as well as encouraging sustainable transport and land use.

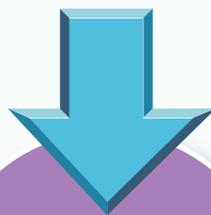
There are some positive interactions between adaptation and mitigation measures. Employing both adaptation and mitigation measures represents a robust climate action response in addressing the challenges at local level. The actions set out in Chapter 7 of this strategy reflect both adaptation and mitigation measures as a considered, relevant and integrated approach to combating the effects of climate change in County Kildare.

Mitigation
Seeks to
prevent
Climate
Change



Adaptation
seeks to
respond to the
impacts of
Climate
Change

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



**Climate
Action**

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

Adaptation in Action – Case Study 2 **Johnstown Flood Alleviation Scheme**

The Morrell River and Annagal Stream both flow through the village of Johnstown, near Naas, while the Hartwell River is located approximately 1km to the east of the village. All three of these watercourses have historically been susceptible to fluvial flooding and in more recent times this has caused injurious affection and disturbance to the residents and home owners of the village, particularly in new developments such as Johnstown Manor, St John's Grove, a small industrial area to the south east of the village as well as private dwellings in the Forenaughts area.

Following a particularly damaging flood event in August 2008 Kildare County Council engaged with the Johnstown Community Association and the OPW to investigate possible flood management options for the area.

The solution eventually put forward for Environmental Screening, planning and subsequently construction included a mix of green and grey flood management options. Included was the upgrade of existing road bridges, the provision of hard flood relief walls, the upgrade of existing river channels, including composite cross sections and flood embankments, and a flood overflow channel to the west of the village. The scheme, which was constructed by the OPW, was successfully completed in 2011 and has proven to significantly reduce the threat of future flooding in the Johnstown area.





1.7 Adaptation Policy Context

This local authority adaptation strategy is set within a policy framework at International, European, National and Local level.

1.7.1 International Context

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. Its 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 did not set binding limits on greenhouse gas emissions and contained no enforcement mechanisms. However it 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 UNFCCC (ratified by Ireland on 4th November 2016) and it is aimed at:

- Limiting global warming to less than 2^oC above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5^oC.
- Building resilience and increasing the ability to mitigate the impacts of climate change.

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

2030 Agenda for Sustainable Development

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 recognises 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.

The Global Covenant of Mayors for Climate and Energy is a voluntary, bottom up, approach for cities and local governments to combat Climate Change and move towards a low emission, resilient society.

The Global Covenant of Mayors for Climate and Energy brought the Compact of Mayors and the EU Covenant of Mayors under one international body in January 2017 incorporating over 9,000 cities and local governments. Kildare County Council became signatories of the Global Covenant of Mayors for Climate and Energy in September 2019. This is further explored in Chapter 2: Mitigation in Kildare County Council.

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.



The official signing of the Global Covenant of Mayors for Climate and Energy in September 2019. In the photo is Cathaoirleach of Kildare County Council Suzanne Doyle, Chief Executive Peter Carey, Director of Services for Water Services and Environment Joe Boland, Regional Coordinator of the Eastern & Midlands CARO Alan Dunney, Chair of the Environmental Services and Water SPC Cllr Vincent P. Martin and children from the No Planet B group.

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 gives 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.

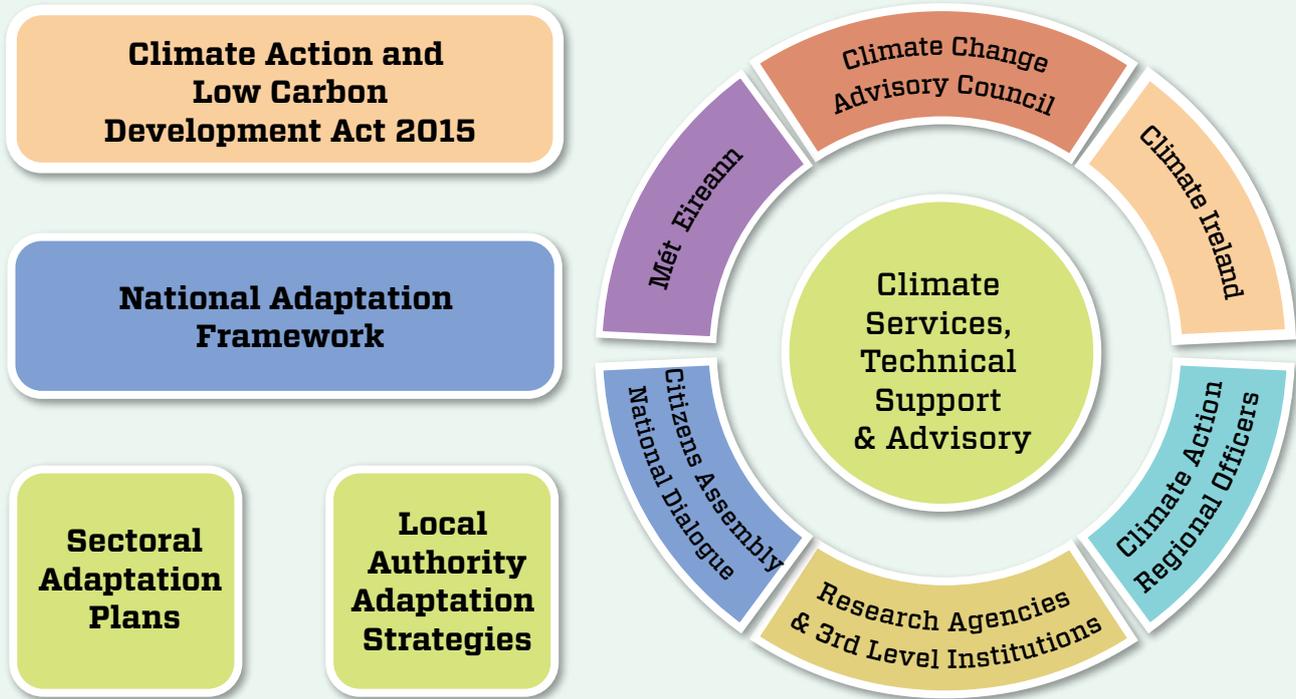
The Local Authority Adaptation Strategy Development Guidelines 2018 provide guidance to Local Authorities to develop their own Climate Change Action Adaptation Strategy. In developing this adaptation strategy Kildare County Council has been consistent with these guidelines.

1.7.4 Local Level

Declaring a Climate and Biodiversity Emergency

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

National Adaptation Plan



1.7 Relationship with other key climate related plans/ strategies

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

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

1.8 Methodology

To develop this climate adaptation strategy a climate adaptation team was convened, representing all functions of Kildare County Council. A series of workshops and interdepartmental meetings were held to assess Kildare County Council's adaptation baseline and identify vulnerabilities and risks to projected climatic events. In developing this strategy, Kildare County Council's plans and policies- such as the Kildare County Development Plan 2017 - 2023, were assessed and climate change information resources, such as the Climate Ireland Website, were used to inform the development process.

The final draft was adopted by Kildare County Council on the 23rd September 2019 following a period of formal public consultation.

Consultation with prescribed environmental authorities for the purposes of Strategic Environmental Assessment was 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 - SEA/AA

Screening Overview for SEA: In accordance with 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 environment effects, and thus warrant SEA. This strategy has been screened for SEA and it is determined that full SEA is not required. The screening report accompanies this strategy.



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



2.1 Introduction

As there are many synergies, it is not possible to develop a Climate Action Adaptation Strategy without discussing measures pertaining to climate mitigation. Section 1.6 defines mitigation as the efforts made to reduce the severity of future climate change impacts by reducing the emission of greenhouse gases.

Kildare County Council has a key leadership role to play locally in terms of climate mitigation and the council's commitment to this role is reflected by its success in securing the role of Host County for the Eastern and Midlands Climate Action Regional Office. As previously outlined, **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.

2.2 Energy Reduction Targets

The Government of Ireland has committed to wider climate change goals, 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) has credited Kildare County Council 20% energy savings against its 2009 energy usage baseline.

2.3 Global Covenant of Mayors for Climate and Energy

As detailed in Chapter 1, Kildare County Council became a signatory of the Global Covenant of Mayors for Climate and Energy on 23rd September 2019. This will lead to enhanced cooperation and support for the council at regional, national and European levels and foster recognition and visibility of Kildare Co. Council's climate and energy action commitments.

Becoming a signatory also requires Kildare County Council to prepare a Sustainable Energy and Climate Action Plan (SECAP). This will complement the strategic goals and objectives of this strategy but will also set out targets for reducing dependency on fossil fuels and committing to sustainability in a range of areas, including:

- Reducing CO₂ (and possibly other greenhouse gas) emissions in the county by at least 40% by 2030, namely through improved energy efficiency and the greater use of renewable energy source.
- Increasing resilience by adapting to the impacts of climate change, as per the requirements of this Climate Action Adaptation Strategy.
- Sharing our vision, results, experience and know-how with fellow local and regional authorities within the EU and beyond through direct cooperation and peer-to-peer exchange, namely in the context of the Global Covenant of Mayors.

2.4 Climate Action Plan - 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.

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

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



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

- Reducing emissions by 30% and improve energy efficiency of local authority buildings by 50% under the guidance of a new Public Sector Decarbonisation Strategy.
- Setting a target to demonstrate leadership in the adoption of low emission transport options
- Developing and implementing a Climate Action Charter
- Public buildings (all) to reach BER 'B' Rating
- Building capacity through upskilling and knowledge dissemination
- Developing robust community engagement on climate action by linking to the existing and new networks and cluster initiatives using the National Dialogue on Climate Action and Local Authority Structures.
- Supporting and delivering projects that include strong ambition on climate action through funding resources from Project Ireland 2040
- 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.

The Climate Action Plan is notably focused on mitigation measures to achieve emission targets to 2030 and Local authorities will need to expand their role to take on actions and measures from the Climate Action Plan to respond to and meet obligations set out. The level of ambition within Kildare County Council over and beyond adaptation measures is all embracing of the mitigation measures prescribed by the Government of Ireland Climate Action Plan and this is reflected in the council's resolution to commit to the Covenant of Mayors.

2.5 Kildare County Council Mitigation Activities

The Council is corporately committed to mitigating the causes of climate change and to decreasing the organisations dependency on fossil fuels. This goal is defined in a number of strategic objectives, including 2.1 and 4.5, of the Kildare County Council Corporate Plan 2015 - 2019.

2.1 *To strive to minimise the impact on the environment from all of our activities through energy conservation and reduced carbon emissions.*

4.5 *Examine energy usage at all Local Authority facilities and work to minimise energy costs through enhanced conservation and the use of new technologies subject to availability and resources.*



Sustainable Energy Communities Group.

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

Through the Energy Management Team, a number of projects and community initiatives have been developed in order to reduce the dependency on fossil fuel energy generation across the county, including:

- Energy management schemes, including provision of LED lighting in public libraries, such as Maynooth and Leixlip.
- Energy management schemes in public sports centres such as K Leisure in Athy and Naas.
- The construction of solar photovoltaic banks on the roof of Aras Chill Dara.
- Working with local community groups to expand the number of Sustainable Energy Communities in collaboration the Sustainable Energy Authority of Ireland.

Mitigation in Action

Solar Photovoltaic Installation at Áras Chill Dara

In 2018 Kildare County Council completed a Solar Photovoltaic (PV) installation on the roof of Áras Chill Dara in Naas to increase its utilisation of renewable energy. The installation consisted of 272 PV panels and will generate over 60,000kWh's of electricity per year for the next 25 years.

The project was completed through the SEAI Community Grants Scheme and was 30% funded.

The PV panels cause no emissions to air, soil or water and their construction is 100% reversible after the lifetime of the project. The Solar Photovoltaic panels went live in early 2019 and will reduce Kildare County Council's consumption of non-renewable energy helping to meet its energy reduction targets.

Mitigation in Action

Sustainable Energy Communities

In September 2018 the first workshop for Sustainable Energy Communities within County Kildare was hosted in Áras Chill Dara in Naas. A sustainable Energy Community (SEC) is a community in which everyone works together to develop a sustainable energy system. They aim to be as energy efficient as possible, to use renewable energy where feasible and to develop decentralised energy supplies. The sustainable energy community can include all the different energy users including homes, community centres, sports clubs, businesses and churches.

The workshop was organised by Kildare County Council in conjunction with the Sustainable Energy Authority of Ireland (SEAI) who provide mentorship and expertise. The event was attended by seven different SECs from all around the County, five of whom are currently progressing, with support from Kildare the Council, to partner with SEAI.

There are many benefits to becoming an SEC, including to:

- Achieve financial and energy savings
- Enhance comfort and health from energy efficient buildings
- Boost local employment
- Build capacity and access funding

By becoming an SEC, there will be access to a range of supports from SEAI for energy projects.

An integrated community approach makes it possible to deliver much more than is possible at an individual level.

An SEC is a partnership approach between public, private and community sectors. Partnerships make it possible to share local resources, knowledge and experience. This enables long-term mutual benefits for all involved.

SECs contribute to national energy targets and in reducing society's environmental impact. It is the ambition to scale up the numbers of SECs across the county in line with the targets set out in the Climate Action Plan. Kildare County Council will facilitate this scale up.

Mitigation in Action – Case Study **LED lighting upgrade at Leixlip and Maynooth Libraries**

Energy efficiency upgrades were completed at Leixlip and Maynooth Libraries in 2018 that involved designing a new lighting layout and replacing all existing fluorescent and halogen lights with LEDs.

The upgrades in Leixlip library reduced energy consumption (from lights) by 63% with energy saving in the first year of just over €4,000 and providing a payback period of 2.92 years. It is projected an energy saving of approximately €49,000 will be achieved over the next 10 year period.

Upgrade work in Maynooth Library reduced energy consumption by 68% with energy savings in the first year of just over €2,400 with a payback period of 2.31 years. It is projected the upgrades will produce energy savings of approximately €29,000 over the next 10 year period.

In addition the Council is committed to further developing policies to promote cross sectoral sustainability in areas such as transport and housing by using the spatial planning process to encourage a modal shift towards sustainable transport and by piloting energy retrofitting schemes within local authority housing stock.





Vision

Kildare County Council will be a leader in climate change adaptation taking an holistic all of local authority approach by mainstreaming climate change considerations into its functions and services, thereby building preparedness, responsiveness and resilience into both its operations as well as in the communities in which it serves.

The vision and high level goals for climate adaptation are based on the priorities expressed by the climate adaptation team and are supported by the assessment of the key vulnerabilities and risk, experience, as well as best practices. The order of the goals does not reflect the order or priority or preference for the implementation of actions. It is acknowledged that adapting to climate change requires a flexible approach and this will be guided by continued learning and understanding of the impacts.

Climate adaptation is promoted through the implementation of actions set out under six high level goals (refer to Chapter 7). This focused approach seeks to work towards a strategic vision that envisions Kildare County Council as a strong leader to successfully deliver the many benefits of adaptation. The vision and six high level goals are underpinned by four guiding principles.





Mainstream Adaptation:

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

Building Resilience:

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

Guiding Principles

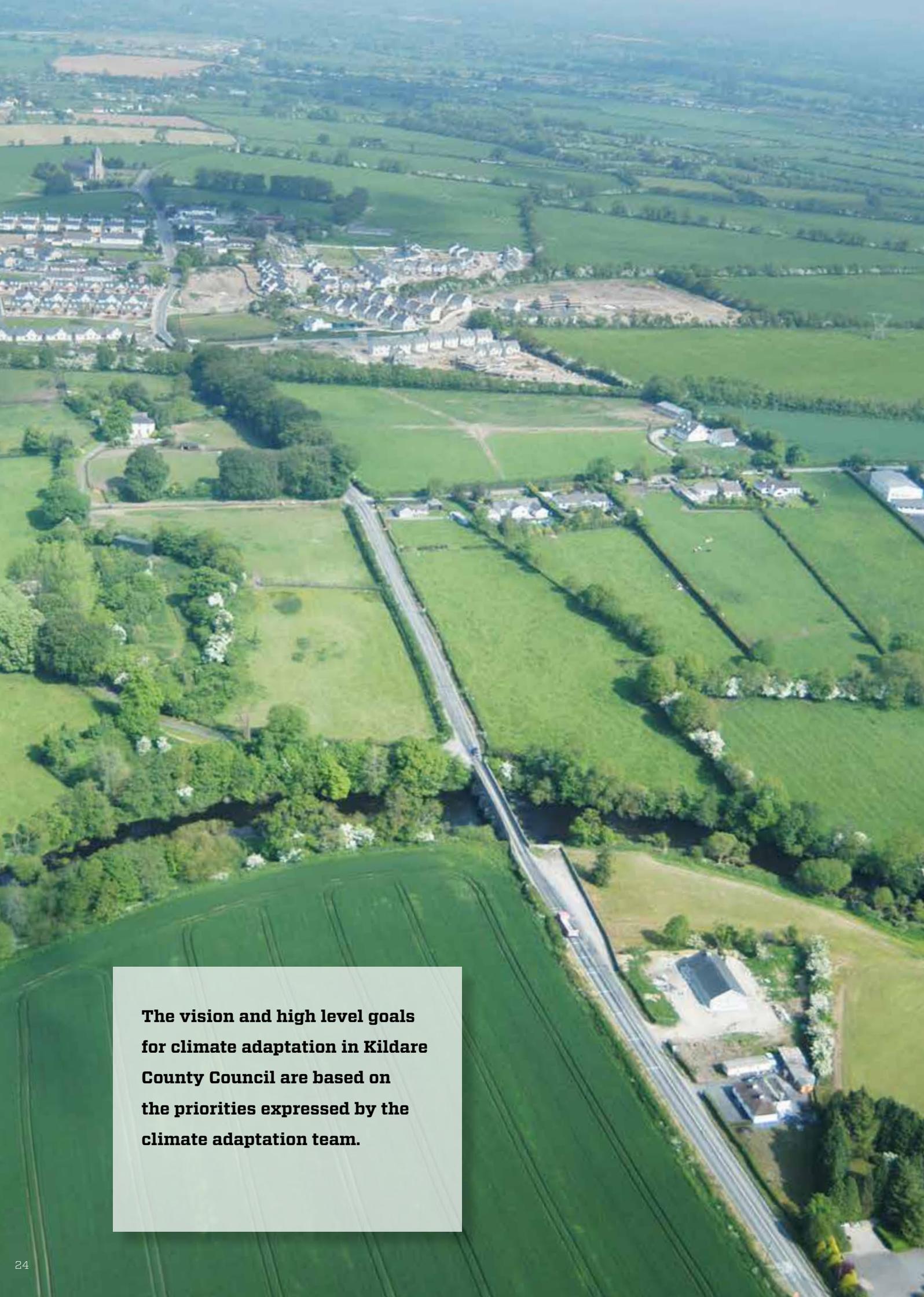
Informed decision making:

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

Capitalising on Opportunities:

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





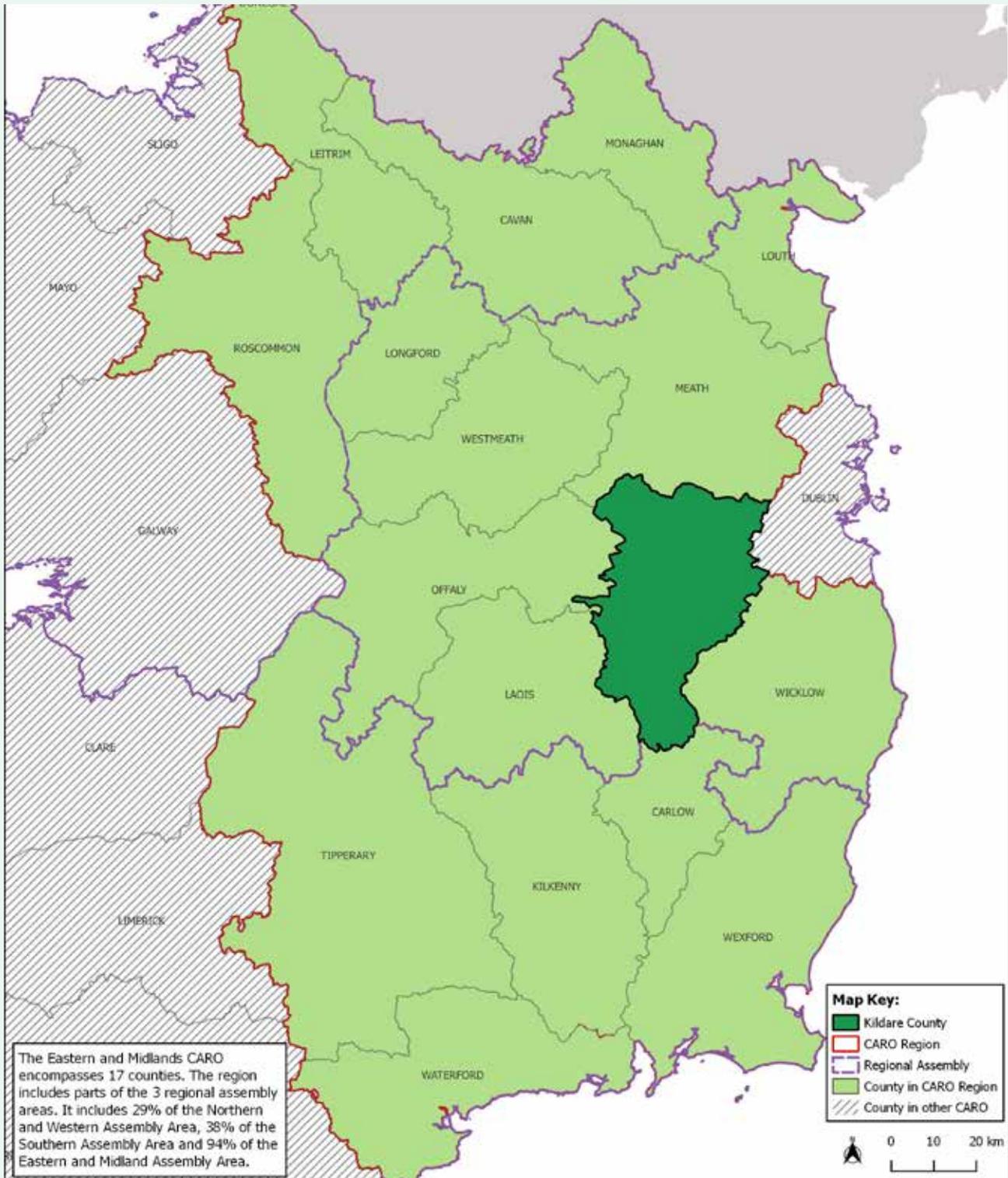
The vision and high level goals for climate adaptation in Kildare County Council are based on the priorities expressed by the climate adaptation team.



4.1 Eastern & Midlands Climate Action Region and County Kildare in context

County Kildare is centrally located within the Eastern & Midlands Climate Action Region and is one of 17 Local Authorities in the region.

The Eastern and Midland Climate Action Regional Office (CARO) has assisted and supported Kildare County Council in the development of this climate change adaptation strategy.





4.2 Background to the Eastern and Midlands Climate Action Regional Office

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

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

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



The four CARO regions and constituent local authorities are illustrated in Table 4.1 as follows:

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



4.3 Profile of the Eastern and Midlands Climate Action Region

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

The region with its extensive pattern of settlement areas and rural areas has a population of almost 1.8 million people accounting for 37.7% of the total population of the state⁶ and at 32,542 sq.km occupies 46.3% of the area of the state.⁷ The region plays a significant role economically to the country hosting a range of sectors inclusive of multinationals, public service, private and small-medium enterprises. Agriculture remains the prevailing sectoral landuse in the region.

There is a rich variety of landscapes and topographies across the region. A mostly flat low lying landscape sweeps through the midland counties. Significant areas of raised bogs occupy this central location in the country 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. 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, Meath, 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.



⁶ Total population of E&M Region is 1,796, 92

⁷ Total area of state is 70,282 sq.km

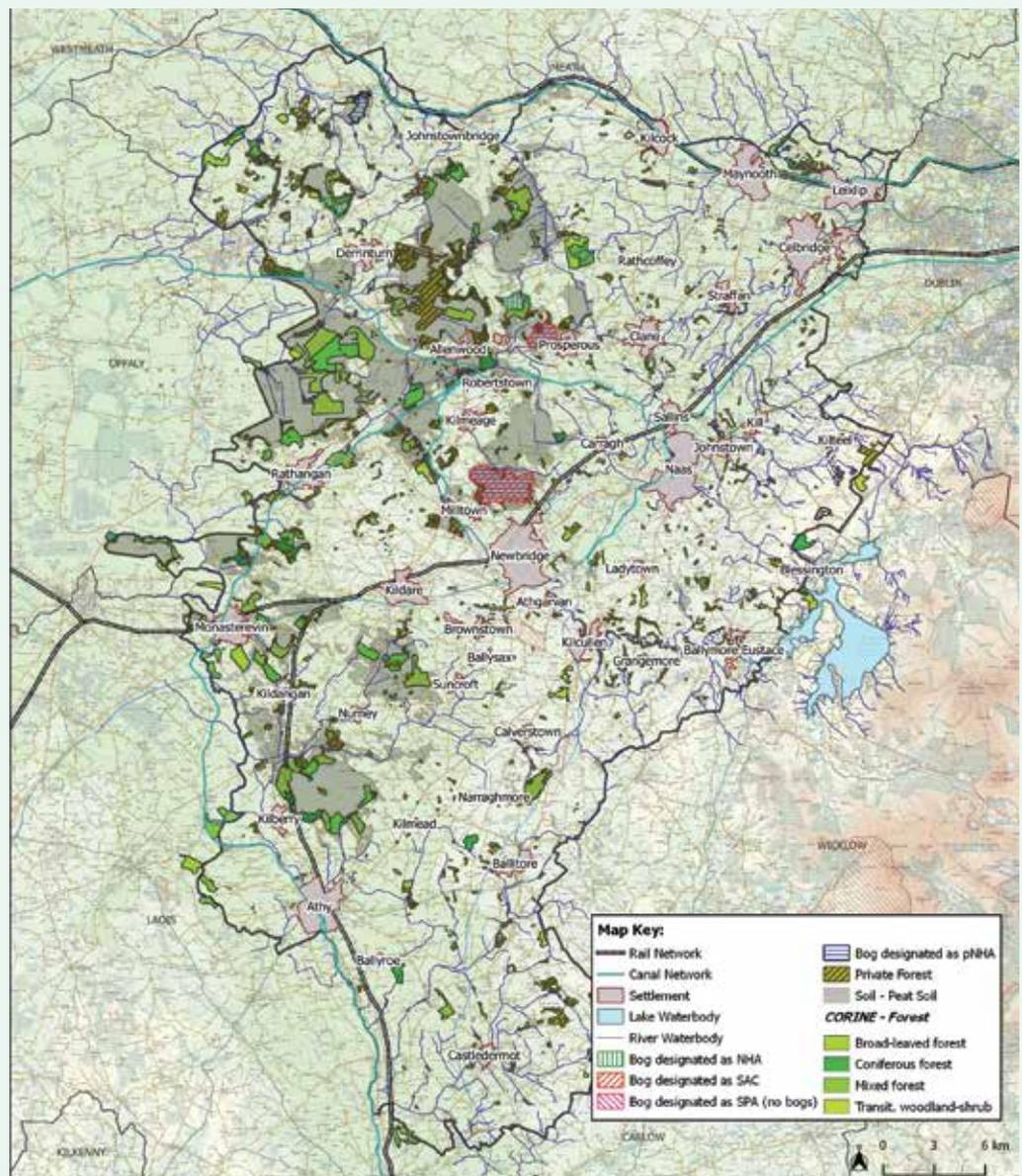


4.4 Kildare in profile

County Kildare with an area of 1695 sq.km is located in the mid-east of Ireland. Kildare is bordered by six counties, Dublin and Wicklow to the East, Meath to the North, Laois and Offaly to the West and Carlow to the South. The county is relatively flat in its topography save for a number of hills dispersed throughout with the highest points to the east at the foothills of the Wicklow Mountains. Large areas of forestry and bogland are widespread throughout the county with an estimated 32% of land in Kildare considered marginal. The Bog of Allen, the largest raised peat bog in Ireland covers over 950 square kilometres to the west of the county.

The population of Kildare at 222,504,⁸ ranks as the 5th highest population in the state at 4.7% of the total population. The population increased significantly by 64.8% in the twenty years between 1996 and 2016. Kildare also has the highest rate of young people ages 0-24 years in the State (81,517) which represents 36.6% of the county's population.

The settlement pattern in County Kildare shows that there are higher population densities in the metropolitan north east, as a result of employment opportunities in the Dublin region, and in and around the towns of Naas, Newbridge, Kildare, Athy, Kilcullen and Monasterevin. Newbridge, Naas, Celbridge, Leixlip and Maynooth all have populations of over 10,000 persons.



⁸ CSO 2016



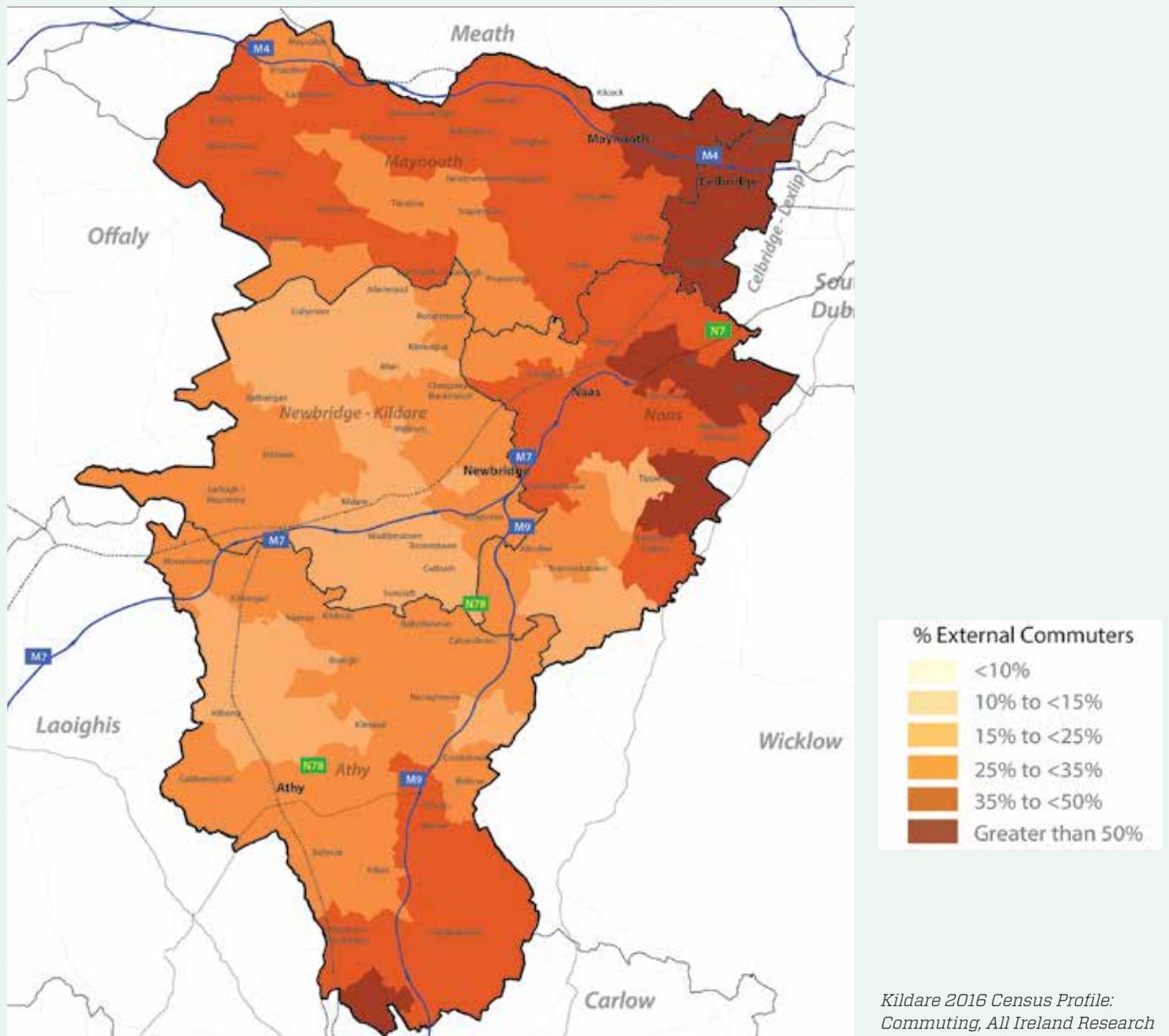
It has a significant housing stock with a total of 73,348 occupied households representing 4.3% of the state total. Over 89% of this housing stock is classified as conventional housing (house/bungalow). The housing stock owned and managed by Kildare County Council is just over 4,000 units.

County Kildare boasts an extensive transport network. This network is considered extremely important given the high number of commuters to the Dublin Metropolitan Region.

Three motorways including the M4, M7 and M9 traverse the county. Four mainline railway passenger services link Sligo, Cork/Limerick, Galway and Waterford to Dublin. The two suburban railway services include the Kildare to Heuston and the Maynooth to Connolly Services.

The county has approximately 2,528km of public road infrastructure including 128km of Motorway, 12km of National Primary Roads, 17km of National Secondary Roads, 82km of Regional Roads, and 1889km of Local Roads, the majority being local secondary roads.

% Workers Commuting Outside the County, 2016



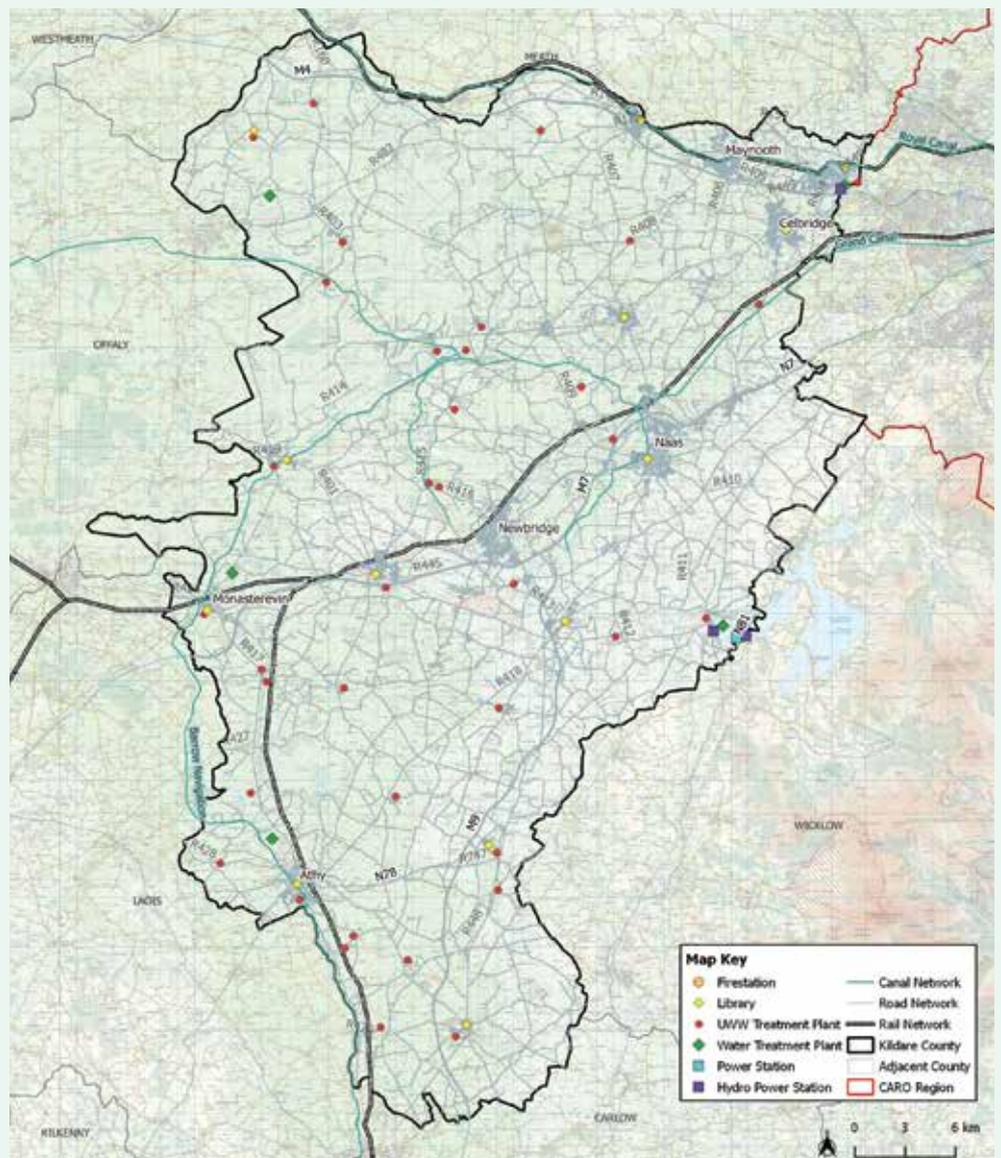


Among the notable rivers that flow through the county are three of Ireland's most prominent rivers including the River Liffey, River Barrow and River Boyne. While the catchments of rivers are mostly in rural areas there are a significant number of towns influenced by the river courses including Ballymore Eustace, Newbridge, Celbridge and Leixlip (River Liffey), Monasterevin and Athy (River Barrow), and Carbury (River Boyne). Other notable rivers in the county include the Rye Water, the Lyreen river (main tributary of the Rye Water) and the Morrell river which are tributaries of the River Liffey, and the rivers Greese, Slate, Finnelly and Tully (tributary of the Finnelly) flow into the River Barrow.

There are three main canals that run across the county's countryside making up over seventy miles of waterway. These include the Royal Canal, the Barrow Line, and sections of the Grand Canal running through the northern border of the county.

Enterprises / Jobs: Kildare has the highest rate of employment supported by foreign owned companies (through foreign direct investment) in the State. 15 enterprises in the county employ 13,792 people which accounts for 26.7% of the workforce.

It also has a strong rural economy with equine, agriculture, energy production and tourism featuring strongly. The equine industry, particularly the bloodstock sector, continues to be hugely important to the County's economy.





This assessment takes account of a range of climate hazards that have affected Kildare County Council in the past specifically in respect of local level vulnerability and the impacts and consequences for the delivery of services and functions across the county.



5.1 Introduction

Assessing the baseline provides for an understanding of how well adapted Kildare County Council is to current climate hazards which include extreme weather events and periods of climate variability. This process is a crucially important first step in developing an adaptation strategy that is relevant and responds specifically to the impacts of climate change experienced locally. This assessment takes account of a range of climate hazards that have affected Kildare County Council in the past specifically in respect of local level vulnerability and the impacts and consequences for the delivery of services and functions across the county.

While past and recent experiences of climate hazards may not entirely be representative of the longer term climate reality, it is a useful starting point in the assessment of impacts on local authority services which can further be examined in the context of the identification of future risk. Conducting this assessment will illustrate Kildare County Council's capacity to cope with existing extreme weather events and periods of climate variability and identify the resilience of key services.



5.2 Observed Climate Hazards

Warming of the climate is happening and it is extremely likely that man has been the main cause of global warming since the mid-20th century. Observations show that global average temperatures have increased by 0.85°C since 1850.⁹ The atmosphere and oceans are warming; sea levels are rising while there has also been a decline in snow and ice. The impacts can be seen on all continents.

A publication by The EPA entitled *Summary of the State of Knowledge on Climate Change Impacts for Ireland 2017*, advises that research at national level has shown that changes in Ireland's climate are in line with global trends. Even if greenhouse gas emissions fall to levels required to stop the worst impacts of climate change some changes are still likely to occur. This is because the climate system is slow to react and some changes are already locked in.

For Ireland, climate change impacts are expected to increase over the coming decades and could include the following:

- Sea level rise
- More intense storms and rainfall events
- Increased likelihood and magnitude of river and coastal flooding
- Water shortages in summer
- Increased risk of new pests and diseases
- Adverse impacts on water quality and
- Changes in distribution and phenology (the timing of lifecycle events) of plant and animal species on land and in the oceans.¹⁰



⁹ IPCC, 2013

¹⁰ Authors: Margaret Desmond, Phillip O'Brien and Frank McGovern



The following table, taken from the National Adaptation Framework highlights the main observations in Ireland's changing climate.

While Ireland has experienced colder than normal periods since 1900 there is an upwards trend in national temperature with higher temperatures experienced in the middle of the 20th century and from the 1980's to the present day. While an increase in average annual rainfall has been observed, precise changes in spatial patterns of precipitation cannot be determined with further research required. The mean annual sea surface temperature has increased by one degree compared to the long term average over the end of the 20th century. An increase in annual mean river flows has also been observed including mean flow increases for both the summer and winter periods.

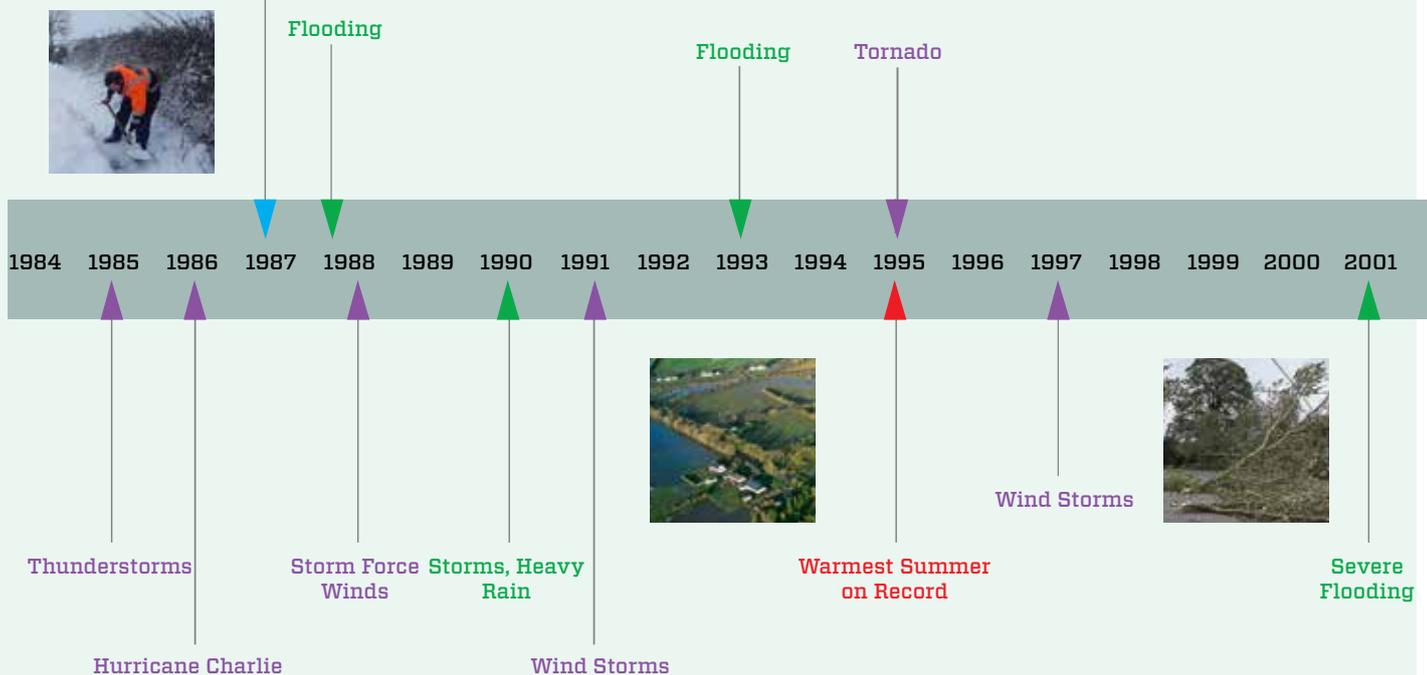


Heavy Snowfall

Table 5.1: Observed changes in Ireland's Climate

Parameter	Observed
 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.
 Precipitation	Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981- 2010, compared to the 30 year period 1961-1990. The largest increases are observed over the west of the country.
 Wind Speed and Storms	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.
 Sea Level and Surface Temperatures	Historically, sea level has not been measured with the necessary accuracy to determine sea level changes around Ireland. However, measurements from Newlyn, in southwest England, show a sea level rise of 1.7cm per decade since 1916. These measurements are considered to be representative of the situation to the South of Ireland. Sea Surface temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish Coastal records.

(Source: National Adaptation Framework 2018)





Severe Flooding



Coldest Winter for almost 50 years

Heavy Rains and Flooding

Severe Cold Spell

Wettest January in 20 years

Storm Darwin

Heavy Snowfall in many areas
Storm Emma



2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019



Warmest Summer on Record

Severe Flooding

Heavy Rainfall

Winter Storms

Driest Winter in 25 Years

Hurricane Ophelia

Heatwave & Drought



5.3 Kildare - Climate Hazards

The impacts of climate change experienced in County Kildare generally reflect the national pattern and trends of observed climate hazards. A review of extreme weather events in County Kildare over the past 35 years has been undertaken using published Met Éireann data,¹¹ along with relevant OPW Flood Risk Management Plans and some information from Kildare County Council. The timeline on the previous page highlights the range and frequency of major events to impact County Kildare.

The timeline visually represents the profile of climatic hazards that have been experienced in Kildare and have had both direct and indirect impacts on the delivery of services and the performance of functions across the Council. Table 5.2 identifies by category the extreme weather events having impacted the delivery of services and functions of the Council.

It is evident when assessing the climatic hazards there are four main climatic categories that are relevant to Kildare County Council. These include wind storms, extreme heat/drought events, extreme rainfall events and freezing conditions/snow events. Combination events, i.e. two extreme climatic events occurring simultaneously, are noted also. Such combination events give rise to more severe and destructive impacts.

¹¹ www.met.ie

While some events such as storm events can and are expected to bring with them extreme rainfall, other less usual combination events such as an extended dry period/heatwave followed quickly by an extreme rainfall event or a heavy snow event followed by heavy rainfall bring about new and significant impacts.

With all extreme events and particularly combination events, comes an understanding of the level of unpredictability. Nevertheless, knowledge and experience acquired from past events (including future cycles of OPW Flood Risk Management Plans) will benefit future planning and preparedness and a continuous review of extreme events will help build resilience and prevent the worst of risks.

The most prevalent climatic hazard relevant to Kildare County Council is extreme rainfall events, followed by wind storms, freezing/snow events and extreme heat/drought events. The impacts and consequences of these climatic events vary quite significantly in terms of impacts on service delivery. While extreme rainfall events represent the most prevalent climatic hazard for Kildare County Council, the impact on service delivery can be limited to just a small number of operational areas. Significant wind and snow events, although less prevalent, have proven to be more impactful on Kildare County Council with consequences including building closures and complete service disruption for days. The impacts and consequences of these extreme weather events are examined in further detail on the following pages.





Table 5.2 Climatic Hazards by category

EXTREME WEATHER EVENTS	DESCRIPTION
Extreme Rainfall 	<ul style="list-style-type: none">• Jan 2016. Wettest January on Record.• October 2011. Heavy rain and flooding approaching 1/100 year event.• November 2009. Severe flooding with rainfall totals highest on record.• August 2008. Heavy rain & flooding on back of a dry spell (combination event)• November 2002. Heavy rain and severe flooding.• November 2000. Heavy rain and severe flooding.• November 1993. Prolonged rainfall and severe flooding.• August 1986: Hurricane Charley: Heavy rainfall and severe flooding.
Wind Storms 	<ul style="list-style-type: none">• September 2018. Storm Ali gale force winds.• October 2017. Storm Ophelia RED level Wind Warning.• February 2014: Storm Darwin ORANGE level warning 1/20 year event• December 2013 - February 2014: Series of wind storms.• December 1997: Windstorm, strong winds.• August 1986: Hurricane Charley: Strong and damaging winds.
Freezing conditions/ Heavy Snow 	<ul style="list-style-type: none">• February /March 2018: Storm Emma (Beast from the East) blizzard, heavy snowfall, snowdrift. Significant disruption.• 28 Nov/13th Dec 2010: Extreme by duration cold/ice event• Winter 2009/2010: Dec, Jan, Feb: Coldest winter in 50 years• January 1987: Heavy snowfall.
Extreme heat/drought 	<ul style="list-style-type: none">• Summer 1995: Warmest Summer since 1955• Summer 2006: Warmest driest, sunniest summer since 1996 (exceeded 2018)• Summer 2018: High temperatures, heatwave and drought conditions.
Combination events 	<p>Some of the above events represent combination events, for example:</p> <ul style="list-style-type: none">• The heavy snowfall in February / March 2018 was a combination of a cold blast (beast from the East), moving across Ireland, from Eastern Europe and Storm Emma, moving Northeast from the Atlantic, up through the country.• Water scarcity in the summer 2018 was through a combination of a prolonged heatwave and a prolonged drought period occurring at the same time. Water scarcity lead to a hosepipe ban and other water conservation efforts in the greater Leinster region.



5.3.1 Extreme Weather impacts in County Kildare - Case Studies

Kildare has experienced some of the hottest summers on record in more recent times, including the summer of 1995, the hottest summer on record in 2006 and the summer of 2018, one of the hottest and driest periods ever recorded. The hot temperatures had an adverse impact on roads in Kildare with incidents of road bleeding and road subsidence in bog land areas. The hotter temperatures also dried out water sources, trees and soils resulting in reduced water availability, tree and building structure deterioration around the county. The hot temperatures also boosted the tourism sector in Kildare.

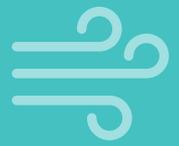


The summer of 2006, the winter of 2017 and the summer of 2018 brought drought / low rainfall conditions impacting water availability in the County including group water schemes in east Kildare with no water going to houses for several days. Tillage farmers and cereal growers had reduced crop output and farmers with livestock were not able to save enough fodder for the winter after the drought in the summer. Hosepipe bans were issued around the County. The Department of Agriculture issued an extreme fire risk for the County in the 2018 summer. Drought conditions also brought the opportunity to new archeological treasures to be revealed.



Heavy / Prolonged Rainfall events have resulted in flooding that has impacted the Local Authority and the people of Kildare. In 2002, localised flooding stretched the resources of the Area Offices, Emergency Department, Civil Defence and Army as they pumped water out of people's homes and rescued stranded motorists in the north of the County. Severe flooding in 2008 led to motorists getting stranded and houses being evacuated. Severe flooding in 2009 caused by the Rivers Barrow and Liffey bursting their banks at several places impacted Athy, Newbridge, Clane and Sallins. Clane nursing home had to be evacuated, residential areas in Sallins flooded and roads near Maynooth became impassible.





High Winds / Windstorms have caused numerous impacts in Kildare. In most recent times Storm Darwin in 2014 caused significant damage to housing and forestry, and led to issues around access to safe drinking water to many. Ex-hurricane Ophelia in 2017 caused tree fall on power lines throughout the county with homes and businesses in Johnstown, Kill, Straffan, The Curragh, and Milltown without power. Damaged roofs and storm debris increased the risk to the population of the county. One example involved a tree falling on a moving car in south Kildare. Disruption to travel was also experienced on train and bus routes with schools and colleges closing over the duration of weather events.



Storm Emma in 2018 led to widespread falls of heavy snow with North Kildare particularly affected. Snow drifts led to impassible roads, disruption to services including hospital services, water shortages and an increased threat of flooding if heavy rain followed.

The winter in 2009 brought the coldest winter experienced in 50 years leading increased demand on Area Offices to maintain water infrastructure and carry out increased road maintenance. Conditions led to dangerous driving conditions, increased water pipe damage and an adverse impact on biodiversity and native species.





5.4 Impacts of Climate Hazards on Kildare County Council

The Council is responsible for the delivery of a significant and wide range of services and functions across its administrative area. This table identifies the services and functions performed by the Council and the impacts from the associated climatic hazards.

Table 5.3 Impacts on service delivery

Services/Functions	Impacts and climatic hazards
Business Operations/Continuity	
<p>Business Efficiency, Effectiveness and Emergency Response</p>	<ul style="list-style-type: none"> • Building Closures – storm, snow, extreme rainfall. • Building damage, impacts on servers – storm events. • Electricity supply affected – storm events • Risks to staff welfare, public safety, local business and tourism assets – storm, snow, and rainfall events. • Increased risk of uncontrolled fires due to hotter, drier summers. Damage to forests, farmland, raised bogs and peatlands, diminish air quality causing threat to public health and safety and increased pressure on fire services.
<p>Business Operations</p>	<ul style="list-style-type: none"> • Capitalising on opportunities arising from addressing the impacts of climate hazards.
Infrastructure & Built Environment	
<p>Roads/Footpaths, Bridges, Project Construction and Maintenance</p>	<ul style="list-style-type: none"> • Changes in rates of deterioration - faster rate of deterioration in areas subject to flooding, sustained high temperatures, combination events. • Infrastructure collapse, significant damage – sustained duration and frequency of extreme events. • Blocked roads – storm, snow, and rainfall events • Impact on construction projects – all extreme weather events.
<p>Surface Water Drainage</p>	<ul style="list-style-type: none"> • Exceedance of drainage capacity – localised and larger scale flooding - rainfall, combination events. • Reduction in drainage capacity – rainfall events • Inflow/infiltration into wastewater networks – extreme rainfall event • Reduced pressure on surface water drainage systems - drought conditions
<p>Building Stock – LA Buildings and social housing stock</p>	<ul style="list-style-type: none"> • Damage and deterioration of housing stock – Storm, rainfall, snow and heatwave events (combination events) • Increased need for heat – extreme cold events • Closure of Local Authority buildings – storm, snow, rainfall events • Need for mechanical ventilation systems and cooling systems – heatwave events



Services/Functions	Impacts and climatic hazard
Flood defences Infrastructure	<ul style="list-style-type: none">Exceedance of existing flood defences - rainfall events
Community Infrastructure	<ul style="list-style-type: none">Deterioration of community infrastructure eg, playgrounds, public parks, swimming pools, public realm spaces - sustained extreme events.Impacts on recreation amenities and tourism activities - storm, rainfall, snow events.Reduced water for swimming pools, irrigation of open spaces, parks etc - drought conditions.Risk to public safety in times of high temperatures for unsecured lakes, water spots (quarries).
Cultural/Heritage	<ul style="list-style-type: none">Damage to cultural and heritage assets and cultural landscapes - storm and rainfall events.
Water and Sewerage Services	
Stormwater /sewerage	<ul style="list-style-type: none">Inundation of stormwater and sewerage infrastructure - rainfall events.Increased peak flows - rainfall eventsChanges in groundwater levels - drought conditionsChanges in floodplains - rainfall eventsReduced dry weather sewerage flowsReduced/unreliable power supply for pumping and treatment - storm eventsChanges in mean and peak stream and river flows - rainfall and drought events.Uncertain water availability - drought conditions.
Wastewater	<ul style="list-style-type: none">Inflow and infiltration to wastewater network - rainfall events.Interruption to anaerobic process - heatwave eventsInterruption to process - freezing events.
Water Supply	<ul style="list-style-type: none">Increase in water demand and reduction in receiving water assimilative capacities during drought conditions - drought eventsFlooding and inundation of wastewater treatment and water abstraction plants - rainfall eventsReduced availability of water supply sources during low rainfall and drought eventsLoss of power supply during intense storm eventsIncreased potential for water contamination - rainfall and drought eventsChanges in availability of groundwater - drought eventsQuality of water diminished - rainfall, drought, heatwave events.



Services/Functions

Impacts and climatic hazards

Water Quality

- Ground movement, in **high temps**, resulting in cracking of old wastewater pipe networks
- **Increased flooding** mobilising nutrient runoff from land/agricultural activities (slurry storage and land spreading) contaminating water courses.
- Changes in species distribution and phenology of river systems - **heatwaves, rainfall and cold events**.
- Low flows resulting in deterioration of water quality - **low rainfall/drought events**
- Soil Quality - impacted by both wet and dry conditions due to machinery working or livestock out on land in wet conditions causing poaching. Soil sediment run-off impacting water quality in river catchments.

Natural Resources and Flood Management

Biodiversity

- Shift in distribution of plant and animal species from heat and cold stress- **heatwaves and cold events**.
- Loss of biodiversity - **all sustained extreme weather events**.
- Increased risk of disturbance to population and species leading to extinction - **heatwave events**
- Reduced ecosystem resilience to stress - **all extreme weather events**
- Increased ecosystem and species heat stress - **heatwave events**.
- Increased bog fires - **heatwave and drought events**.

Weed/Pest Management - Area Offices

- Changes in rate of coverage and spatial distribution of non-native invasive species leading to loss of bio-diversity
- **change in average mean temperatures**

Landuse and Development Policy

Spatial Planning and Landuse

- Inappropriate location of urban expansion areas
- Increased uncertainty in long term landuse planning and infrastructure design, i.e. location of future developments; suitability of infrastructure designs to cope with impacts of weather events
- Loss of private property and community assets - **extreme rainfall events**.
- Early retirement of capital infrastructure - **all extreme weather events**

Community Health and Wellbeing

Community Development

- Increased isolation and disconnect of communities through inaccessibility - **rainfall, snow, heatwaves** (i.e. bog, gorse, commonage fires)
- Damage to properties, streetscapes and community assets - **storm and rainfall events**
- Contaminants to waterways and drinking water supplies - **rainfall (flooding)**.
- Pressure on drinking water supplies - **heatwave and extreme cold events**



5.5 Consequences

The impacts from climate hazards identified above experienced within the county, have varying and far reaching consequences for the delivery of services and functions both during and in the aftermath of extreme weather events and as a result of periods of climate variability. These consequences have seen widespread services disruption whereby all services and operations closed/ceased, for example, during Storm Ophelia, in 2017 and during and after Storm Emma in 2018. For other events such as heavy or prolonged rainfall events, or heatwave events, individual services and operations are put under increased pressure, i.e. Emergency Response, Area Offices, Roads Sections etc.

The level of disruption to Kildare County Council has been assessed at a very high level against broad categories set out in the Adaptation Strategy Guidelines of consequences level i.e.

Consequence	Level
Catastrophic	5
Major	4
Moderate	3
Minor	2
Negligible	1

The consequences identified for Kildare County Council are categorised in Table 5.4 below:

Consequences for Kildare County Council

Consequences for Kildare County Council	Category	Level
Service Delivery & Business Continuity: - stretching the resources of the local authority and its ability to respond to emergencies, provide services to customers and meet deadlines. Need for resources increased to deal with aftermath of extreme events and periods of climate variability.	Moderate	3

Critical infrastructure - blocking and damage to roads and damage to Local Authority owned buildings, social housing stock and other structures (including heritage structures). Increasing costs of maintenance and repair.	Minor	2
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Environmental and Natural Capital - degradation of the natural environment but identified early and possibly reversible. However, the range of impacts reduces the ability of the local authority to protect and conserve habitats.	Minor	2
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Economic Development - disruption to communities, business and local economies leading to reduced interest in settlement in more vulnerable areas and this then having a long term economic cost to the area.	Minor	2
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Health and Wellbeing - increased risk to public safety in terms of both increased risk to injury and health consequences, for example, from deficient water quality.	Minor	2
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5.6 Flood Risk Management

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

The OPW led extensive research and development of the Catchment Flood Risk Assessment and Management (CFRAM) Studies for the country in the last decade. The aim of these studies was to assess flood risk, through the identification of flood hazard areas and the associated impacts of flooding. The flood hazard areas have been identified as being potentially at risk from significant flooding, including areas that have experienced significant flooding in the past.



Importantly, they take account of issues such as climate change, land use practices and future development. These studies have been developed to meet the requirements of the EU Directive on the assessment and management of flood risks (the Floods Directive). The CFRAM Studies have produced Flood Risk Management Plans (FRMP) to manage flood risk within river catchments. Flood maps are one of the main outputs of the studies. The maps indicate modeled flood extents for flood events of a range of annual exceedance probabilities (AEP). The flood event maps and future scenario maps are a crucially important mechanism that will support and assist in planning appropriate adaptation strategies and measures for local authorities.

County Kildare falls within two CFRAM study areas, the Eastern CFRAM and the South Eastern CFRAM. Both were published in February 2018 and outline a series of proposed flood risk policy measures. These include regional policy measures and also identified specific measures for specific areas across the county including: Allenwood, Athy, Blessington, Castledermot, Celbridge, Clane, Hazelhatch, Johnstownbridge, Kilcock, Leixlip, Maynooth, Monasterevin, Naas, Newbridge, Rathangan, Suncroft and Turnings / Killeenmore.

Kildare County Council have committed to implementing any recommendations from the FRMPs and will work in conjunction with the OPW to deliver any proposed flood alleviation schemes that are deemed appropriate and viable particularly Tranche 1 flood protection scheme in Naas, Athy Leixlip, and Tranche 2 schemes in Clane, Maynooth, and Newbridge. All of these schemes have integrated climate change considerations.

The CARO in conjunction with the OPW and supervised by Maynooth University are funding research which will commence in Q4 2019 on the sensitivity of framework for small catchments. The aim of the research is to assess the sensitivity of fluvial flood peak flows to a changing climate. It is envisaged that the outputs from this work will assist the OPW and Local Authorities to plan for the impacts of changing rainfall (due to climate change), flood risk and flood management measures.

5.7 Opportunities

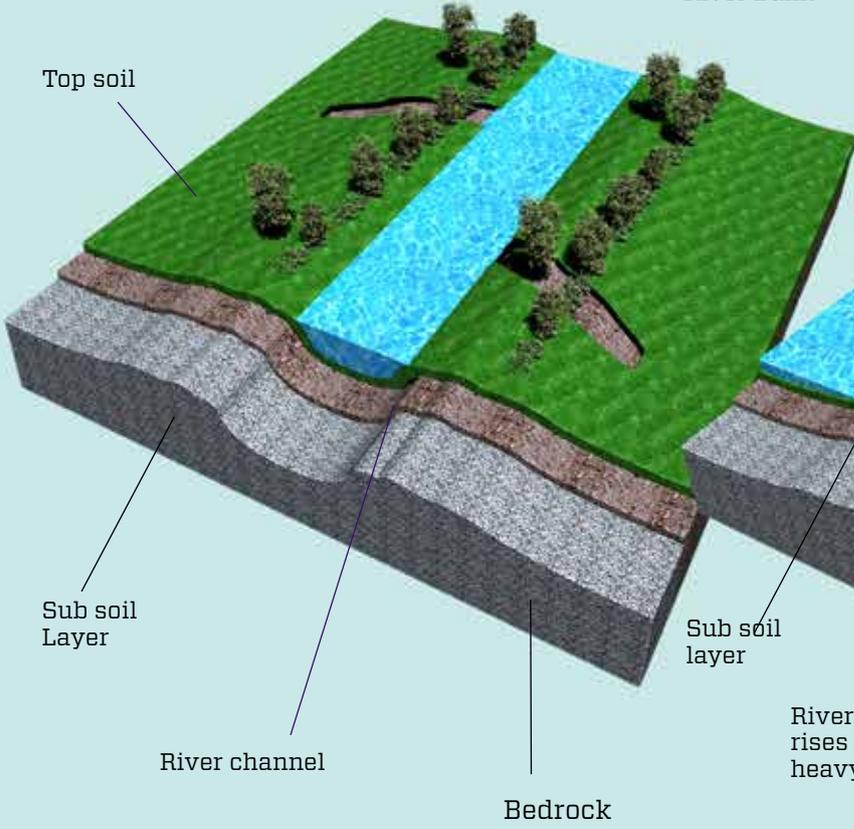
It is widely acknowledged that Climate Change Adaptation should not just be focused on impacts and consequences. **Opportunities** that can arise from a changing climate need to also be considered and where possible capitalised upon. These can include:

- The implementation of more cost effective and more efficient operating processes and materials more suitable to a warmer climate.
- The implementation of more energy efficient and cost sensitive solutions for living in a warmer climate.
- Improving the living environment in the County through quality of life, public realm improvements and enhancing the natural environment.
- Improving economic opportunities in local communities.
- Ensuring infrastructure and facilities are in place to take advantage of an expected increase in tourism.
- Ensuring land use development within the County can take advantage of a potential increase in foreign direct investment increasing local economy growth.

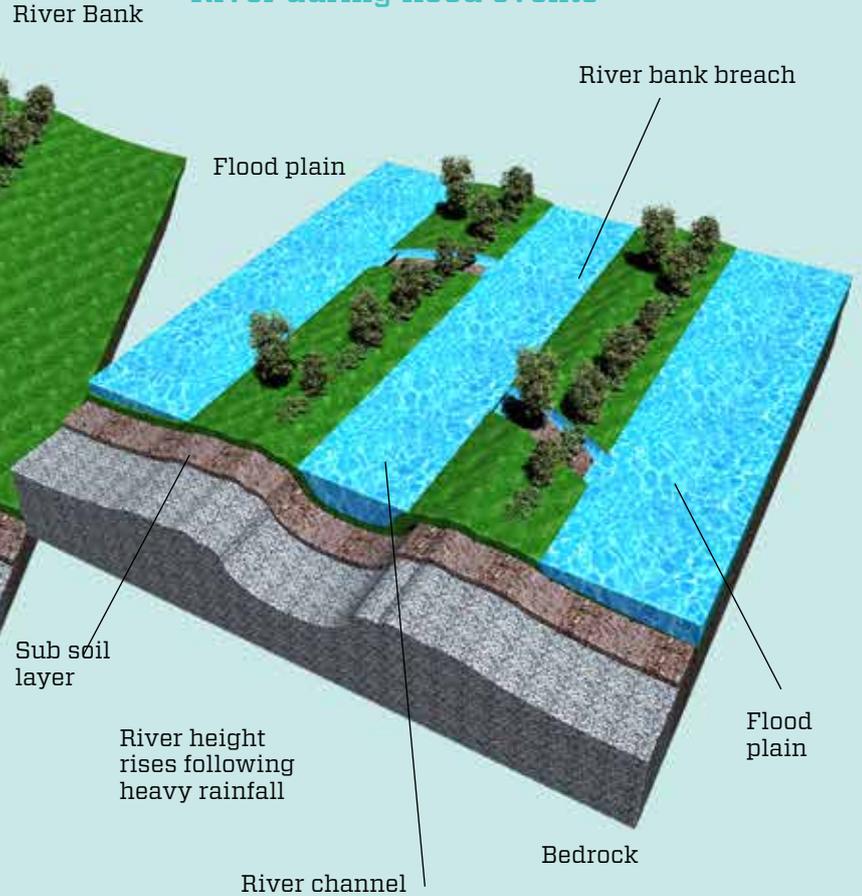
Flooding Adaptation

Note: this type of work is not carried out in isolation with downstream impacts taken into consideration before any implementation

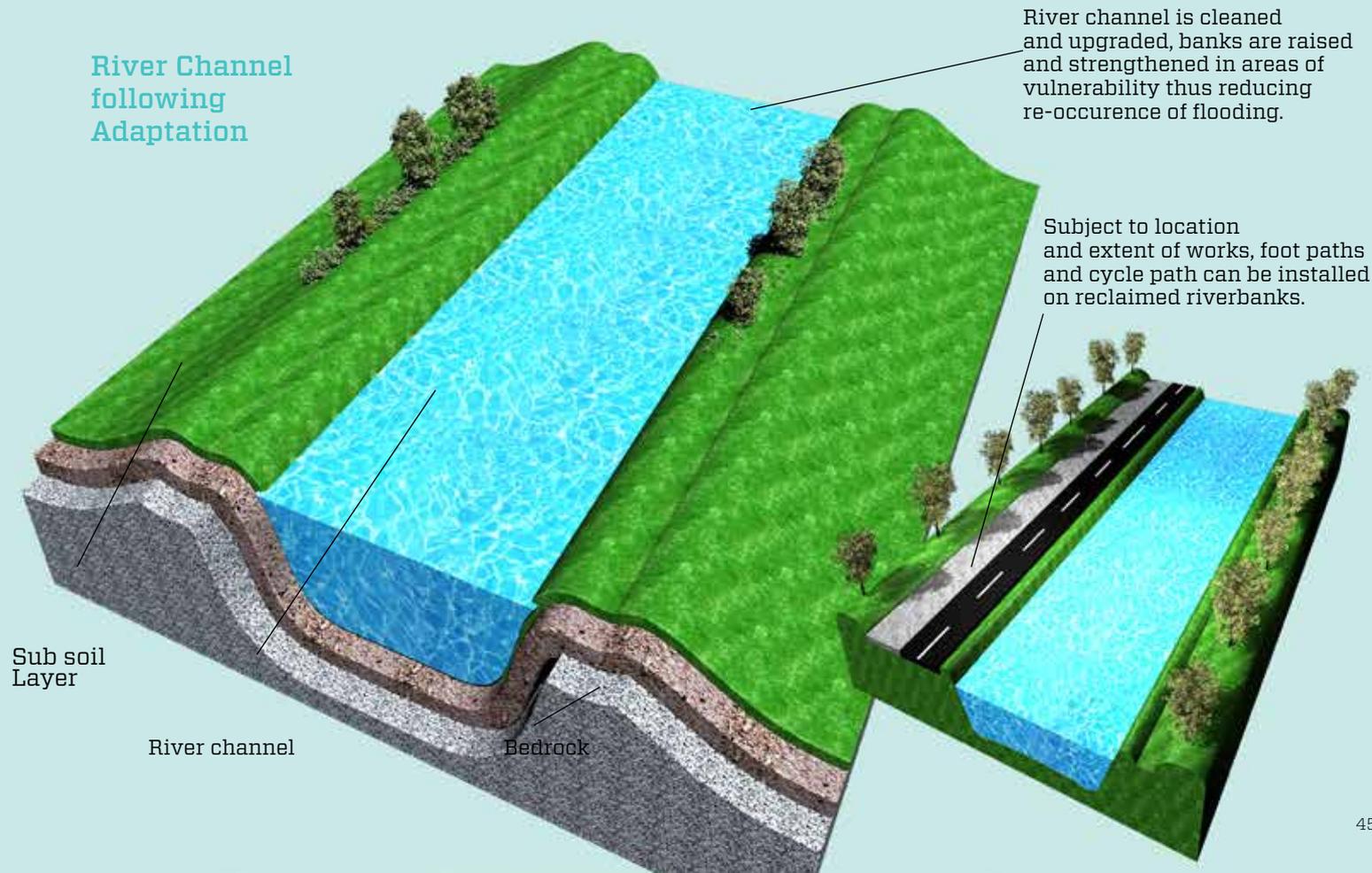
River prior to flood event



River during flood events



River Channel following Adaptation



Met Éireann Senior Climatologist Keith Lambkin setting up a mobile weather station at a Youth Climate Camp held at the Irish National Stud & Japanese Gardens during the Summer of 2019. The camp, which was supported by Kildare County Council, the EPA and M Qo, was a collaboration between a number of local groups including Kildare Tidy Towns, The Hive Youth Hub, the Irish National Stud & Japanese Gardens, Met Éireann and the Eastern & Midlands CARO.





6.1 Climate Risk Identification

Identifying the future risk to Kildare County Council of projected climate hazards is the next crucial step in the development of this Climate Change Adaptation Strategy. This process identifies potential future local level vulnerabilities, sensitivities and risks, based on the most up-to-date available climate projections. These projections describe a range of possible future climate scenarios from which potential impacts can be identified. It was important to consider the full range of events to ensure all potential risks are considered. Using the information attained in the previous assessment of the current baseline and considering future projections, a future risk analysis is carried out to identify potential future impacts and vulnerabilities to the council's services.

This process identifies potential future local level vulnerabilities and sensitivities of, and risks to, the local authority and is based on the most up-to-date available climate projections.

Climate change projections indicate that:

- Warming in Kildare will continue especially in the summer and winter
- Kildare will experience more extreme weather conditions including rainfall events and storms
- There will be an increased likelihood of fluvial flooding in the County
- Winters will be wetter and summers will be drier (which could lead to water shortages)
- These climate changes will impact the type, distribution and lifecycles of species

These projections signal significant challenges for the council, the county, and its citizens. Climate Change will have further effect on land use including agriculture, forestry and peatlands, on biodiversity, on water resources, human health, the economy and society. The following table highlights the key risks to operations and areas of influence identified during the development of this strategy.

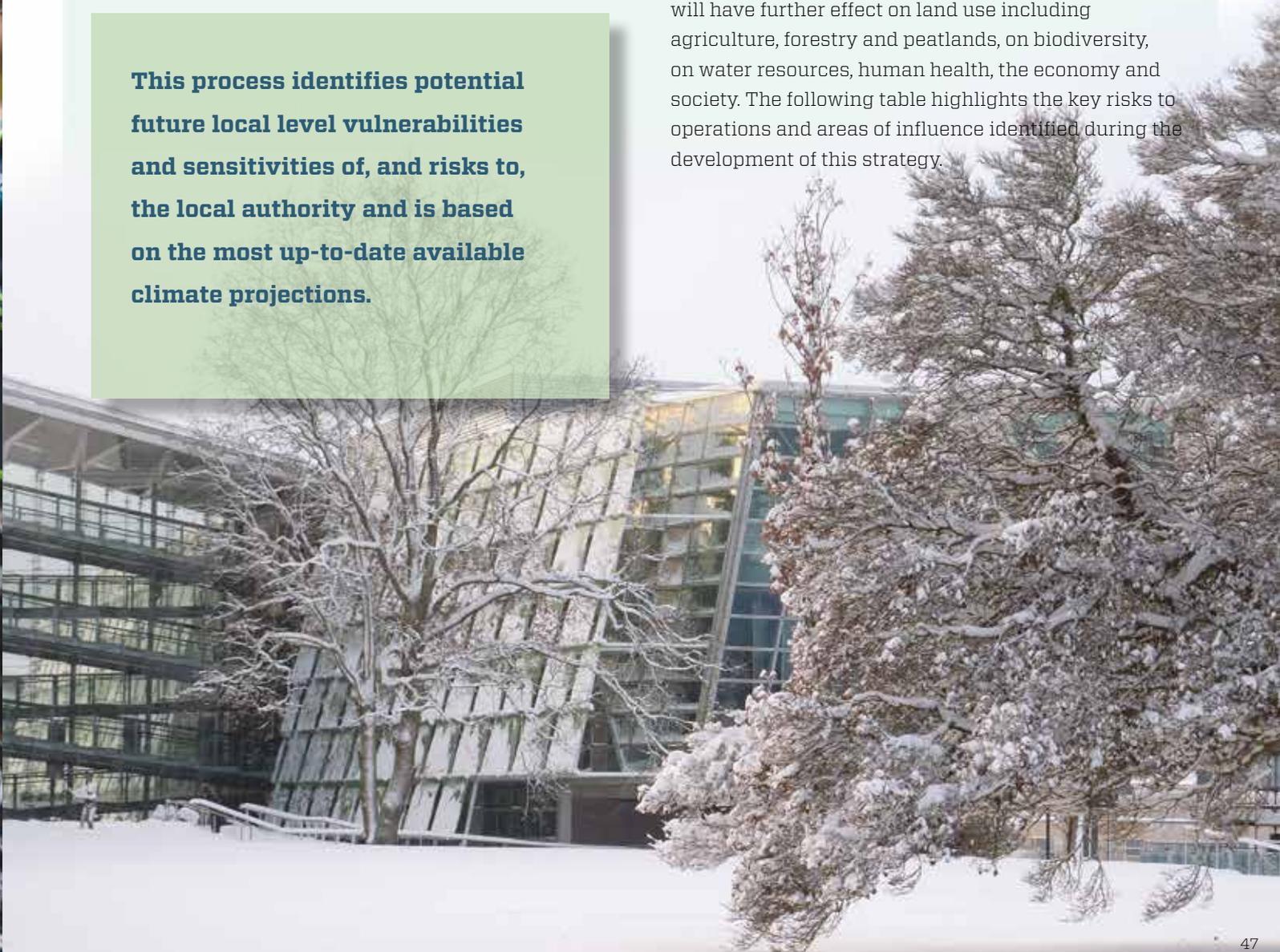




Table 6.1

Climatic Hazard	Impact area	Risk Statement
	LA Assets	More frequent and intense extreme events i.e. rainfall, wind and snow events will damage local authority buildings, housing stock, equipment and facilities (machinery yards, storage facilities etc) giving rise to increased costs for maintenance, repair and replacement and increased demand on staff resources.
	Business Operations & Continuity	More frequent and intense extreme events will see more closures impacting the local authority in performing normal daily tasks exercising statutory duties and organising events. This will interrupt work flows and efficiencies, disrupt scheduled events and increase staff costs in dealing with extreme events.
	Business Operations & Continuity	Increased frequency of flooding and inundation, storm and extreme cold events (snow) will give rise to general service disruption presenting difficulties for business continuity and the delivery of projects locally, as a consequence of staff being unable to travel to work.
	Business Operations & Continuity	Projected increases in storm intensity will see a higher risk of service disruption due to closure of local authority buildings, damage to local authority communications infrastructure, impact on road networks from debris and impact on utility networks e.g. electricity supply, directly impacting local authority's ability to operate.
	Critical Infrastructure Flood/ Water Management	Extreme rainfall events could affect critical infrastructure such as roads, water, sewerage, storm water, housing and communications, through flooding and inundation. Damage to critical infrastructure will impact the economic function of transport routes, will give rise to flooding impacts to properties and communities resulting in increased costs of clean up and maintenance, repair and insurance costs and a wider economic impact.
	Environment, Bio-diversity	Extreme rainfall events will give rise to flooding of habitats and wash nutrients and sediment into watercourses. This will result in changes to geomorphology and cause contamination of watercourses. Landscape may become more vulnerable, ecologically sensitive and may result in habitat loss.
	Environment, Bio-diversity	Heatwaves and/or sustained drought conditions will result in significant and serious degradation of the natural environment and biodiversity with loss to/of important species/habitats, impact on important landscapes and reduction in water quality.
	Community	Higher temperatures and more hot days could result in heat exhaustion and increased heat-related stress, with vulnerable people within communities increasing the need for emergency response. Remote communities are particularly vulnerable.



Climatic Hazard

Impact area

Risk Statement



**Infrastructure
Structural,
Community,
& Cultural**

More frequent, more intense weather events and combination events will undermine the integrity of critical infrastructure, community infrastructure and cultural assets giving rise to increased costs to repair, reinforce, or replace with potential for loss of these assets.



**Emergency
Services**

Higher temperatures and longer dry seasons will increase risk of bog, sand dune, gorse or forest fires in some areas, will impact on the integrity of road composition in these areas and water supply in such areas. This will impact on resources of the fire services,

**Environment
Infrastructure**

result in road closures, threat to public safety and potential local economic impact through loss of tourism potential.



**Infrastructure
Structural,
Community
Heritage**

More frequent and intense weather events and combination events will undermine the integrity of Community, Heritage and Cultural Infrastructure, giving rise to increased and significant costs of repair, reinforcement or replacement and possibly rendering assets unviable. *(Note: some assets of heritage or cultural significance, by their nature and historical importance, cannot be replaced).*



Bio-diversity

More climate extremes - changes in rainfall variability and increased frequency of heatwaves will impact on native species; encourage diseases,

Environment

weeds, pests and invasive species, which will need to be managed appropriately.



All Services

Failure by the local authority to plan for, respond effectively and appropriately adapt to the impacts of Climate Change will encourage a negative perception of ability and will impact the reputational status of the area (damage/loss of critical assets, degradation of the natural and historical environment, local economic impact, community abrasion).

An aerial photograph of a town in Ireland. A river flows through the center, with a railway line crossing it via a bridge. To the left of the river, there is a large, modern building complex with a curved facade. To the right, there are residential houses and a large green field. The foreground shows a green field with a herd of sheep.

The Government of Ireland has committed to wider climate change goals whereby one of these goals is to achieve a 50% energy efficiency improvement in all public sector buildings by the year 2030, as defined in the Climate Action Plan 2019.



7.1 Introduction

The information set out in the preceding chapters culminates to develop a better understanding of climate change impacts and their consequences for Kildare County Council. This chapter sets out the identification of a range of appropriate adaptation actions to enhance the capacity of both Kildare County Council and the wider community to address climate change impacts and work towards a greater level of climate resilience. The adaptation framework described further below sets out actions in a thematic format using identified objectives and high level goals to support Kildare County Council in achieving and realising climate resilience.

7.2 Adaptation Framework for Kildare County Council

The adaptation framework has been informed by an understanding of the vulnerabilities and the risks from the impacts of climate change. In recognition that adaptation responses require collective responsibility within the organisation to develop capacity and build resilience, the adaptation framework is designed with appropriate objectives and actions that encompass all services, functions and operations of Kildare County Council.

The adaptation framework is centred around six complementary high level goals. Each high level goal contains a suite of relevant actions directed by specific objectives, all working towards a clear Vision.

Vision

Kildare County Council will be a leader in climate change adaptation taking an holistic all of local authority approach by mainstreaming climate change considerations into its functions and services, thereby building preparedness, responsiveness and resilience into both its operations as well as in the communities in which it serves.





High level Goals

The six high level goals are presented as the longer term and ideal scenario for Kildare County Council.

The order of the goals does not reflect the order or priority or preference for the implementation of actions.

1 Local Adaptation Governance and Business Operations

Climate Change adaptation considerations are mainstreamed and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change

2 Infrastructure and Built Environment

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.

3 Landuse and Development

Sustainable policies and measures are devised and implemented to influence positive behavioural changes, support climate adaptation actions and endorse approaches for successful transition to a low carbon and climate resilient society.

4 Drainage and Flood Management

Great understanding of risks and consequences of flooding and successful management of a co-ordinated approach to drainage and flooding.

5 Natural Resources and Cultural Infrastructure

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.

6 Community Health and Wellbeing

Empowered and cohesive communities with strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level.

The six high level goals have been informed and developed with the support of a number of guiding principles, necessary to ensure an understanding of the role of adaptation and a considered and coherent approach to the impacts of climate change in the service delivery of the council:

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

Informed decision making:

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

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



Capitalising on Opportunities:

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

7.3 Role of Kildare County Council

Adaptation requires practical action to reduce vulnerability to the negative impacts of our changing climate and enhance opportunities and benefits. Adapting to climate change does not have to be an overly complex task. Within Kildare County Council, a significant number of adaptation actions are already advancing. The steps taken by this strategy helps to change the scale and focus of existing efforts being pursued to orientate towards a greater level of understanding of vulnerabilities and risks and to inform a considered approach to climate resilience.

The Council is well placed and mobilised to focus and drive local adaptation having influence in areas such as housing, transport, landuse planning, protection of natural and cultural environments, other infrastructure and community development as well as sustainable economic development. It has an obligation to manage resources as efficiently as possible in the interest of the local citizens, as not doing so will result in loss and damage to critical assets, increased costs and the uneconomic use of resources.

In terms of climate adaptation and as is represented through all actions of this strategy, Kildare County Council will champion and assume responsibility for:

- Ensuring the effective and efficient delivery of functions and services under changing climatic conditions to reduce risk and increase resilience.
- Integrating climate hazards and adaptation considerations into policies and decision-making processes.
- Responding effectively to emergency situations during or after extreme weather events.
- Managing climate risks to public assets owned or managed by the Council (on behalf or in partnership with other bodies/agencies).

- Translating and implementing national adaptation policy and cross-sectoral adaptation initiatives at local level, for eg, CFRAM programme.
- Ensuring access to up to date and relevant climate science and information to maintain an understanding of risks/vulnerabilities that the changing climate presents to local communities, local economic development and the natural environment and opportunities arising to support adaptation actions.
- Working with communities and local organisations to build resilience and adaptive capacity.
- Collaborating through partnerships with other agencies and government agencies to achieve effective climate adaptation for Kildare.

7.4 Adaptation Actions

There are 121 adaptation actions set out under the six high level goals. These actions which may involve a mixture of grey, green and soft measure cover all functional/operational areas of the council as well as actions translated from relevant sectoral adaptation strategies. Actions have been identified for all functional/operational areas of the council who have a role in their implementation and delivery.

7.5 Timeframes

The action framework as set out over the 6 High Level Goals provides for the implementation of actions within the timeframes of short, medium and long.

For clarity, these timeframes have been determined as

- Short 1-2 years
- Medium 3-4 Years
- Long 5+ years

Given their nature, some actions may be commenced within the lifetime of this strategy and continue beyond it.

¹² Ireland's Biodiversity Adaptation Strategy, Department of Culture, Heritage and the Gaeltacht



Integrating climate change considerations as a first step in its operations and activities will inform sustainable investment in the delivery of services across the county.

1 **Goal 1 Local Adaptation Governance and Business Operations**

Goal: Climate Change adaptation considerations are mainstreamed and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change

This Goal seeks to enable adaptation action by directing governance for the practical implementation of actions and thereafter mainstreaming climate change considerations into all activities and functions of the local authority. The Council is responsible for the delivery of a significant and broad range of services across its administrative area. Integrating climate risk into the relevant business operations of Kildare County Council will be extremely important in terms of

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

Integrating climate change considerations as a first step in its operations and activities will inform sustainable investment in the delivery of services, decision-making processes, informing business efficiencies, risk assessment processes, project design and management, as well as procurement processes.

To support the delivery of actions from this strategy, this goal specifically actions the establishment of an adaptation steering team. The purpose of this steering team is to progress and influence the uptake on climate change adaptation action across all operations and functions of Kildare County Council. This approach reflects a great understanding of collective responsibility and to work together across all functions of the local authority, to address the impacts of our changing climate and to monitor and report on progress.

The actions set out under this goal work to achieve five key objectives:

- **Support the successful and practical implementation of adaptation actions.**
- **Ensure that climate adaptation is mainstreamed into all activities and operations of the Council.**
- **Build resilience to support service delivery.**
- **Build capacity to respond effectively to extreme weather events.**
- **Identify and support opportunities that may arise from pursuing adaptation efforts through the functions of Kildare County Council.**



Goal 1 Local Adaptation Governance and Business Operations

Objective 1: To support the successful and practical implementation of adaptation actions

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	<p>Establish a Climate Action Steering Team with representatives from the key functions of the local authority, and Chair of Environmental Services and Water SPC, to:</p> <ul style="list-style-type: none"> • Ensure the successful implementation of the actions of this Climate Change Adaptation Strategy • Mobilise for the practical implementation of mitigation measures prescribed by Climate Action Plan and Covenant of Mayors • Set strategic direction and assist in policy formation • Report on progress • Encourage local innovation 	Management Team	✓	Short
2.	Ensure that Climate Action is listed as a standing item on the agenda of the Management Team meetings.	Management Team	✓	Short
3	Integrate Climate Action into the Service Delivery Programme and provide for its translation to Team Development Plans and Personal Development Plans, to enable actions to be directly pursued per operational area.	Management Team Line Managers Human Resources	✓	Short
4	Compile a list of local service indicators to be used to track and monitor the progress of adaptation actions.	Climate Action Steering Team Human Resources	✓	Short
5.	<p>Explore the potential of appointing a Climate Action Officer and strengthen other staff resources as considered appropriate with responsibility for climate related activity within the County administrative area. as prescribed by the requirements of the:</p> <ul style="list-style-type: none"> • Kildare Climate Change Adaptation Strategy • Global Covenant of Mayors • Climate Action Plan - to tackle Climate Breakdown • Any other national policy direction 	Management Team	x	Short
6.	Explore the potential for Kildare County Council to expand its service delivery to include Climate Action considerations with the scope to inform on local climate change issues, climate action measures, run awareness campaigns and manage funding for climate action projects.	Management Team Climate Action Steering Team	✓	Short - Long
7	Liaise, collaborate and work in partnership with the Eastern & Midlands CARO in the delivery of adaptation actions from this strategy.	Climate Action Steering Team Eastern & Midlands CARO	✓	Short - Long

Objective 1: To support the successful and practical implementation of adaptation actions

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
8.	Liaise, collaborate and work in partnership with the sectors identified in the NAF, subject to funding, in the delivery of the Government approved sectoral adaptation actions, where they relate and are relevant to the functions and activities of the council at local level/in local communities.	Climate Action Steering Team Eastern & Midlands CARO Government Sector (where relevant)	x	Short - Long
9.	Mainstream Climate Action as an integral consideration in the Corporate Plan objectives providing for all local authority activities and the delivery of functions and services across the administrative area.	Corporate Policy Group Management Team	✓	Short
10.	Support and encourage efforts currently being undertaken within the council to meet the energy reduction targets of 33% energy efficiency improvement by 2020 as set out in the Public Sector Energy Efficiency Strategy	Climate Action Steering Team Energy Team Roads Housing all Staff	✓	Short
11.	Become a signatory to the EU Covenant of Mayors for Climate & Energy, and commit voluntarily to a 40% reduction in the Council's greenhouse gas emissions by 2030 thus supporting the implementation of the EU 40% target for greenhouse gas-reduction target by 2030 and fostering a joint approach to tackling climate change through mitigation and adaptation measures.	Senior Management Team Elected Members Climate Action Steering Team	✓	Short - Long
12.	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.	Climate Action Steering Team Environmental Services Elected Members	x	Short- Long

Goal 1 Local Adaptation Governance and Business Operations

Objective 2: To ensure that climate adaptation is mainstreamed into all activities and operations.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
13.	The Climate Action Steering Team will be tasked with managing and overseeing the effective mainstreaming of Adaptation measures into all plans, programmes, strategies and policies* of Kildare County Council:	Climate Action Steering Team Management Team	✓	Short
(a)	Steering team to generate a list of all plans, strategies and policies developed and implemented by Kildare County Council including expected review/update timelines.			
(b)	Ensure and monitor integration of Climate Change considerations, thus providing for the practical implementation of adaptation measures and setting the framework for future potential climate action projects.			
(c)	Report to management team on progress.			
	*Such plans, programmes, strategies and policies include (but not confined to):			
	<ul style="list-style-type: none"> • Corporate Plan • County Development Plan • Biodiversity Plan • Heritage Plan • Severe Weather Plan • Roads Programme • Housing Strategy • Local Economic and Community Plan • Economic Strategy • Tourism Strategy • Others 			
14.	Take on a more robust role in promoting green procurement, in order for goods, services and works to support environmental and wider sustainable development objectives, to assist in balancing cost effectiveness and sustainable development, representing both short-term and long-term value for money.	Procurement Officer Budget Holders	✓	Short - Long
15.	Assess changing the title of the Environment Section, and the Environmental Services and Water SPC to include Climate Action and incorporating climate change on the agenda of the Environmental Services and Water SPC. This Adaptation Strategy to be reviewed annually by the SPC.	Management Team Environmental Services and Water SPC	✓	Short
16.	Ensure through the delivery of all services, functions and activities that there is more effective implementation of relevant regulations, policies, plans and strategies with a role in climate adaptation and environmental protection.	Climate Action Steering Team All Sections	✓	Short, Medium & Long Term

Objective 2: To ensure that climate adaptation is mainstreamed into all activities and operations.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
17.	Actively pursue and implement measures to ban single use items within the main offices and buildings of Kildare county council including libraries and expand also to Council managed or supported events.	Climate Action Steering Team Corporate Services All actions	✓	Short

Objective 3: To build resilience within Kildare County Council to support service delivery

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
18.	Review of Business Continuity Plan to identify and address specifically, the impacts associated with extreme weather events on all functions/services of the local authority and explore potential opportunities to increase resilience. This will involve: <ul style="list-style-type: none"> Preparing for critical services disruptions. Mitigating/minimising the impact of service disruption. 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. Assess impact of climate events on scheduled site visits and any impacts on deadlines and level of service provided. Assessment of staff working environments during high temperatures and review of potential ways to maintain comfortable working conditions. 	Business Continuity Team	✓	Short - Medium
19.	Assess Kildare County Council's vehicle policy and undertake vehicle suitability assessments regularly to ensure timely and necessary maintenance for effective operation in challenging conditions.	Management Team Health & Safety Machinery Yard Individual Departments Commercial Vehicle Roadworthy Testing	X	Short - Medium
20.	In context of Health and Safety (for staff and customers): <ul style="list-style-type: none"> Review Kildare County Council Health and Safety Statement to reflect climate related risks. Ensure risk statements are completed for job roles in each operational area taking into consideration the potential risks to workers from extreme weather events. Review operational plans for outdoor and indoor workers around times of climate events. Review the Lone Working policy integrating considerations of working climatic events. Review current health and safety practices for staff involved in clean-up activities after extreme events. Review Blue Light Policy with the aim of increasing resilience to extreme weather events. 	Health & Safety Management Team	✓	Short

Goal 1 Local Adaptation Governance and Business Operations

Objective 3: To build resilience within Kildare County Council to support service delivery

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
21	Actively pursue and implement measures to ban single use items within the main offices and buildings of Kildare county council including libraries and expand also to Council managed or supported events.	Severe Weather Assessment Team	✓	Short
22.	Assess back-up communication systems to ensure communication for emergency responders is maintained in the disruption to main communication system.	IT Severe Weather Assessment Team	✓	Short

Objective 4: To build capacity within Kildare County Council to respond effectively to extreme weather events.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
23.	Identify gaps in data or information from an assessment of previous experiences of dealing with severe weather events and explore ways and sources to maintain a high level of understanding of the risks and vulnerabilities of Kildare County Council in dealing with the future impacts of climate change.	Climate Action Steering Team	✓	Short, Medium & Long
24..	<p>Develop and manage a centralised repository for all information relating to climate hazards and events.</p> <p>Information supplied to this repository should include:</p> <ul style="list-style-type: none"> • Reports of incidents supported by maps/photographic evidence. • Estimates of costs incurred in remediation works. • No. of resources deployed during and post event • Description of impacts on service delivery • Funding recouped for remediation works • Recording of third party companies who have suitable plant in weather emergencies <p>This information is necessary to encourage an understanding of the impacts on the Council of severe weather events and will provide a shared resource to contribute to effective planning and decision making to reduce potential risks to the Local Authority and the communities. (Potential to use mechanisms within financial systems to calculate and allocate costs to keep more robust record of financial impact of severe weather events).</p>	Climate Action Steering Team	✓	Short- Medium

Goal 1 Local Adaptation Governance and Business Operations

Objective 4: To build capacity within Kildare County Council to respond effectively to extreme weather events.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
25.	<p>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:</p> <ul style="list-style-type: none"> Increased operational costs Increased maintenance costs Increased contractor and out-of hours costs Additional funding sought/received. 	<p>Severe Weather Assessment Team Climate Action Steering Team Director of Services Finance Senior Executive Engineer Line Manager</p>	✓	Short - Long
26.	<p>Make provision for a contingency in the budget of each service/operational area to ensure continued or improved capacity of service in face of the projected increase in climate event intensity.</p>	<p>Section Heads Head of Finance</p>	X	Short
27.	<p>Encourage and develop further inter agency and departmental collaboration to increase climate change resilience in County Kildare, providing for:</p> <ul style="list-style-type: none"> Emergency planning and coordination. Sharing expertise and experience around adaptation actions. Coordination around implementing adaptation actions. Liaison with the relevant Departments and Agencies regarding the implementation of actions set out in sectoral climate adaptation strategies. Cross boundary collaboration with adjoining Local Authorities. 	<p>Climate Action Steering Team Severe Weather Assessment Team</p>	✓	Short - Long
28.	<p>As part of the Local Authority Staff Climate Action Training Framework produced and organised by the CAROs, build expertise, capacity and increase knowledge base through relevant training programmes on Climate Change and its implications on the operations/functions of Kildare County Council.</p> <p>Training courses/modules/programmes may include:</p> <ul style="list-style-type: none"> Climate Change awareness training to staff, Elected Members and communities Invasive species awareness and management training Relevant safety training Staff training for outdoor staff in service delivery in flood situations 	<p>Human Resources</p>	✓	Short - Long

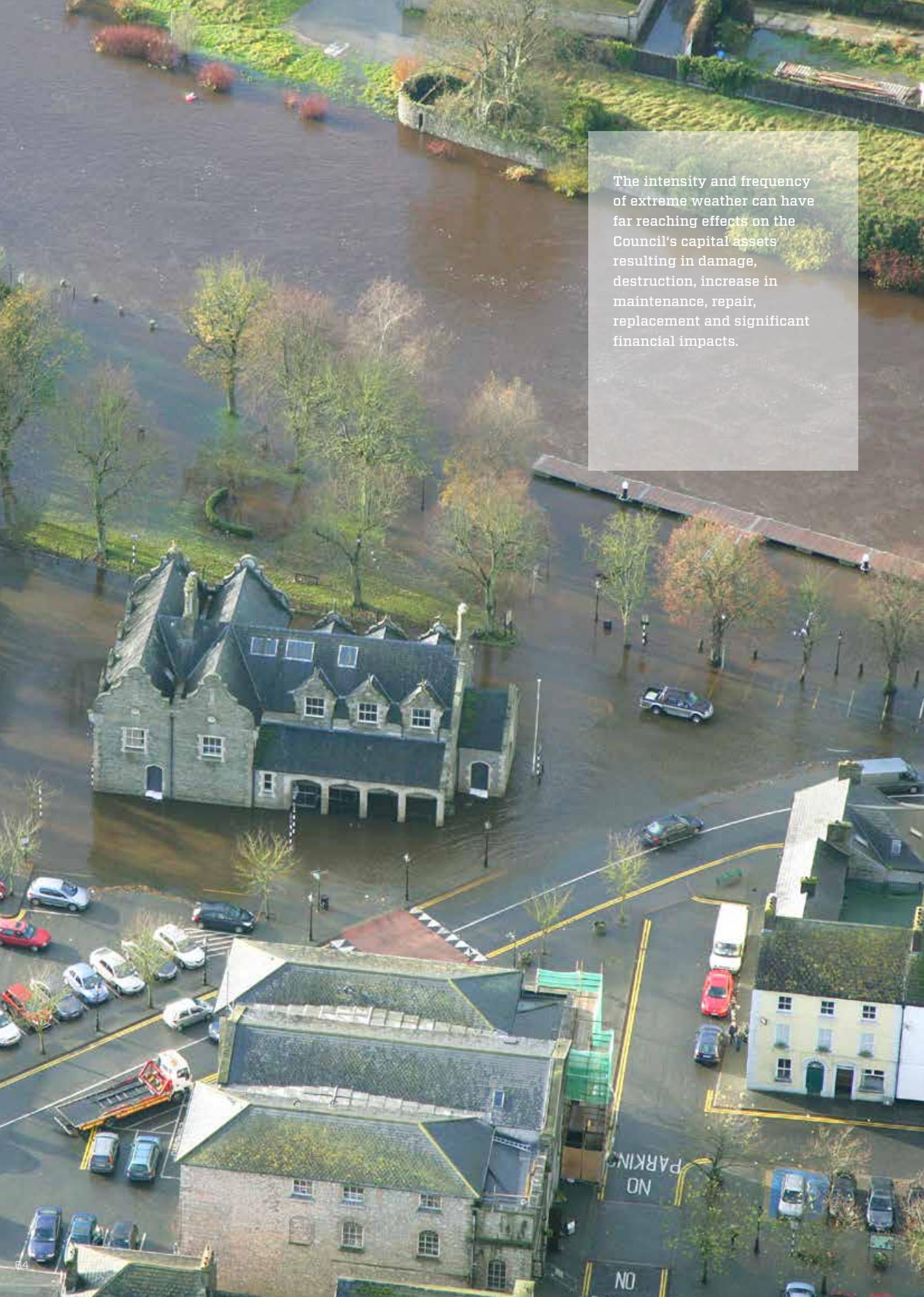
Goal 1 Local Adaptation Governance and business Operations

Objective 5: To identify and support opportunities that may arise from pursuing adaptation efforts through the functions of Kildare County Council.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
29	Identify, source and leverage funding streams for the active implementation of adaptation actions and measures across County Kildare with an emphasis on capitalising on opportunities that will contribute both environmentally and economically to the area.	Climate Action Steering Team Director of Services All Section Heads EMRA External Agencies & Government Departments	X	Short - Long
30.	Through the work of the LEO Kildare, support, encourage and nurture new ideas seeking to capture opportunities associated with environmental and technological advances that support low carbon transition.	LEO (Mid East Rep Manager) Other External Stakeholders	✓	Short - Long
31.	A) In line with Strategic Objective No. 4 of the Mid-East Regional Enterprise Plan to 2020, actively provide and contribute to existing and planned regional enterprise initiatives, up skilling programmes and other education and training programmes, to capitalise on up skilling and employment opportunities in the transition to a low carbon economy.	LEO (Regional Skills Forum / Rep Manager) SEAI Leader Environmental Education Groups	X	Medium
	B) Ensure climate related actions are included in future	LEO (Regional Skills Forum) DBEI DCCAE	X	Medium - Long
32.	In line with Strategic Objective No. 2 of the Mid-East Regional Enterprise Plan to 2020: <ul style="list-style-type: none"> Development of a clean tech hub in Kildare that will support environmental and technological economic opportunities. Encourage and promote projects 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. Support development of co-working hubs and work towards reducing the carbon footprint of local communities. 	LEO (Mid East Rep Manager) EECCD LEADER National Organic Training Skillset (NOTS) Local Authority Services National Training Group LASNTG Teagasc An Taisce	X	Medium to 2020

Goal 1 Local Adaptation Governance and Business Operations

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
33.	<p>Develop a Climate Change Awareness Plan / Campaign for business and start-ups to inform of climate action measures that can be integrated into business activities. This may include;</p> <ul style="list-style-type: none"> Information to business operators and start ups on building resilience to the impacts of climate change. Adding Climate Change considerations on agendas at conferences, training and awareness programmes. Marketing campaign identifying business supports and funding options to businesses seeking to become more resilient to climate change events. Organise a green business conference with SEAI creating awareness for business. Develop a pilot project to audit businesses on their energy efficiency. 	<p>LEO Enterprise and Economic Development Local Community Development Committee Enterprise Ireland Community and Cultural Development SEAI</p>	X	Medium - Long
34.	<p>Explore innovative ways of stimulating interest and creating awareness about climate change in the business community. For example: running a “Big Ideas” competition</p>	<p>LEO Enterprise and Economic Development Community and Cultural Development Enterprise Ireland SEAI</p>	X	Short - Medium
35.	<p>Work with the County Kildare LEADER Partnership to support and develop adaptation actions in communities economies and promote innovation at local level through climate action.</p>	<p>Climate Action Steering Team LEADER Partnership</p>	✓	Short - Long to benefit local



The intensity and frequency of extreme weather can have far reaching effects on the Council's capital assets resulting in damage, destruction, increase in maintenance, repair, replacement and significant financial impacts.

2 Goal 2 Infrastructure and Built Environment

Goal: Increased capacity for climate resilient structural infrastructure is centered around the effective management of climate risk, informed investment decisions and positive contribution towards a low carbon society.

Kildare County Council owns and maintains responsibility for a range of capital assets including:

- Property Assets i.e. local authority buildings, housing stock, libraries and community infrastructure, land banks, machinery yards and public realm assets.
- Infrastructural Assets i.e. roads, bridges, cycle ways and walkways.
- Vehicles (fleet), Plant and Machinery.
- Information Technology/Communications Hardware including masts.

The effective management of these assets and associated capital works programmes supports the delivery of services across all operations and functions of the council. The intensity and frequency of extreme weather can have far reaching effects on these capital assets resulting in damage, destruction, increase in maintenance, repair, replacement and significant financial impacts. It is crucially important that reasonable steps are taken to safeguard capital assets from the risks associated with the impacts of climate change. In terms of infrastructure and buildings it is acknowledged that:

“The implementation of early adaptation strategies in the infrastructural and property services responsibility of local government will ultimately decrease the risk of assets damage and failure in the future which would represent an economic and social cost to councils (UKCIP, 2001).¹³”

The actions set out under this goal seek to address the risks and vulnerabilities to capital assets of Kildare County Council and bring forward adaptation measures under three objectives, to:

- **Increase the resilience of roads and transport infrastructure.**
- **Increase the resilience of the Council’s buildings and housing stock.**
- **Increase the resilience of critical infrastructure.**

¹³ UKCIP, 2001, *Climate Change and the Built Environment Research Cora. Workshop Report*



Goal 2 Infrastructure and Built Environment

Objective 1: To increase the resilience of roads and transport infrastructure

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	Undertake a Risk Assessment of all road infrastructure to identify the severity of climate change risks function and condition. This risk should provide for an understanding and quantification of risks posed by extreme heat/drought, cold and rainfall events. The findings should be integrated into decision making processes, road infrastructure programmes, design and planning for new roads, project budgets and investment.	Roads Section DTTAS TII	✓	Short - Medium
2.	Review road infrastructure in the context of climate vulnerabilities to establish: <ul style="list-style-type: none"> The need to implement structural integrity assessments of infrastructure after extreme events. The need to collate a critical infrastructure inventory to aid works prioritisation. Infrastructure capacity limits and the impact of climate change events on road networks and alternative transport modes throughout the county. Road safety standards can be maintained at all times in face of projected climate event hazards including: <ul style="list-style-type: none"> Cyclist and walker safety Building awareness on driving in adverse conditions best practice The need for clean-up and route clearing operations after major weather events and increase efficiencies where required. 	Roads Section Municipal District Offices	✓	Short
3.	Integrate climate considerations into the design, planning and construction of all roads, footpaths, bridges, public realm and other construction projects and make provision to incorporate green infrastructure as a mechanism for carbon offset within projects as well as for wider environmental benefits such as providing shade to alleviate heat stress, supporting urban bio-diversity, water retention and flood alleviation.	Planning Section Roads Sections Architectural Services	✓	Medium
4.	Record and document severe weather events and impact on road infrastructure as a baseline approach to future planning. Represent the information visually through GIS mapping (potential app for wider use) to help identify future diversionary routes and quickly mobilise action and a prepared response.	Roads Section TII	X	Medium

Goal 2 Infrastructure and Built Environment

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
5.	<p>Explore ways to reduce the expected increase in maintenance requirements and costs to road infrastructure from climate stress:</p> <ul style="list-style-type: none"> Integrating climate change considerations at design / potential re-design stages. Explore the climate resilience of materials used in road construction and road finish. Examine drainage channel and combined service overflows design, capacity and maintenance. Examine options to reduce road settlement deterioration occurring from severe weather events. Assessment of clearing and maintenance plans with the aim to become more proactive in reducing costs. Ensure that road maintenance services have the required plant to deliver appropriate services during severe weather events. Explore implementing a cost benefit approach to balance the cost of planned improvements in road networks and increased maintenance resources against the cost of the suspension of the road network. 	<p>Roads Section DTTAS TII</p>	✓	Short - Medium

Objective 2: To increase the resilience of the Council's buildings and housing stock

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
6.	<p>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.</p>	<p>Housing Section Facilities Manager Architectural Services (Housing)</p>	X	Short
7.	<p>Increase the resilience of Kildare County Council buildings, housing stock and infrastructure through:</p> <ul style="list-style-type: none"> Identifying and assessing the integrity of old and derelict buildings in the context of extreme weather events and threat to public safety and take measures to reduce. Examine the need to regularly assess buildings owned or occupied by Kildare County Council after extreme events to ensure structural integrity, including: <ul style="list-style-type: none"> Roof, windows (including frames and hinges) and timber fencing. Explore the need to assess and identify the integrity of buildings, structures or surrounding trees that could be affected by soil instability. Assess vulnerability of housing stock to potential flooding damage including identifying stock currently in flood plains. Consider a one off condition survey of all building stock to be undertaken to assess vulnerabilities to current and projected events. 	<p>Environment Section Facilities Manager Architectural Services Housing Section</p>	X	Short - Medium

Goal 2 Infrastructure and Built Environment

Objective 2: To increase the resilience of the Council's buildings and housing stock

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
8	Explore building design options that promote natural cooling, thus reducing the need for expensive air conditioning in Council Buildings.	Facilities Manager	X	Short - Medium
9.	<p>Review ways to improve building and maintenance plans/standards to reduce the impacts of climate change on occupants. This is to include:</p> <ul style="list-style-type: none"> • Exploring the need and benefit of updating or installing new technologies in new builds and when retrofitting, including: <ul style="list-style-type: none"> - Energy efficient technology. - Water harvesting systems. - Plumbing technology. - Cooling systems. • Assessing the need to increase repair standards and maintenance frequency to combat the expected increase in structural deterioration during extreme events and expected plant growth during growing season. • Establish an asset management structure for all KCC stock. 	Housing Section Architectural Office SEAI	X	Short - Long
10.	<p>Increase awareness of housing stock tenants to potential impacts from climate change events and how best to look after their home to avoid or reduce impacts. This is to include updating the tenant's handbook and the online communication and social media plan to provide the necessary climate change resilience information. Detailed induction of tenants when new properties are awarded - particularly where active technology is incorporated in the house design.</p>	Housing Section	✓	Short
11.	Provide training and information to tenants to address fuel/energy poverty issues, minimise carbon emissions, improve air quality and improve health of residents.	Housing Section	✓	Short

Goal 2 Infrastructure and Built Environment

Objective 3: To increase the resilience of critical infrastructure

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
12.	<p>Develop a communication infrastructure maintenance plan that consider a range of potential climate change risks, and their impact on works to be carried out on IT infrastructure, to include:</p> <ul style="list-style-type: none">• Assessment of access points to remotely located IT infrastructure to ensure staff can have safe access to complete any repairs.• All potential risks are identified and eliminated or minimized increasing resilience.• An operational plan provided and communicated to all relevant workers carrying out these repairs.	IT Section	✓	Short
13.	<p>Assess Kildare County Council's communication infrastructure for vulnerabilities to climate change impacts.</p>	IT Section	✓	Short



3 Goal 3 Land use and Development

Goal: Sustainable policies and measures are devised and implemented to influence positive behavioural changes, support climate adaptation actions and endorse approaches for successful transition to a low carbon and climate resilient society

Climate change has the potential to undermine sustainable development. Implementing adaptation measures through land use and development policies is an effective way to influence urban form, reduce the pressure on natural resources, improve environmental risk management, and influence positive behaviour. This goal represents both the challenges as well as opportunities of climate change adaptation and the need to balance and manage the development of areas against the risks and vulnerabilities associated with the impacts of climate change.

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

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

...Effective planning reduces vulnerability to the negative effects of climate change by integrating climate considerations into decision making in order to avoid inappropriate forms of development in vulnerable areas and promoting compact development in less vulnerable areas".¹⁴

Both the National Planning Framework (NPF) and the Regional Spatial and Economic Strategy (EMRA RSES), underpin the national ambition for the transition to a low carbon and climate resilient society, aiming to promote sustainable transport, green infrastructure, a clean and healthy environment and accelerate climate action.

The actions in this adaptation strategy seek to work with and inform the strategic objectives, policies and development standards of the County Development Plan, in line with the provisions of the NPF and the RSES. It is acknowledged that the planning process provides an established means through which climate change adaptation objectives and actions can be integrated and implemented at community level. Landuse and Development actions are set out under three objectives which seek to:

- **Integrate climate action considerations into land use planning policy.**
- **Explore policies to help the transition to a climate resilient low carbon society.**
- **Promote and maximize the most efficient and sustainable use of land.**

¹⁴ *Built Environment and Spatial Planning, Chapter 3, NAF, 2018.*



Goal 3 Landuse and Development

Objective 1: To Integrate climate action considerations into landuse planning policy

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	Identify and integrate climate change as a critical consideration, guiding principle and / or strategic objective informing the Kildare County Development Plan.	Planning Section	✓	Short
2.	<p>During the Review of the Kildare County Development Plan 2017 - 2023, examine and tailor planning policies to reduce the vulnerability of Co. Kildare to the impacts of climate change, for example by:</p> <ul style="list-style-type: none"> • Enhancing the role of the natural environment to promote climate adaptation through promoting green infrastructure (including bogs and peatland areas). • Continue to take a stringent risk-based approach to developing in areas at risk of flooding. • Designing urban areas or developing criteria to incorporate shading/cooling areas and water features into urban design to provide for urban heat reduction. • Undergrounding of services where justified. • Promote energy efficiency in buildings and climate resilient materials and finishes. • Invasive species management. • Invasive species management. • Promote green roofs • Use of rainwater harvesting for grey water use in drought conditions. • Measures for Carbon Sequestration within the natural environment including bogs and peatland areas and recognise the importance of peatland areas for their significant contribution to climate action 	<p>Planning Section All Sections and External Stakeholders</p>	✓	Short
3.	Integrate and promote climate-smart building and urban design performance outcomes in terms of policy and development standards through the development management process.	Planning Section	✓	Short - Long
4.	<p>Continue to promote the integrated planning, design and delivery of green infrastructure (including urban greening) through appropriate provisions in:</p> <ul style="list-style-type: none"> • Planning policies of development plans. • Development standards and conditions on planning permissions. • Infrastructural, public realm and community projects. 	<p>Planning Section EMRA</p>	✓	Short - Long

Goal 3 Landuse and Development

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
5.	<p>In the review of the Kildare County Development Plan, research and incorporate (after consultation with organisations who provide best practice), mitigation measures in accordance with section 10 (n) of the Planning and Development Acts 2000 (as amended) for:</p> <p><i>(n) the promotion of sustainable settlement and transportation strategies in urban and rural areas including the promotion of measures to—</i></p> <p><i>(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,</i></p> <p><i>(ii) reduce anthropogenic greenhouse gas emissions, and</i></p> <p><i>(iii) address the necessity of adaptation to climate change; in particular, having regard to location, layout and design of new development;</i></p>	<p>Planning Section External Stakeholders</p>	✓	Short

Objective 2: To explore policies to help the transition to a climate resilient low carbon society

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
6.	Continue to promote the planning of new urban areas to integrate landuse and transportation to reduce reliance on cars.	<p>Planning Section Road Section</p>	✓	Short - Long
7.	Examine and pursue projects that seek to work towards the key objectives of the National Mitigation Plan and actions of the Climate Action Plan to decarbonise electricity, promote sustainable landuses and reduce energy consumption.	<p>Climate Action Steering Team</p>	X	Short - Long
8.	Continue to promote Sustainable Mobility across County Kildare as an alternative way of travelling and to maintain healthy and active communities. Encourage the use of Greenway / Blueway routes and other amenity trails.	<p>Planning Section Roads Section Kildare Sports Partnership Community Section</p>	✓	Short - Long
9.	<p>Encourage policy to support and develop the rollout of Electric Vehicle (EV) charging infrastructure on:</p> <ul style="list-style-type: none"> Sites owned and occupied by Kildare County Council Private sites through supportive policies and control standards of the County Development Plan. 	<p>Climate Action Steering Team Facilities Manager Kildare Energy Team Planning Section Transport Section</p>	X	Short - Medium

Goal 3 Landuse and Development

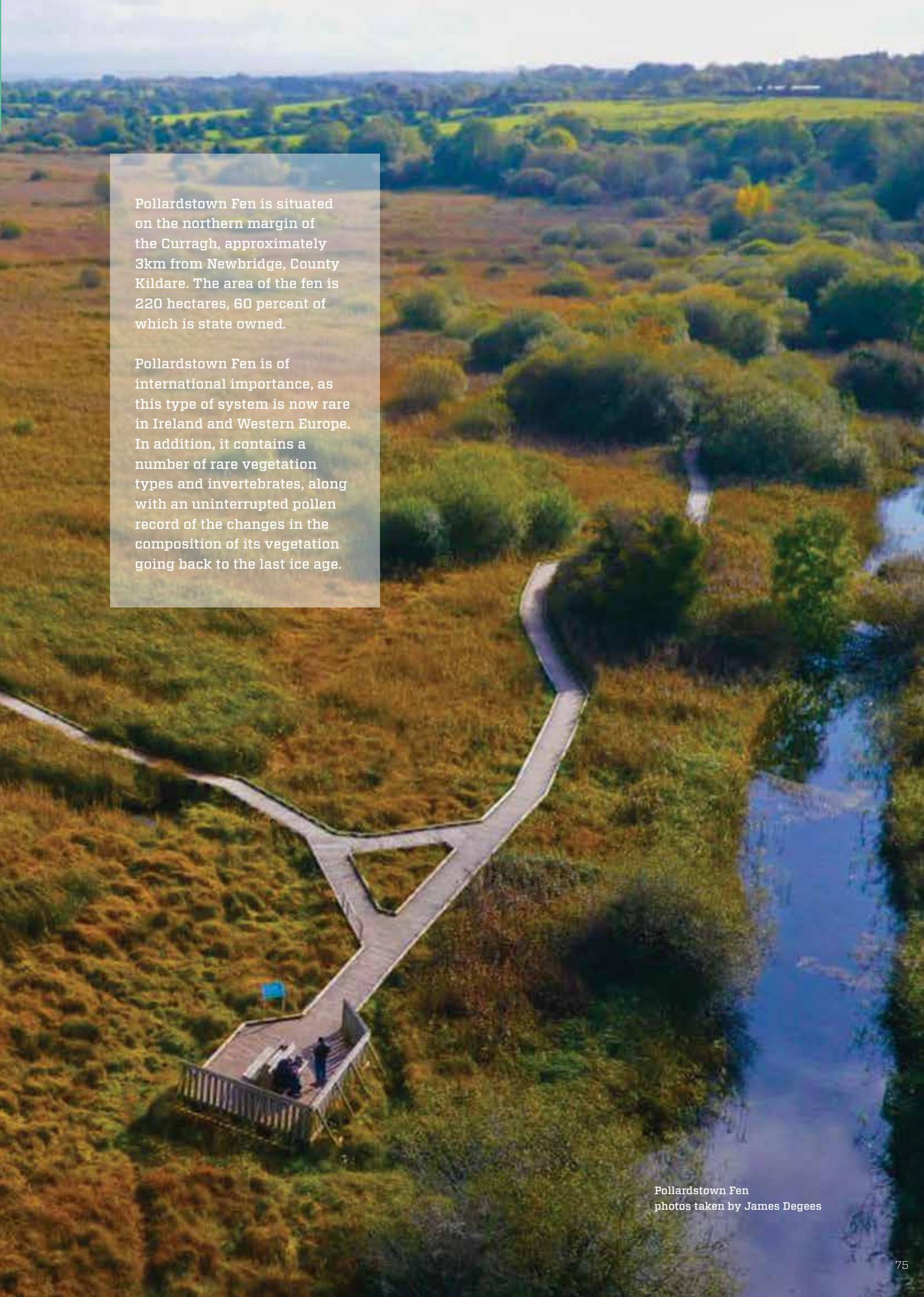
Objective 3: To promote and maximize the most efficient and sustainable use of land

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
10.	Examine ways to reduce/avoid unnecessary staff travel and promote initiatives to promote more sustainable forms of transport for staff.	Climate Action Steering Team Sustainable Transport and Road Safety Officer All Sections	✓	Short - Long
11.	a) Promote cycling and walking to support a greater uptake of active travel around the county reducing carbon emissions and to promote the modal shift away from private cars through landuse planning policy, development management and local initiatives and promotions. b) Explore and co-ordinate car sharing and bike sharing initiatives within the county, engage with external companies providing such services, support Mobility Management Initiatives and other initiatives which support greater use of walking, cycling and public transport including Bike Week, European Mobility Week and other related promotions.	Climate Action Steering Team Sustainable Transport and Road Safety Officer Community Section Kildare Sports Partnership	X	Short - Long
12.	Liaise closely and engage with the Department Planning Section 3 Short of Housing Planning and Local Government and the EMRA Regional Assembly, during the review process of the DHPLG Kildare County Development Plan, to develop a coherent and sustainable approach to landuse, consistent with Outcomes of the National Planning Framework and the Regional Strategic Outcomes of the Regional Spatial and Economic Strategy.	Planning Section EMRA DHPLG	✓	Medium - Long
13.	Explore and make provision for the need to plan and Planning Section provide more indoor sporting facilities and outdoor all Community Section weather facilities for recreation and sporting use Management Team on appropriately zoned land.	Planning Section Community Section Management Team	X	Long
14.	Explore the identification and protection of areas that are subject to flooding/inundation to allow for natural uninhibited floodplain areas. Consider land designation to preserve these areas.	Planning Section Management Team Environment Landowners	X	Medium - Long

Goal 3 Land use and Development

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
15.	Identify non designated bogs and peatland areas within the county and examine the potential for their protection through appropriate designation(s) recognising their significant contribution to enhancing bio-diversity and as strategic and integral mechanisms (by way of sequestration) for the long term storage of carbon to mitigate the contribution of fossil fuel emissions and combat climate change	Climate Action Steering Team NPWS Landowners	X	Medium
16.	As a coordinated, strategic and planned approach to promoting walking and cycling, engage with stakeholders as considered appropriate to develop a walking and cycling strategy that will: <ul style="list-style-type: none"> Investigate the potential of and opportunities for the development of walking/cycling trails in County Kildare to provide for a network that promotes alternative forms of transport within a dedicated, safe and conducive environment. Forge links to existing and planned regional and national cycle networks. Explore greenway/blueway options in line with the Strategy for the Future Development of National and Regional Greenways, 2018 with a view to harnessing associated economic, social and cultural benefits. 	Road Safety, Cycling & Sustainable Transport Officer NTA Landowners	X	Medium



An aerial photograph of Pollardstown Fen, a wetland area. A winding path leads from a wooden viewing platform in the foreground towards the background. The landscape is a mix of green and brown vegetation, with a body of water visible on the right side. The sky is overcast.

Pollardstown Fen is situated on the northern margin of the Curragh, approximately 3km from Newbridge, County Kildare. The area of the fen is 220 hectares, 60 percent of which is state owned.

Pollardstown Fen is of international importance, as this type of system is now rare in Ireland and Western Europe. In addition, it contains a number of rare vegetation types and invertebrates, along with an uninterrupted pollen record of the changes in the composition of its vegetation going back to the last ice age.

4 Goal 4 Drainage and Flood Management

Goal: Great understanding of risks and consequences of flooding and successful management of a co-ordinated approach to drainage and flooding.

Climate Change poses significant risks to water management and will exacerbate existing pressures in terms of water supply, quality and flooding. Water management, particularly water quality, drainage and flooding, remains very much the responsibility of Kildare County Council notwithstanding the transition to Irish Water.

The CFRAMS programme has completed important work to meet the requirements of the EU Floods Directive and deliver on the National Floods Policy. Flooding risks and impacts from across parts of Kildare arise from many sources including heavy rainfall, fluvial flooding from rivers, lakes and streams, groundwater flooding and exceedance or capacity issues with drainage networks. The implementation of this strategy will be confirmed by outputs in the second cycle of CFRAMS.

The impacts of flooding can be devastating to properties, business, infrastructure, cultural heritage and the natural environment.

It is likely that climate change will have a considerable impact on flood risk in the future, with projections indicating that the number of heavy rainfall days per year may increase, which could lead to an increase in both fluvial and pluvial (storm water) flood risk.

While there is considerable uncertainty associated with most aspects of the potential impacts of climate change on water quality and flood risk, it will be prudent from this point on for the Council to take the potential for change into further account in dealing with water quality, the design and development of local drainage systems and flood risk management measures.

The actions of this goal are set out under four fundamental objectives together representing a coherent response that seeks to reduce the risks to water management, of the negative impacts of climate change:

- **Mitigate the risk and impact of flooding.**
- **Provide and plan for effective drainage systems.**
- **Provide for adequate and quality water supply in times of extreme drought conditions.**
- **Liaise and work with other bodies, agencies responsible for the management of water courses.**



Goal 4 Drainage and Flood Management

Objective 1: To mitigate the risk and impact of flooding

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	Proposals submitted under the Minor Works Programme should take account of the potential impacts of climate change to ensure that any measures proposed are adaptable to possible future changes.	Environment Section OPW	✓	Short
2.	Ensure that potential flood information is obtained and / or generated through a Flood Risk Assessment (FRA) that is then used to inform suitable adaptation requirements within planning and development management, in line with the guidelines on the Spatial Planning and Flood Risk Management.	Planning Section Environment Section	✓	Short
3.	Ensure that flood event emergency response plans are reviewed on a regular basis to reflect the degree of flood risk and / or our understanding of that risk, including the resource capacity required to provide an effective response.	Severe Weather Assessment Team Fire Services	✓	Short
4.	The requirements and performance of urban storm water drainage systems for new development should take into account the potential future impacts of climate change, in particular intense rainfall and include including consideration of the use of sustainable urban drainage systems.	Planning Section Water Services	✓	Short
5.	The planning and design of future assets should take account of, and be adaptable to, the potential future impacts of climate change.	Water Services Environment OPW	✓	Short
6.	Assess potential of identifying and designating Natural Flood Plains by way of a Green Infrastructure Strategy to allow for natural and unhindered inundation.	Planning Section	X	Short
7.	Identify areas susceptible to isolation as a consequence of flooding. Use future scenario flood maps to assist in the identification of potentially vulnerable communities and assets. Establish measures to reduce the risk and preparedness for significant events to build awareness and resilience in areas to minimise impact.	Severe Weather Assessment Team Civil Defense Community Section	X	Short

Goal 4 Drainage and Flood Management

Objective 1: To mitigate the risk and impact of flooding

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
8.	Review current operations around (natural) drainage channel maintenance to take into account increased siltation and continued plant growth (causing increased flooding and erosion of water quality) – also review waterways maintenance programme in relation to plant growth	Environment Water Services Landowners	X	Short
9.	Consider and explore the use of natural water retention measures in certain suitable areas as a method of managing flood risk, improve water quality, enhance biodiversity, management of soil and sediment and to provide for the creation of new or additional amenity areas. Liaise and collaborate with the OPW and other stakeholders engaged in research and pilot projects to develop knowledge and capacity on such measures.	Environment Section Water Services Parks	X	Short - Long
10	Continually review flood risk data and take into account increased flood extents and depths in the design, planning and build/delivery of new infrastructure by the council to avoid potential/future flood prone areas and ensure that new infrastructure is resilient to climate change risks.	Environment Section Roads Housing Section Parks	X	Short - Long

Objective 2: To provide and plan for effective drainage systems

11.	Undertake and implement a surface water management plan for the assessment and management of surface water flood risks with the aim of reducing the adverse consequences of flooding, to prioritise projects to reduce surface water flood risk and provide for detailed mapping of areas prone to surface water and groundwater flood risk.	Environment Section Transportation Section	X	Short
12.	Stipulate the requirement for the design and specification of urban storm water drainage systems for new development to take account of the potential future impact of climate change through the development management process.	Planning Section Water Services	✓	Short
13.	Incorporate the requirement for Sustainable Urban Drainage Systems where appropriate in local authority projects and private development sites.	Housing Section Planning Section Architectural Services	X	Short - Medium
14.	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.	Water Services Municipal District Offices	X	Medium

Goal 4 Drainage and Flood Management

Objective 3: To provide for adequate and quality water supply in times of extreme drought conditions

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
15.	Ensure Emergency Services have access to water during times of drought while also considering identification of access points (with available water) with due consideration of demand from other users at the time.	Fire Services	✓	Short
16.	Explore benefit and ways to harvest and store water during winter months to be used during the summer when less rain is projected. For example, explore potential of water retaining vessels, terraces with gravity fed irrigation. Include Assessment of options to meet demand for watering public pitches during drought periods and explore opportunities and potential of water harvesting system for this purpose.	Parks	X	Short - Medium
17.	Assess how the Local Authority can continue to provide needed treated water during times of low rainfall to council group water schemes.	Water Services Irish Water	✓	Short- Long
18.	Explore the development of an early warning flooding prevention plan linking with Met Éireann forecasts, CFRAMS reports and historical knowledge of flooding locations, for example, when the river reaches a specific level, sandbags can be delivered to specific locations in case further rainfall arrives.	Climate Action Steering Team Environment Section OPW	X	Short - Long
19.	Pilot a public drinking water fountain at an appropriate location in a public park area and / or public realm to provide quality water supply and contribute to a reduction in plastic waste. Explore the feasibility of expanding to a network if successful. Liaise and collaborate with Irish Water as appropriate.	Parks Planning Section	X	Short - Medium

Objective 4: To liaise and work with other bodies, agencies responsible for the management of water courses

20.	Further develop collaboration with State bodies, Agencies, and other relevant bodies responsible for the management of water courses including (but not limited to):	Climate Action Steering Team	✓	Short
	<ul style="list-style-type: none"> • OPW • River Basin Management LAWPRO • Waterways Ireland • Irish Water • Irish Farmers Association • Inland Fisheries • ESB • Others 	Relevant Sections		

Goal 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.

This Goal sets out actions to manage and adapt to the effects of climate change on both the natural and historic environments. Kildare County Council is both an advocate and a custodian of the natural and historic environments in the county. Their importance from an environmental, cultural and historical viewpoint cannot be understated and so every effort needs to be made, in cooperation with other stakeholders, to manage and adapt to the effects of climate change.

Nature has a significant role to play in climate change. Biodiversity and ecosystem services help adapt to and mitigate climate change and are therefore a crucial part of efforts to combat climate change. Working with nature, rather than against it, brings multiple benefits.

At the same time, climate change affects natural systems. The continuing loss of biodiversity and degradation of ecosystems, weakens their ability to provide essential services to the extent of reaching irreversible 'tipping points'. By conserving nature and restoring ecosystems we reduce vulnerability and increase resilience. Nature conservation and restoration is a major, cost-efficient mechanism in the fight against climate change.

Responding positively to the impacts of climate change is a particular challenge for cultural heritage and sites of historical significance. Much work must be undertaken to understand the risks of climate change to cultural heritage and thereafter integrate considerations of these climate change effects as an intrinsic part of the management plans for historic sites.

This goal brings together the natural and the manmade historical environment of Kildare to address and respond to the vulnerabilities to climate change impacts through three objectives:

- **To protect and enhance the natural environment to work positively towards climate action.**
- **To support Bio-diversity for its intrinsic value within the natural environment.**
- **To protect Heritage and Cultural Infrastructure.**



Goal 5 Natural Resources and Cultural Infrastructure

Objective 1: To protect and enhance the natural environment to work positively towards climate action

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	Tree planting and management:	Parks	X	Short - Medium
(a)	Develop a strategy to undertake and implement an active native tree planting programme in conjunction with an awareness campaign that informs of the benefits to communities in improving air quality, offsetting carbon emissions, promoting biodiversity, limiting flood risk, reducing urban heat, as well aesthetic value.	Heritage Officer Area Engineers Road Safety Officer Bord Na Mona		
(b)	Undertake risk assessment of trees located along travel routes and near critical infrastructure to examine their health/integrity, risk to infrastructure and public safety in context of severe wind events. Survey on an ongoing basis.			
(c)	Use of trees as fire break to reduce spread of wildfires in areas at risk.			
(d)	Explore the use of technology to implement a regular tree survey.			
(e)	Ensure that any trees having to be removed are replaced at locations that are suitable to avoid future impact to infrastructure or public safety.			
2.	Protect and enhance Green Infrastructure through the protection and nurturing of existing natural ecosystems and make provision for the integration of appropriate landscape and planting schemes into all projects (infrastructural and community development)	Climate Action Steering Team All Sections	X	Short - Long
3.	Develop policy provision and development standards for the integration of green infrastructure into private development sites in the County Development Plan for implementation through the Development Management process in the context of active adaptation measures thereafter to incorporate into Council Plans, Programmes and Policies	Planning Section Elected Members	X	Short - Long
4.	Make provision for natural borders/buffers and include as integral component of the design of greenway/blue way, tracks, trails, amenity and tourism areas to promote the natural enhancement and influence positive user experience. Consult with the NPWS to ensure appropriate buffer zones are provided, maintained and protected to avoid individual impacts on designated species area habitats, and to protect and enhance wider bio-diversity,	Parks Roads Section Area Engineers Kildare Fáilte	✓	Short - Long

Goal 5 Natural Resources and Cultural Infrastructure

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
5.	To drive awareness: (a) Encourage the use of information boards at amenity, tourism, wilderness, natural landscape, cultural heritage and other appropriate locations across the county to bring awareness and encourage respect of the benefits of natural environment and its role in Climate Action. (b) Develop and implement an awareness campaign around the role of the natural environment and its positive contribution to Climate Action and the role Kildare County Council plays in working with the natural environment in this context. E.g. Incorporate into the Green Schools Award Schemes.	Environment Section Parks Heritage Officer LEADER Kildare Fáilte	X	Short - Long
6.	Review planting policy to adjust process taking account of longer growing season.	Parks	✓	Short - Long
7.	Explore ways to decrease siltation debris during periods of high run-off to reduce Eutrophication.	Parks Area Engineers	X	Short - Long
8.	Develop a hedge cutting maintenance plan to address parts of the road network subject to increased risk of black ice from shelter. Make provision to include landowners in ongoing maintenance and use legislative powers as necessary.	Roads Section Municipal Districts Offices TII Landowners	X	Short - Long
9.	Examine methods or new technologies for the watering of plants/trees (i.e. gator system, rain harvesting, permeable systems).	Parks Area Engineers	X	Short - Long
10.	Explore ways/practices to reduce the leaching of soils from the increased drying out during drought periods.	Parks Environment Section 3rd Level Institutions DAFM	X	Short - Medium
11.	In collaboration with the NPWS, to work with landowners and communities to: <ul style="list-style-type: none"> Identify non-designated bogs/peatlands in the county that may be suitable for restoration, re-wetting and conservation with an emphasis on positive contribution to climate action and carbon sequestration. Explore opportunities with the NPWS, landowners and communities to investigate appropriate restoration options through research and thorough examination of the characteristics of the bog/peatland i.e. condition, depth of drainage, historical disturbance, geographical location, ownership, maintenance etc. 	Climate Action Steering Team NPWS Landowners	X	Medium Long

Goal 5 Natural Resources and Cultural Infrastructure

Objective 2: To support Bio-diversity for its intrinsic value within the natural environment

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
12.	<p>Review the Kildare Bio-diversity Plan and provide for actions that ensure:</p> <ul style="list-style-type: none"> • All risks from adverse climate change have been identified. • Future changes are assessed and measures employed to address issues identified. • Carbon capture within habitats is considered. • An examination of the changes in seasonality. • The impact of invasive species are examined. 	Heritage Officer	✓	Short
13.	<p>Research and map areas considered beneficial for use as local carbon offset through carbon sequestration and include in Green Infrastructure strategy.</p>	<p>Planning Section Heritage Officer (Biodiversity)</p>	X	Short - Long
14.	<p>Implement a training programme within Kildare County Council to develop cohesion across all functions and enable staff to undertake appropriate management of invasive species, including:</p> <ul style="list-style-type: none"> • Invasive species training and awareness. • Introduction of a new hedge cutting and land maintenance plan to limit spread of invasive species. • Introduction of appropriate spray times / schedule. <p>Explore potential of providing this training for population including farmers, property developers, tidy towns workers.</p>	<p>Heritage Officer (Biodiversity) Environment Section Community Section LEADER</p>	X	Short - Long
15.	<p>To support bio-diversity through natural pollination:</p> <p>(a) Implement the National Pollinator Plan at appropriate locations</p> <p>(b) Examine the impacts of extreme weather events on pollinator sites to establish the impact on food availability and the type of resilience measures that may need to be employed</p> <p>(c) Explore ways to increase the range of plant species with the aim of increasing food sources and habitats for pollinators.</p> <p>(d) Examine ways to reduce the impact of a longer growing season on lifecycles of bees and other pollinators in terms of food availability and lifecycles mismatch.</p> <p>(e) In collaboration with communities, and as part of the green schools campaign, identify suitable new sites for the implementation of the Pollinator Plan and to ensure continued maintenance and upkeep.</p>	<p>Heritage Officer (Biodiversity) DAFM</p>	X	Short, Medium & Long
16.	<p>Review and assess the choice of seeds and plants for planting in parks with aim of limiting vulnerability to harsher conditions and maintaining and increasing biodiversity.</p>	Parks	X	Short - Long

Goal 5 Natural Resources and Cultural Infrastructure

Objective 3: To protect Heritage and Cultural Infrastructure.

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
16.	<p>Undertake a risk assessment to assess the vulnerability and the risk to the historical environment, (also including visual and physical impacts on historic designed landscapes, demesnes and settings of built heritage / protected structures), from the impacts of climate change and to help build resilience of these important assets:</p> <ul style="list-style-type: none"> • Include assessment of soil stability/erosion and integrity of trees in close proximity to structures. • Consider deterioration from freeze-thaw action. • Identify higher risk structures. • Priority actions/recommendations. 	<p>Heritage Officer Conservation Officer Parks Arts Officer Libraries Section Community Section</p>	X	Short - Long
17.	<p>Explore ways to capitalize on new archaeological finds as a consequence of extended periods of drought.</p>	<p>Heritage Officer Conservation Officer National Monuments Service OPW Kildare Fáilte</p>	X	Short - Long
18.	<p>Identify resilience measures to hot/cold extremes of historical/heritage buildings owned and operated by Kildare County Council to ensure continued use.</p> <ul style="list-style-type: none"> • Include consideration of sensor / monitoring projects on built heritage / protected structures with 3rd level institutions. 	<p>Heritage Officer Conservation Officer</p>	X	Short - Long
19.	<p>Integrate climate change considerations and future risks into the development or repurposing of heritage structures/sites in the county.</p>	<p>Climate Action Steering Team Heritage Officer Libraries Section Facilities Manager</p>	X	Short - Long

Goal: Empowered and cohesive communities with strong understanding of climate risks, increased resilience to impacts of climate change with capacity to champion climate action at local level.

Kildare County Council has a strong relationship with the many communities it serves across the county and will pursue an active role in public awareness, engagement and motivation to act in relation to the challenges and opportunities presented by climate change.

While the Council takes an effective position to provide a leadership role in addressing the impacts of climate change, it is recognised that, there is no monopoly on solutions to address the issues around climate resilience. The support of the wider community is very much needed and encouraged to advance not only adaptation measures but all areas of climate action in a local context.

The Council promotes, encourages and is committed to community-based adaptation to climate change by working with local communities and relevant agencies. The actions of this strategy focus on empowering communities to use their own knowledge and decision-making processes to take effective action locally. This will help establish levels of risk to communities of climate change impacts and prioritise potential adaptation actions.

Building capacity and resilience are to the fore of the three objectives to which the actions of this goal are set out:

- **To build capacity and resilience within communities.**
- **To collaborate with other agencies and groups working with communities to enhance the effectiveness of community programmes related to climate change.**
- **To protect and encourage climate resilient community infrastructure.**



Goal 6 Community Health and wellbeing

Objective 1: To build capacity and resilience within communities

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
1.	<p>Through public participation network and working with relevant agencies, raise awareness of the impacts of climate change and ways for communities to increase response and resilience to these impacts. This should include:</p> <ul style="list-style-type: none"> • Information on Severe Weather Event preparedness. • Property security and safety. • Health issues related to heat/cold stress. • Public safety awareness. • Water safety awareness for unsupervised watercourses in local areas. 	<p>Community Section Civil Defence PPN OPW Gardaí HSE</p>	✓	Short
2.	<p>For identified vulnerable communities, develop and implement a programme to enhance their capacity to respond to and recover from extreme weather events with specific aims to:</p> <ul style="list-style-type: none"> • Help the vulnerable community to develop a stronger facilitating role for mitigating risks. • Provide advice on the risk of extreme events affecting their locality. • Devise mitigating actions to enhance preparedness. • Provide support to develop appropriate resilience arrangements to enable response and recovery. 	<p>Climate Action Steering Team Community Section Civil Defence Libraries Section Gardaí HSE</p>	X	Medium
3.	<p>Develop public awareness campaigns to increase knowledge of and encourage behavioural change around climate change and severe weather events.</p>	<p>Climate Action Steering Team Community Section Information Services Section Libraries Section MET Eireann</p>	X	Short
4.	<p>Increase awareness training within communities (and community staff) of potential risks from climate change and ways to build resilience including:</p> <ul style="list-style-type: none"> • Heat stress and heat related illnesses. • Air pollution in residential areas from increased frequency of fires. • Property protection best practice. • Dangers of leaving potential storm debris loose on property before an extreme wind event. • Housing maintenance awareness to combat deterioration of property from changing conditions. For example: mould build-up and fabric damage from condensation. • Road safety around driving or traveling on roads during flood or heavy snow conditions. • Water scarcity and water conservation best practice during hot and cold temperatures • Dangers of swimming in quarries, canals and rivers unsupervised. 	<p>Climate Action Steering Team Community Section Civil Defence Environment Section Road Safety Officer Gardaí HSE Road Safety Authority Irish Water Safety Irish Water</p>	✓	Medium

Goal 6 Community Health and wellbeing

Objective 2: To collaborate with other agencies and groups working with communities to enhance the effectiveness of community programmes related to climate change

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
5.	Work with the County Kildare LEADER Partnership to: <ul style="list-style-type: none"> Identify funding streams available to communities to enable local climate action projects. Support and develop adaptation actions and climate resilience activities in local areas. 	Community Section CKLP Tidy Towns PPN SEAI	✓	Short
6.	Scope the potential of working with training providers to provide training / awareness programmes for people in communities, around adaptation efforts.	Community Section Library Section	X	Medium
7.	Scope the potential of working with training providers to provide training/awareness programmes for the business community around adaptation efforts.	Local Enterprise Board	X	Medium
8.	Explore the potential of developing and implementing a Community Resilience Plan that enhances the opportunity for structured community coordination to drive climate action at local level and respond to the impacts of climate change locally. Use the Councils existing community network to develop this plan. To Include: <ul style="list-style-type: none"> Assessing communities across the county in the context of their vulnerability to the impacts of climate change. Identify vulnerable communities and the associated risks (source) to the community. Explore ways Kildare County Council can help older, vulnerable and isolated people/communities to become more climate resilient. 	Community Section Climate Action Steering Team PPN Housing HSE PPN Age Action Local Community Groups	X	Medium
9.	Encourage Tidy Towns and Community Group's Maintenance Plans to integrate and take consideration of the impacts of climate change and proactively plan to reduce risks and vulnerabilities in the local area.	Environment Section Parks	X	Short
10.	(a) To work with SEAI and mentors to support existing Sustainable Energy Communities in County Kildare and encourage sustainable energy systems, promote energy efficiency, use renewable energy where feasible and to develop decentralised energy supplies. (b) Encourage more communities to participate with Kildare County Council and SEAI to establish Sustainable Energy Communities in their area and actively pursue projects to reduce energy consumption.	Energy Team Environment Local Enterprise Office Tidy Towns PPN SEAI Community Section	✓	Short - Long

Goal 6 Community Health and Wellbeing

Objective 2: To collaborate with other agencies and groups working with communities to enhance the effectiveness of community programmes related to climate change

No.	Action	Lead & Partner(s)	Budgeted	Timeframe S/M/L
11.	Liaise and collaborate with the CARO and the EPA on the implementation of the National Dialogue on Climate Action to engage with communities, develop awareness initiatives, motivate changes in behaviour and create structures at local level to support the generation of ideas and translate into appropriate cost-effective action.	Climate Action Steering Team CARO EPA	X	Short - Long

Objective 3: To protect and encourage climate resilient community infrastructure

12.	Undertake a risk assessment to identify and assess the vulnerability of community infrastructure (including community centres/halls, playgrounds, gardens, public realm spaces, etc), across all communities in the county against the impacts of severe weather events.	Community Section Facilities Parks Housing Fire Service	✓	Short
13.	Establish best practice in building design for future community developments seeking funding and economic unit led projects under the Mid-East Enterprise Plan.	Community Section Planning Section Architectural Services	✓	Short
14.	<p>Integrate climate change considerations in the planning and development stage for festivals/ events, particularly given seasonality factors to:</p> <ul style="list-style-type: none"> Plan for/around the occurrence of weather extremes. Build contingency for alternative staging areas/locations. Reduce the risks insofar as possible for public safety. Mitigate the financial implications. <p>In the licensing and assessment process, Kildare County Council should integrate considerations of extreme weather impacts on the successful running and operation of the event/festival.</p>	Community Section Planning Section Fire Service Civil Defence Gardaí HSE All other Agencies	✓	Short
15.	For projects subject to funding and investment of public money, integrate climate change considerations as criteria for assessment, ultimately ensuring that community projects are designed and developed to be climate resilient and/or are proactive in promoting and working positively towards climate action.	Community Section Planning Section Environment Section Finance Section Municipal District Offices	✓	Short
16.	Explore the need for, and to develop criteria for, funding for cooling systems for community facilities, with the aim of ensuring any funding is put towards more energy efficient / environmentally friendly systems.	Community Section Environment Section Energy Team Facilities Manager	X	Medium - Long



Chapter 8: Implementation Monitoring and Evaluation

Goal One: Local Adaptation Governance and Business Operations, endeavours 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 Kildare County Council, it is important that the Climate Action Steering Team brings together representatives from all key functional areas with various technical, operational and management expertise, who can successfully carry out the necessary tasks and implement the actions contained within the strategy. The Management Team will nominate representation to the Climate Action Steering Team and assign its chair. The Climate Action Steering Team will meet bi-monthly.

The tasks of the team are as follows:

- Prioritise actions within short, medium and long term delivery timeframes.
- Develop an overall approach and initiate implementation of the actions.
- Liaise with other stakeholders and sectors, both locally and regionally, where required.
- Monitor and evaluate delivery of the actions.
- Report on Progress to the Climate Change and Environment SPC and subsequently to full council.

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 as well as assigned owners for delivery. Progress reporting will be aligned to this prioritisation.

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 by way of an Implementation Plan. The requirements of the SEA Directive and Habitats Directive should be considered in the implementation plan as relative and appropriate. The Steering Group will devise a methodology for implementation that includes:

- Who is responsible for implementing the adaptation actions.
- Identification of funding required for the adaptation measures.
- Identification of/establishment of 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.
- Timeframes for the implementation of measures.
- Identification risks to implementation.

It is recommended to encompass actions into the implementation plan. Once complete, key personnel can assume responsibility and begin implementing the adaptation actions.

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

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

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

3: Liaise with other Stakeholders/Sectors

At times, the local authority will be required 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.

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, to determine whether planned outcomes from adaptation actions have been achieved and to establish whether new adaptation actions should be undertaken.

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

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

This ensures an iterative process and allows actions to be informed by the 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. The Climate Action Steering Group should liaise with the Eastern and Midlands Climate Action Regional Office to promote effective monitoring and implementation of the Strategy.

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 to the Management Team, Environment and Water Services SPC and the Elected Members / full council as considered appropriate.

Reporting on progress, i.e. a Climate Change Adaptation Progress Report should be prepared **annually**, for input by the Management Team and SPC and review by the Elected Members.

The report should provide for, inter alia:

- Progress achieved on actions to that point (including key indicators as established).
- Extent to which actions have achieved new relationships with key stakeholders, agencies, communities as well as identified new or emerging opportunities.
- Identification of funding streams used.
- The extent of positive community engagement.
- Report on behavioural change initiatives.

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.



Key Performance Indicators

The following Key Performance Indicators (KPIs) can be used to guide the Climate Action Team in the development of KPIs in line with Action 4 of Goal 1. KPIs cannot be definitely prescriptive at this stage where baseline information is required to be explored. New KPIs can be included as is considered necessary and this will be tracked to the progress reporting. KPIs suggested include:

- No of actions completed according to timeframe short/medium/long term
- No. of meetings convened by the CAT - target 4 p/a.
- No of dedicated staff with responsibility for driving climate related activity across the council.
- No. of plans/programmes, strategies and policies that have integrated/mainstreamed climate change considerations or climate proofed (upon their review)
- No. of tenders issued informed by Green Procurement guidelines as a percentage of over all tenders annually. Target to be set and to increase annually.
- No. of service areas reporting on extreme weather events including breakdown of impacts on service delivery, staff resources and financial resources. Monitor the baseline setting targets to increase annually until maximum required is achieved followed by annual review to maintain level.
- No. of sections with budget allocation / contingency for dealing with climate change impacts (reducing risk /vulnerability / disruption to operations / services).
- No. of climate change related training modules/ programmes attended/undertaken by staff members, elected members and communities (including CARO training, National and Regional events, National Dialogue).
- No. of awareness campaigns organised by KCC for stakeholders including local communities, business communities, housing tenants, PPN, Tidy Towns, green schools etc.
- No of infrastructure. buildings, communication equipment, built heritage sites etc identified as vulnerable to climate change impacts / risk through the carrying out of risk vulnerability assessments by KCC.
- No. of policies/standards explicitly addressing climate change and resilience (adaptation and mitigation) in CDP measured against adaptation strategy, NPF, RSES and CAP.
- No. and outcome of strategic partnerships with other key stakeholders (LEADER, sectors, SEAI, OPW, EPA)
- No. and outcome of strategic partnerships with other key stakeholders (LEADER, sectors, SEAI, OPW, EPA)
- No. of emergency services call outs/responses during/after extreme weather events where classified as an extreme event and reports on costs (staff, equipment etc) and impacts (disruption, damage done etc) has been completed.
- No. of communities identified as being vulnerable to impacts of climate change with works/ awareness programmes undertaken to build and develop resilience.
- Percentage of vulnerable/at risk roads in county targeted annual decrease
- Percentage of newly created SECs as a total of all SECs receiving assistance or partnering with KCC
- No. of climate change related pilot/projects commenced/undertaken (2019 baseline) - aim to increase this annually over the timeframe of the strategy.
- Uptake on measures to enhance natural environment, No. of trees planted, areas designated under the Pollinator Plan, integration/ enhancement of soft landscaping into council driven development schemes from a defined 2019 baseline. Set a defined target to achieve over timeframe of the Strategy.
- No. and amount of climate action funding applications sought/approved



Ireland's boglands are very special places. Boglands are areas of peat bogs and they make up 5% of the Irish landscape. They are home to many rare plants and animals. Midland bogs, like those found in Kildare, are raised bogs. They have an average depth of 8 metres.

Appendix 1: Kildare County Council Climate Action Team Members



Gillian Allen - Library Services

Celina Barrett - Fire Services

Jim Byrne - Kildare Civil Defence

Grace Clarke - Kildare PPN

Mario Corrigan - Library Services

Brenda Cuddy - Roads & Transportation

Martin Donnelly - GIS Unit (IT)

Liam Dunne - Environment

Amy Granville - Planning

Barry Griffith - Facilities

Bernard Higgins - Kildare PPN

Declan Keogh - Roads & Transport

Ronan Linnane - Water Services

Bridget Loughlin - Heritage & Biodiversity

Patricia McNeela - Kildare Civil Defence

Mary Morrissey - Architectural Services

Edele O'Brien - Environment (CFRAMS)

Brian O' Gormam - Environment

Paula O'Rourke - Parks

Bebhinn O'Shea - Strategic Projects & Public Realm

Tom Sexton - Water Services

Conor Sweeney - (on behalf of) Local Enterprise Office

Mairead Sweeney - Finance

Simon Wallace - Parks

Derek Whelan - Fire Services

Bridget Wright - GIS Unit

Dara Wyer - Environment

With Thanks.

Alaine Clarke - Planning

Ann Marie Conneely - Community & Enterprise

Jonathan Deane - Roads & Transportation

Enda Hoey - Environment

Eimear McGinn - Library Services

Shane O'Keeffe - Finance



Age Action: A national charity which works to improve policy and services for older people. Services provided include care and repair, computer training and information, and campaigning for older people at a national level.

An Taisce: The National Trust for Ireland, is a charity working to preserve and protect Ireland's natural and built heritage. It is funded through various sources including: donations, membership fees, the Environmental Protection Agency, Department of Communications, Climate Action and the Environment, Irish Environmental Network (IEN) and Local Authority (LA21) grants.

Biodiversity: The variety of animal and plant life in a particular habitat, a high level of which is usually considered to be important and desirable.

Blueway: A network of multi-activity recreational trails, based on or alongside idyllic lakes, canals and rivers in Ireland.

Capital Assets: Includes buildings, land and infrastructure and is defined in financial terms as: resources controlled by the Local Authority as a result of past events and from which future economic or service potential is expected to flow to the authority.

Carbon Capture: Process of capturing waste carbon dioxide (CO₂) from large point sources such as fossil fuel power plants, transporting it to a storage site and depositing it where it will not enter the atmosphere.

Carbon Offset: Reduction in emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere.

CFRAMS: Catchment Flood Risk Assessment and Management – A national approach to flood risk management examining the causes of significant flooding throughout each river basin district and producing integrated plans of specific measures to address the significant flood risk factors in a comprehensive and sustainable way.

Climate Action and Low Carbon Development Act 2015: An Act to provide for the approval of plans by the Government in relation to climate change for the purpose of pursuing the transition to a low carbon, climate resilient and environmentally sustainable economy and to establish the Climate Change Advisory Council.

Climate Change: The climate can be described as the average weather over a period of time. Climate Change means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period – decades or longer.

Climate Variability: Deviations in climate statistics over a given period of time (such as a month, season or year), when compared to long term statistics for the same calendar period.

Commercial Vehicle Roadworthy Testing (CVRT): Roadworthiness test for all commercial vehicles, buses with more than eight passenger seats and ambulances, all over one year old.

Critical Infrastructure: Term used by governments to describe assets that are essential for the functioning of a society and economy.

Cross Sectoral adaptation: Adaptation activities involving two, or more, sectors working together to increase resilience of an area, or areas, to climate change impacts.

Cultural assets: Something that has value because of its contribution to a community's culture, meaning, traditions, knowledge, creativity and vitality.

Culverts: A structure that allows water to flow under a road, railroad, trail or similar obstruction from one side to the other side. It can be surrounded by soil and may be made from reinforced concrete, a pipe, or other material.

Decarbonisation: The reduction or removal of carbon dioxide from energy sources.

Decentralised Energy Supplies: Energy generated off the main grid including micro renewable, heating and cooling. It can refer to energy from waste plants, combined heat and power, district heating and cooling, geothermal, biomass and solar energy.

Ecosystems: A biological community of interacting organisms and their physical environment.



El Nino Effect: A climate cycle in the Pacific Ocean with a global impact on weather patterns.

EMRA: Eastern & Midlands Regional Assembly - comprising 38 elected members nominated by the 12 constituent local authorities within the region. Their main roles include (but not limited to) implementing appropriate Regional Planning Guidelines; preparing adopting and implementing the Regional Spatial and Economic Strategies; Identifying, participating in and coordinating certain EU projects.

EU Habitats Directive: Protects a wide range of rare, threatened or endemic species occurring in the European Union.

Eutrophication: Excessive richness of nutrients in a lake or other body of water, frequently due to run-off from the land, causing a dense growth of plant life.

Fire break: An obstacle to the spread of fire, such as a strip of open space in a forest.

Freeze-thaw action: Where surfaces such as stone get weathered by freezing and thawing of ice. During times of very cold weather, water in a crack in a rock will freeze. When water turns to ice it expands by about 10%. This usually happens at night. During the day when the ice thaws out, more water flows into the gap in the stone and then freezes again at night causing the gap to expand even more.

GIS: Geographical Information System - involves processing information to help make an informed decision. When used in conjunction with location (using maps) a link is created between diverse datasets that can concern people, places or things. Visual information in a GIS system can help it to be more easily understood and explained.

Green Flood Management: (Also known as Natural Flood Management) is an approach to managing flooding which works with natural hydrological processes throughout the catchment to store flood water temporarily during flood events.

Green Infrastructure: A strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services such as water purification, air quality, space for recreation and climate mitigation and adaptation.

Green Schools: An international environmental education programme, environmental management system and award scheme that promotes whole school action towards a sustainable environment through the implementation of a seven step methodology.

Greenhouse gases (GHG): A gas that contributes to the greenhouse effect by absorbing infra-red radiation. Examples include: carbon dioxide, methane and chlorofluorocarbons.

Greenway: A dedicated cycling and walking route that can take a variety of forms either off road or on road within part of the verge or footway segregated from motorized traffic. Benefits include facilitating modal shift, improving air quality and sustainably connecting people to places.

Grey Flood Management: Man-made infrastructure to manage flooding such as building embankments and cleaning / upgrading river channels.

Heat Stress: When your body can no longer regulate your temperature and you become too hot. This can occur in hot temperatures, high sun exposure or high humidity. Heat stress can lead to heat exhaustion and heat stroke.

Heritage assets: An item that has value because of its contribution to a nation's society, knowledge and / or culture. These are usually physical assets.

Human systems: Systems created by humans including human settlements, transportation routes, communication systems, economics, infrastructure and energy.

ICARUS: The Irish Climate Analysis and Research UnitS is part of the Department of Geography at Maynooth University and a national leader in the area of climate change.



Inland Fisheries Ireland: State agency responsible for the protection, management and conservation of Ireland's inland fisheries and sea angling resources.

Intergovernmental Panel on Climate Change (IPCC): A United Nations body for assessing the science related to climate change, the IPCC provides policymakers with regular scientific assessments on climate change, its implications and potential future risks as well as to put forward adaptation and mitigation options.

Invasive Species: A species that is not native to a specific location (an introduced species), and that has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health.

LEADER Partnership (County Kildare) / CKLP: One of over fifty Local Development Companies in Ireland responsible for the delivery of a range of rural, enterprise, social inclusion, and community development initiatives.

Lifecycles mismatch: A mismatch in the lifecycles of animals and food sources specifically in the timing of peak food abundance and peak food requirements. It can also describe a mismatch condition for species depending on more than one area to fulfill their lifecycle, such as during bird migration.

Mid-East Regional Enterprise Plan to 2020: Builds on the success of the Mid-East Regional Action Plan for Jobs (2016-2017) to ensure that it remains effective and that it continues to deliver jobs across the Mid-East region and can be robust to address challenges including Brexit.

National Adaptation Framework (NAF): Sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The NAF was developed under the Climate Action and Low Carbon Development Act 2015.

National Mitigation Plan (NMP): Initial step to set Ireland on a pathway to achieve the level of decarbonisation required. It is a whole of Government Plan, reflecting in particular the central roles of the Key Ministers responsible for the sectors covered by the plan – Electricity Generation, the Built Environment, Transport and Agriculture,

as well as drawing on the perspectives and responsibilities of a range of other Government Departments.

National Planning Framework: A National Document that will guide at a high-level strategic planning and development for the country over the next 20 (plus) years, so that the population grows, and such is sustainable (in economic, social and environmental terms).

National Pollinator Plan: Also known as the All-Ireland Pollinator Plan, which aims to create an Ireland where pollinators can survive and thrive. The plan identifies what can be done to achieve this by Local Authorities, farmers, businesses, communities, and schools.

Natural Pollination: The movement of pollen from one flower / plant to another of the same species through wind, water or by animal pollinators such as bees.

Natural Systems: Open systems where their existence depends upon effects beyond their borders. They are created over millions of years of evolution in a changing world, where the climate and the layout of the land have interacted with the distribution and composition of life.

Public Realm: Broadly refers to those areas of a town or city to which the public has access. It includes streets, footpaths, parks, squares, bridges and public buildings and facilities.

Regional Skills Forum: The network of Regional Skills Fora was created in 2016 as part of the Government's National Skills Strategy to provide an opportunity for employers and the education and training system to work together to meet the emerging skills needs of their regions.

Sequestration: Natural or artificial process involved in carbon capture and the long term storage of atmospheric carbon dioxide (CO₂).

Special Areas of Conservation: Prime wildlife conservation areas in the country, considered to be important on a European as well as Irish level.



Special Protection Areas: A designation under the European Union Directive on the Conservation of Wild Birds. Under the Directive, Member States of the European Union (EU) have a duty to safeguard the habitats of migratory birds and certain particularly threatened birds.

Sustainable Energy Communities (SECS):

A community that works together to develop a sustainable energy system. To do so, they aim to be energy efficient, use renewable energy and consider smart energy solutions.

Teagasc: A State agency providing research, advice and education in agriculture, horticulture, food and rural development in Ireland.

The 2013 EU Strategy on Adaptation to Climate

Change: Adopted by the European Commission in April 2013 it sets out a framework and mechanisms for taking the EU's preparedness for current and future climate impacts to a new level.

The National Policy Position on Climate Action and

Low Carbon Development 2014: The National Policy Position provides a high-level policy direction for the adoption and implementation by Government of plans to enable the State to move to a low carbon economy by 2050. Statutory authority for the plans is set out in the Climate Action and Low Carbon Development Act 2015.

The Paris Agreement 2015: At COP 21 in Paris, on 12 December 2015, Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement brought all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so.

Tipping Points: A tipping point in the climate system is a threshold that, when exceeded, can lead to large changes in the state of the system.

Topographical: The arrangement or accurate representation of the physical features of an area.

Urban Heat: Occurs in metropolitan or urban areas that are significantly warmer than surrounding rural areas due to human activities such as the modification of land surfaces.



CFRAMS - Catchment Flood Risk Assessment and Management

DAFM - Department of Agriculture, Food & the Marine

DBEI - Department of Business, Enterprise and Innovation

DCCAIE - Department of Communications, Climate Action and Environment

DHPLG - Department of Housing, Planning and Local Government

DTTAS - Department of Transport, Tourism and Sport

EMRA - Eastern & Midlands Regional Assembly

GIS - Geographical Information Systems

ICARUS - The Irish Climate Analysis and Research UnitS

NPF - National Planning Framework

OPW - Office of Public Works

PPN - Public Participation Network

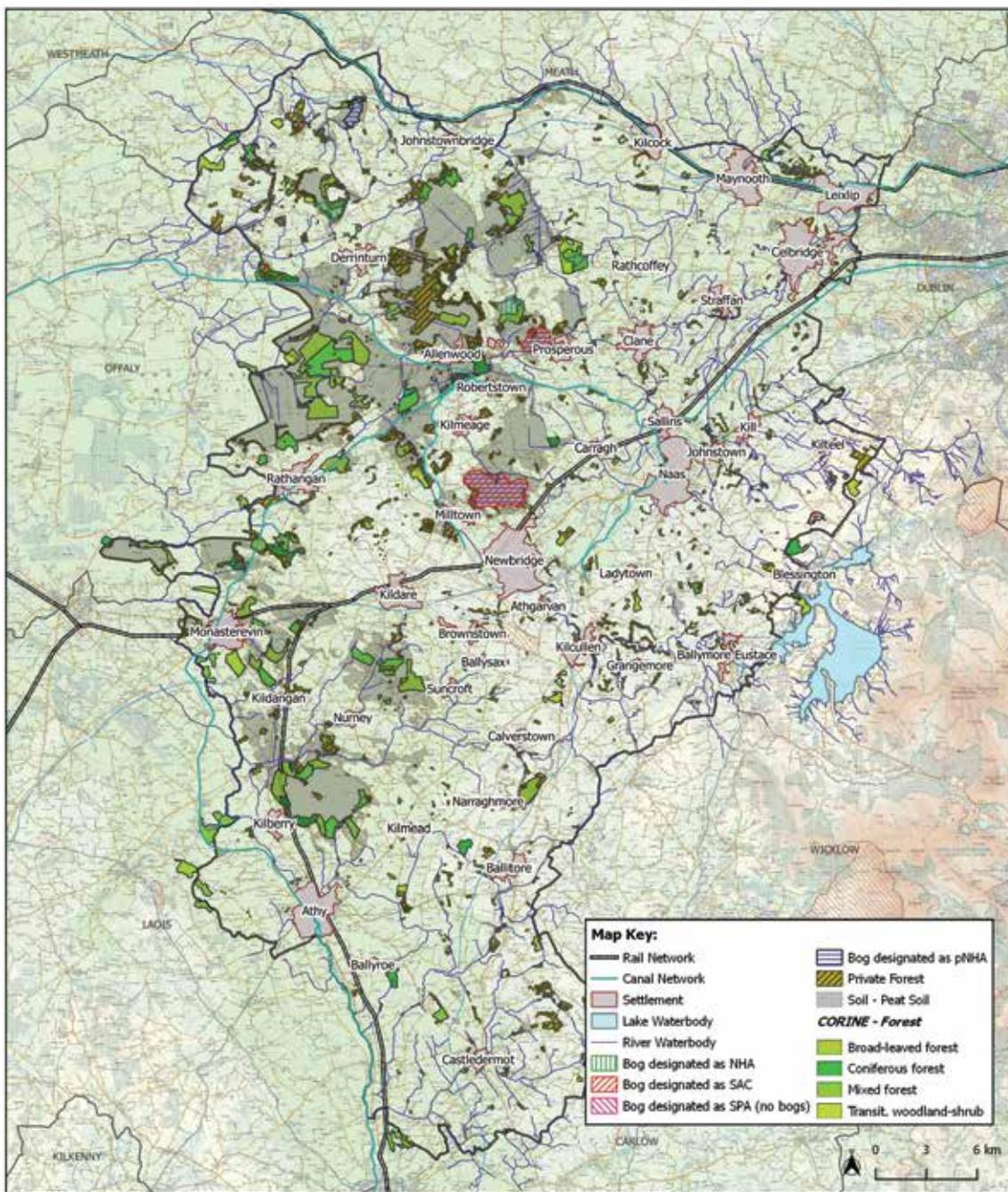
RSES - Regional Spatial and Economic Strategy

SEAI - Sustainable Energy Authority of Ireland

SPC - Strategic Policy Committee

TII - Transport Infrastructure Ireland





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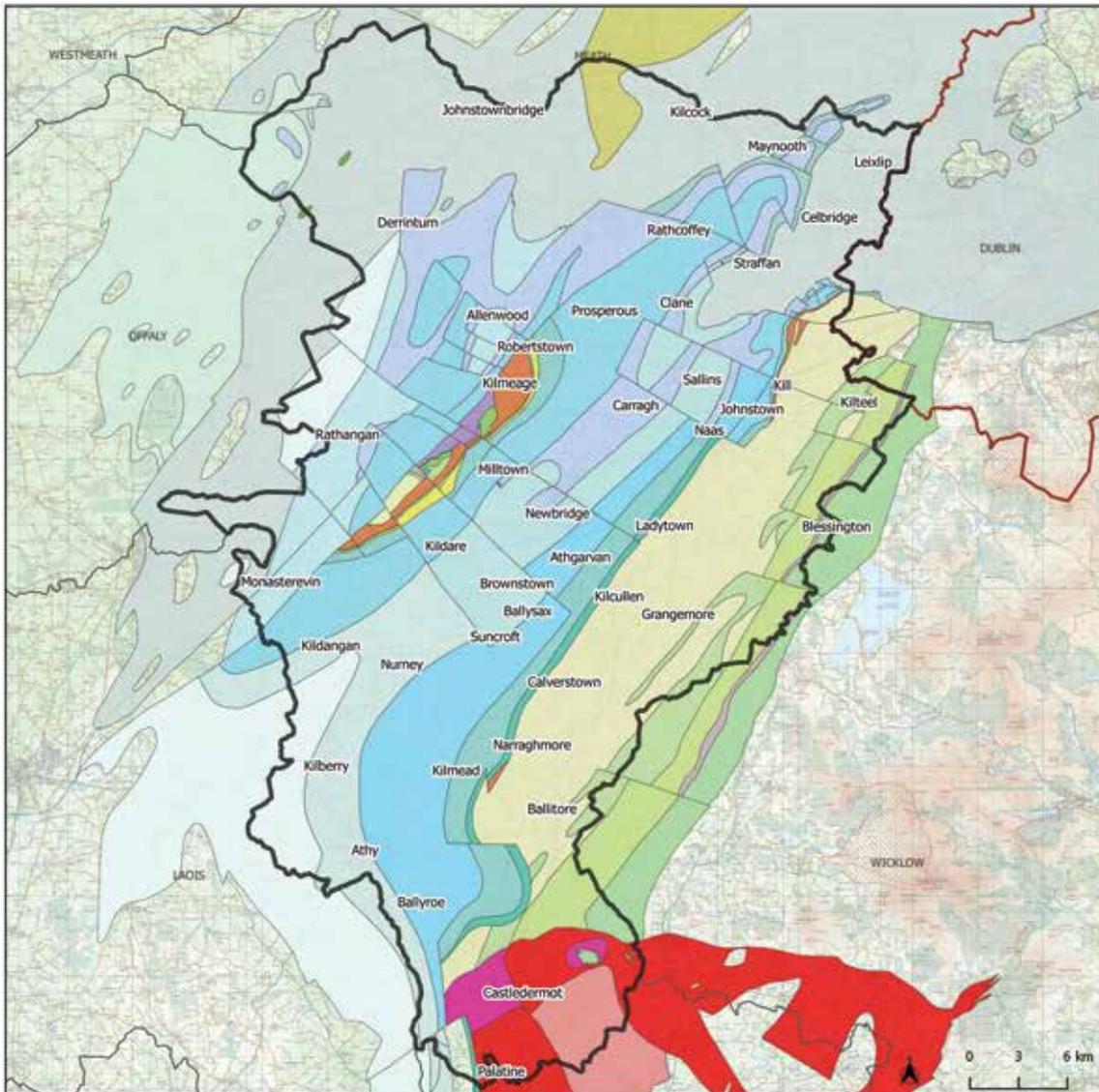


Waterbodies are managed by catchment area. Thus waterbodies were not clipped to the county boundary.

Scale: N.T.S	Map Name: Physical Environment		
Date: 13-09-2019	Map No: 001		
Data Source: OSI, KCC, CARO, EPA, NPWS, DAPM, OSNI	DB: BW	FB: PR	AB: JB
File Path: \\Kewinr1\1\data\users\GIS\ Tasks\30_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows the physical environment of County Kildare including, the canal and river network, bog areas and forests. This map also shows the rail network running through the County.

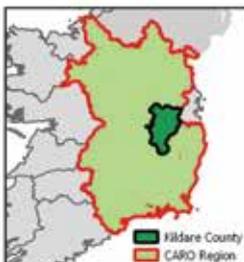
Appendix 4: Maps of Kildare



Map Key:

Kildare County	in Ballockpark Bay Member	Lucan Formation	Namurian (undifferent.)	Kildare Limestone Formation	Guidinstown Formation
Adjacent County	Ballymartin Formation	Milford Formation	Old Red Sandstone (undifferent.)	Allen Andesite Formation	Pollaphuca Formation
CARO Region	Boston Hill Formation	in Milford Formation	Type 1 Granite	Grange Hill Formation	Rabilla Formation
Bedrock 100k					
Allenwood Formation	Edenderry Colite Member	Quisagh Formation	Tullow T ₂ Equigranular Gc.	Conlanstown Formation	State Quarries Formation
Ballyadams Formation	Feighcullen Formation	Rickardstown Formation	Tullow T ₂ Microcline Porphyritic Gc.	Carrigill Formation	Tipperkevin Formation
Ballyteen Formation	Ferbane Mudstone Formation	Tober Colleen Formation	Volcanics	Dunmurry Formation	
		Vaulsortian Limestones	Grange Cottage Formation	Glen Ding Formation	

OSI/CCM 2019/2019/CCM4/KildareCountyCouncil



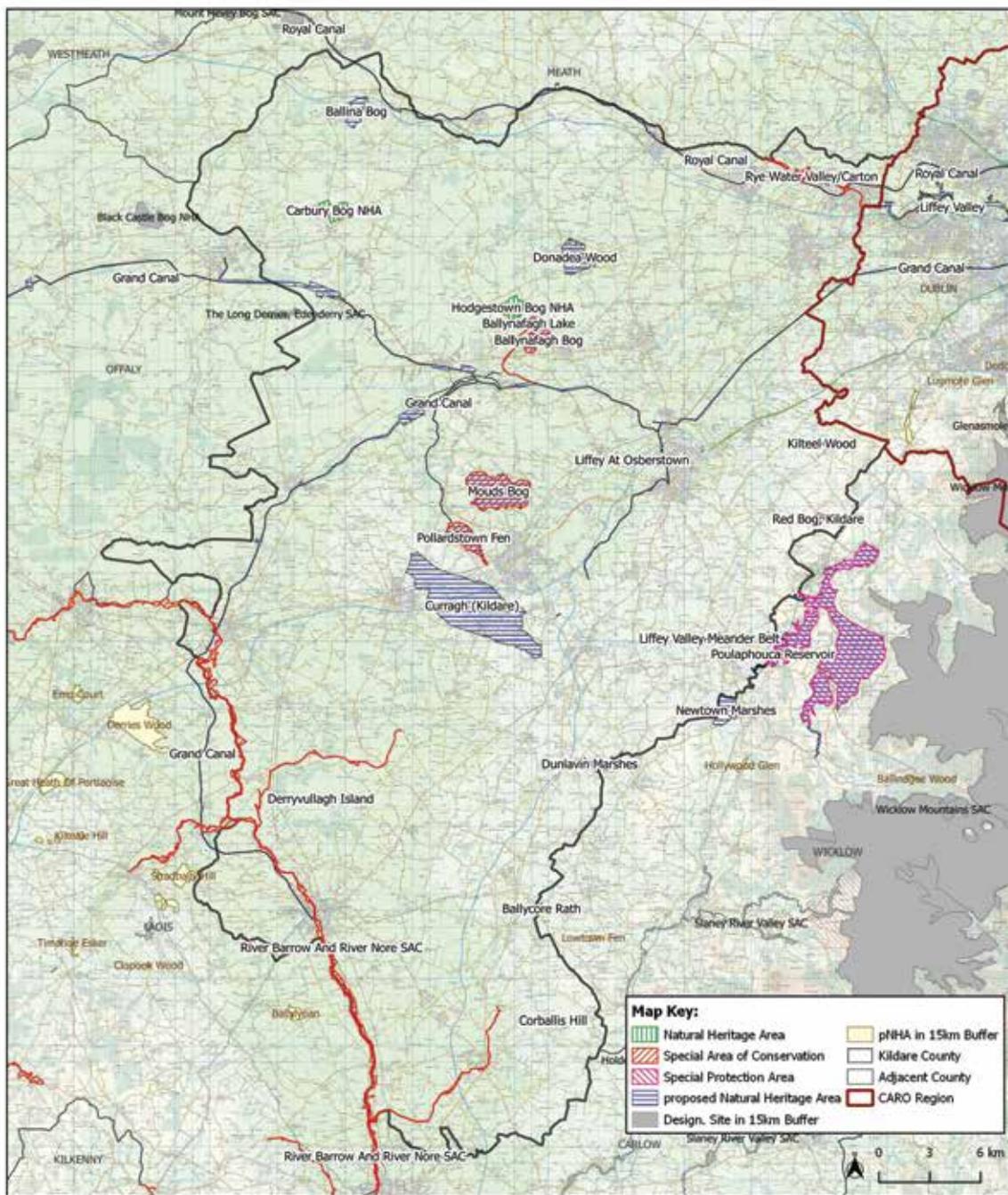
Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S.	Map Name: Bedrock		
Date: 29-03-2019	Map No: 002		
Data Source: OSI, KCC, CARO, GSI, OSNI	DB: BW	FB: PR	AB: JB
File Path: \\kewinf1\1\data\osni\GIS\Tasks\30_CARO\Maps	This drawing is to be read in conjunction with the written statement.		

This map shows the bedrock within the county of Kildare and surrounding areas. The names of urban settlements are also shown to highlight the spread of varies bedrock throughout the County.

Appendix 4: Maps of Kildare



OSI CCMA 2019/26/CCMA/KildareCountyCouncil

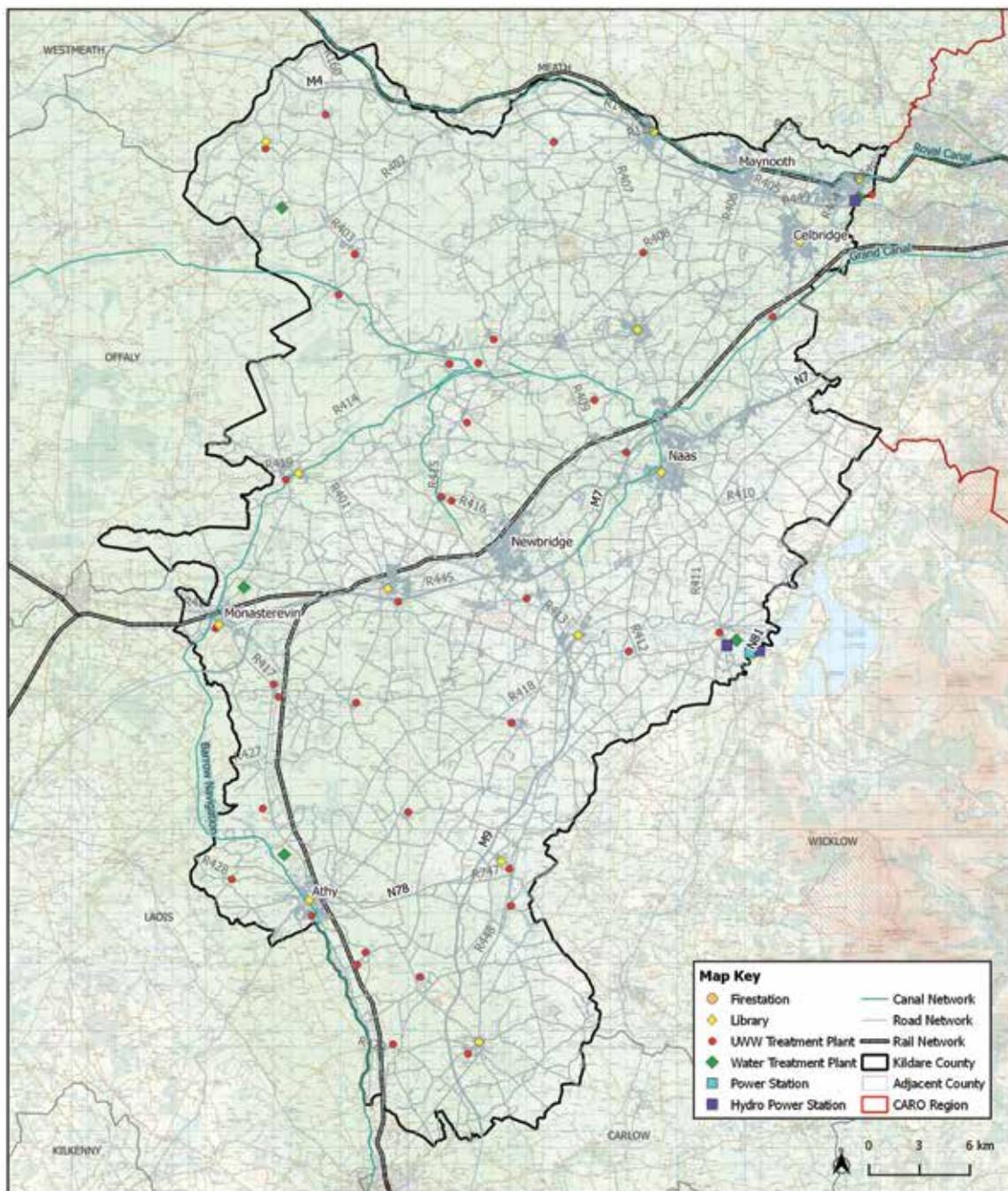


Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Natural Environment		
Date: 29-03-2019	Map No: 003		
Data Source: OSI, KCC, CARO, NPWS, OSNI	DB: BW	FB: PR	AB: JB
File Path: \\wawinf11\data\users\OSI\ Tasks\30_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows Natural Heritage Areas, proposed Natural Heritage Areas, Special Protection Areas and Special Areas of conservation. This map also shows those within a 15km buffer of the County border.



OSI CCMA 2019/26/CCMA/Kildare/County Council



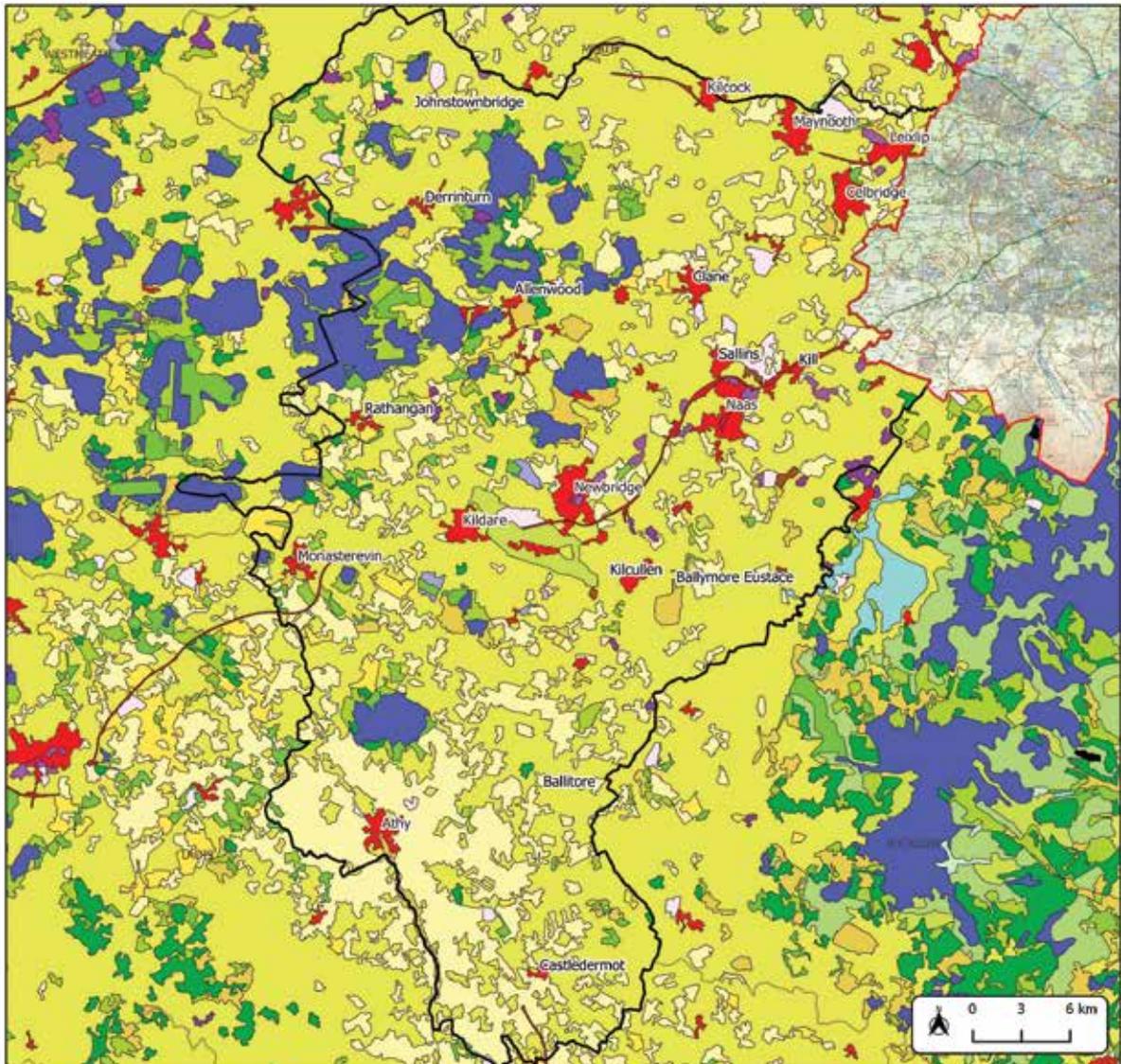
Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Built Infrastructure		
Date: 29-03-2019	Map No: 004		
Data Source: OSI, KCC, CARO, EPA, Waterways Irel, OSNI	DB: BW	RB: PR	AB: JB
File Path: \\kewinf1\data\users\GIS\Task\38_CARO\Maps	This drawing is to be read in conjunction with the written statement.		

This map shows Natural Heritage Areas, proposed Natural Heritage Areas, Special Protection Areas and Special Areas of conservation. This map also shows those within a 15km buffer of the County border.

Appendix 4: Maps of Kildare



Map Key

CORINE Classification

Continuous urban fabric	Mineral extraction sites	Pastures	Moors and heathland	Coastal lagoons
Discontinuous urban fabric	Dump sites	Complex cultivation patterns	Transitional woodland-shrub	Estuaries
Industrial or commercial units	Construction sites	Land occup. by agric., with nat veg.	Beaches, dunes, sands	Sea and ocean
Road / rail netw. & associated land	Green urban areas	Broad-leaved forest	Sparsely vegetated areas	Salt marshes
Port areas	Sport and leisure facilities	Coniferous forest	Burnt areas	Intertidal flats
Airports	Non-irrigated arable land	Mixed forest	Inland marshes	Peat bogs
	Fruit trees & berry plantations	Natural grasslands	Water courses	

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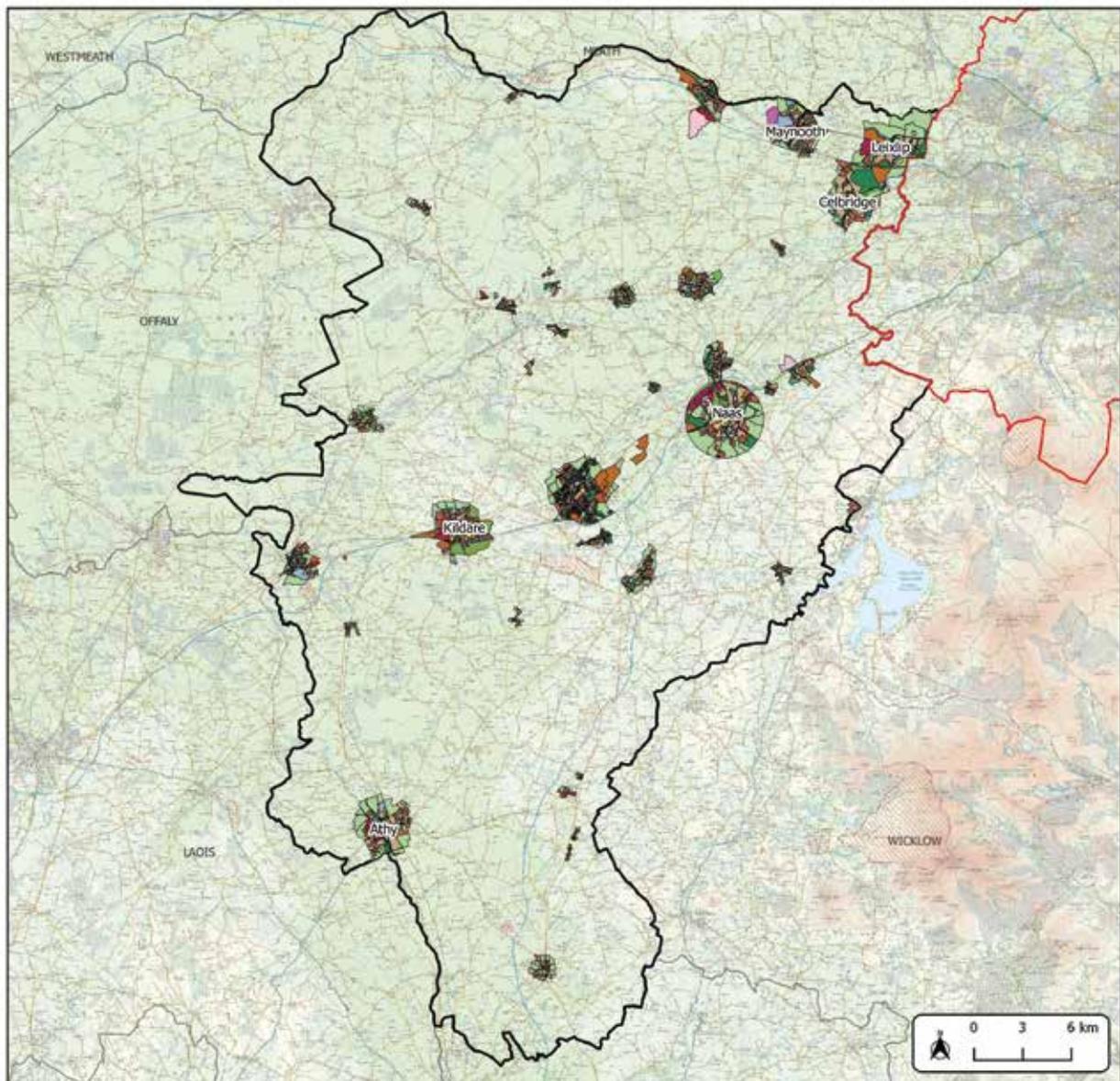
Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Land Cover		
Date: 27-09-2019	Map No: 006		
Data Sources: OSI, KCC, CARO, EPA, OSNI	DB: BW	RB: PR	AB: JB
File Path: \\viewinfst\data\users\GIS\ Tasks\38_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows land cover in the County based on CORINE (Coordination of Information on the Environmental) Data.

Appendix 4: Maps of Kildare



Map Key

Agricultural	Community & Education	Equine Industry	Integrated Leisure	Department of Defence
Enterprise & Employment	Existing Residential & Infill	General Development	Light Ind/Commerc/Warehouse	Strategic Reserve
Business & Technology	BNE 1: Low Density Residential	Nat Stud/Fut Park/Green Belt	Utilities & Services	Carton Avenue
Research & Technology	New Residential	Open Space & Amenity	Transport & Utilities	Regen. Magee Barracks
Commercial/Retail/Tourism	Equestrian	Strategic Open Space	Town/Village Centre/Extension	White Land
Commercial/Residential	Equine Leisure, Tourism & Enterpr	Leisure & Amenity	Neighbourhood Centre	

OST COM 2019/26/CCNA/KildareCountyCouncil



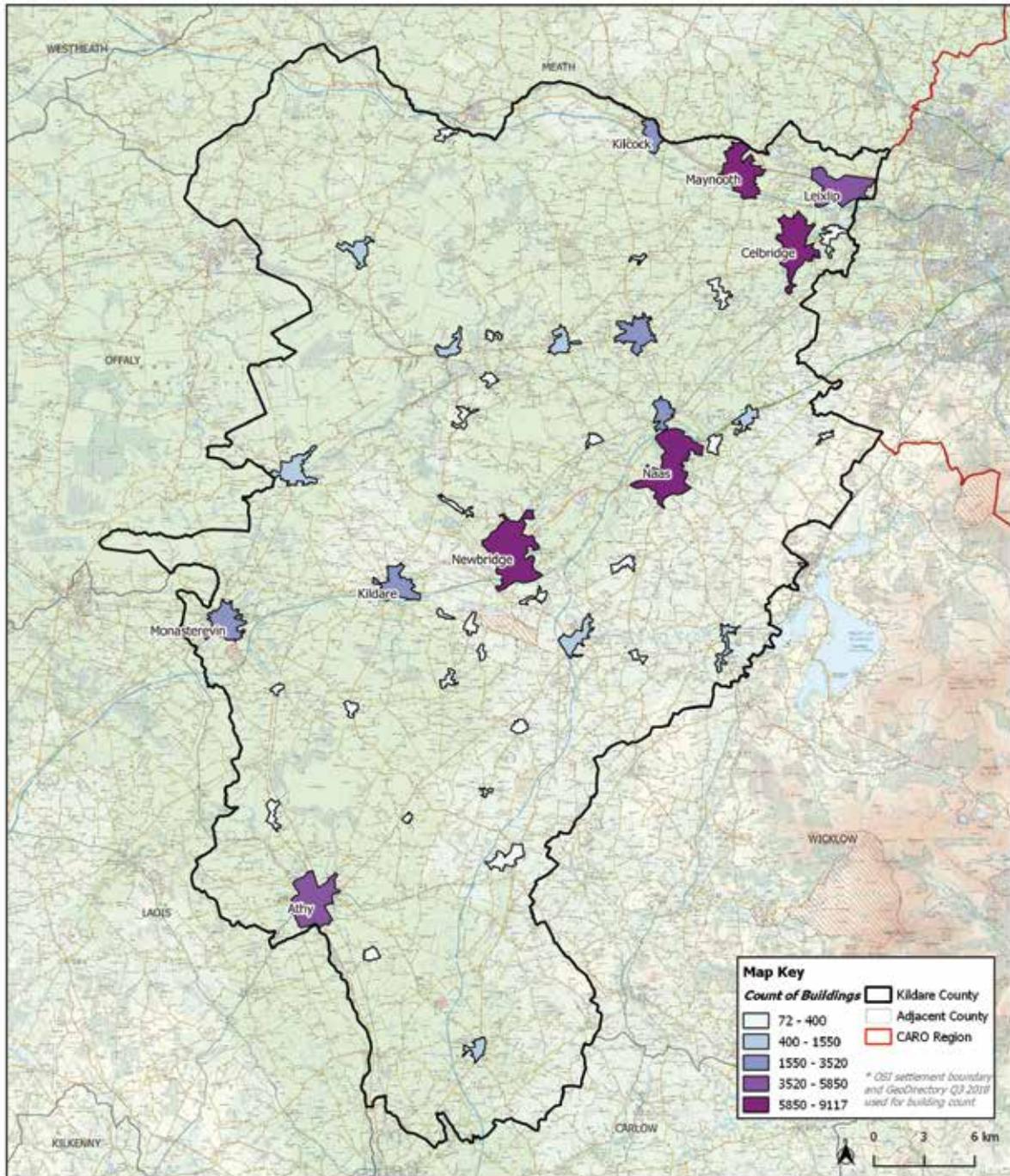
**Climate Change Adaptation Strategy
Kildare County Council
2019 - 2024**



The purpose of this map is to indicate the location and extent of zoned land in Kildare. The zoning categories and the plan life cycles are varied across the county. Please refer to the county development plan / local area plans for more detail.

Scale: N.T.S	Map Name: Land Use Zoning		
Date: 27-09-2019	Map No: 007		
Data Source: OSI, KCC, CARO, OSNI	DB: BW	RB: PR	AB: JB
File Path: \\(sewinf)\data\users\GIS\ Tasks\3B_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map should be viewed as a map that shows the general location and the extent of the Zoning in the County.



Map Key	
Count of Buildings	Kildare County
72 - 400	Adjacent County
400 - 1550	CARO Region
1550 - 3520	
3520 - 5850	
5850 - 9117	

* OSI settlement boundary and GeoDirectory Q3 2019 used for building count

OSI CCMA 2019/06/CCMA/KildareCountyCouncil



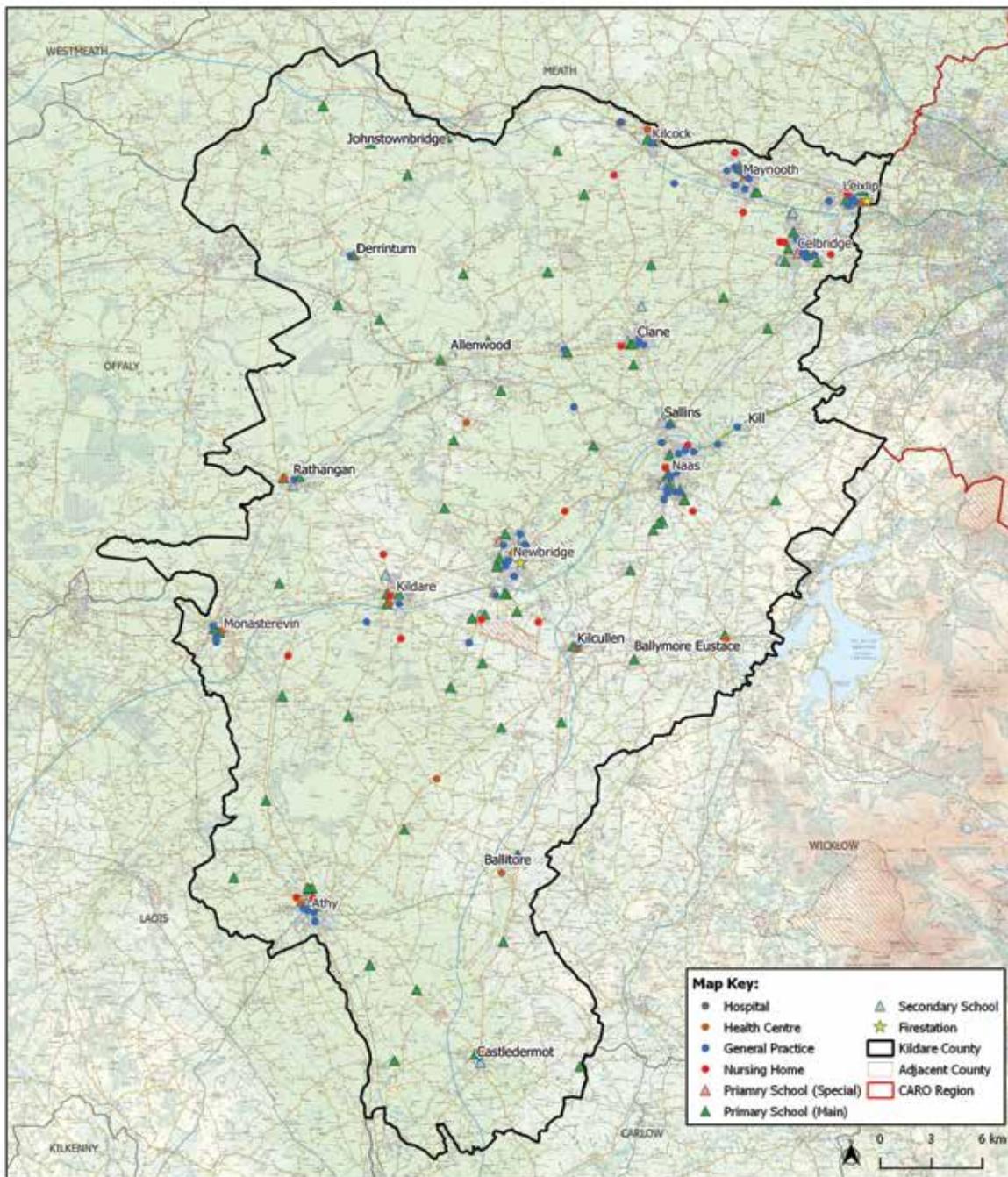
Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Urban Form and Buildings		
Date: 27-09-2019	Map No: 008		
Data Source: OSI, KCC, CARO, GeoDirectory, OSNI	DB: BW	RB: PR	AB: JB
File Path: \\Kevin\fs1\data\users\GES\ Tasks\JB_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows the main urban settlements in the County. The urban settlement highlight the amount of buildings within each settlement.

Appendix 4: Maps of Kildare



OSI COP4 2018/26/COP4/KildareCountyCouncil

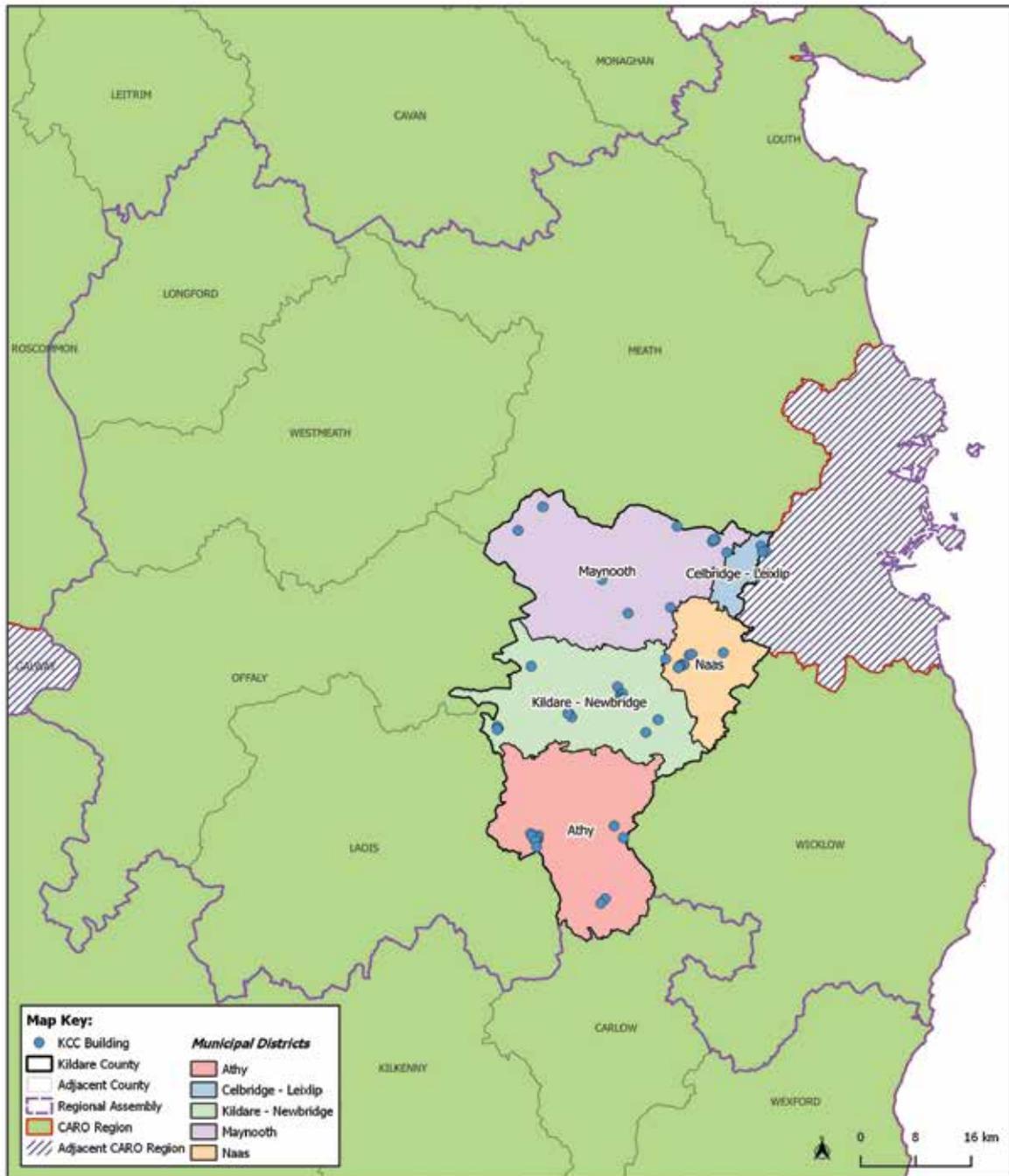


Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Critical Infrastructure		
Date: 27-09-2019	Map No: 009		
Data Source: OSI, KCC, CARO, NIAH, NMS, OSNI	DB: BW	FB: PR	AB: JB
File Path: \\filewin1\data\users\GIS\ Tasks\36_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows locations where vulnerable people may be within the County including hospitals, health centre, nursing homes and schools.



OSI CCMA 201806/CPM/KildareCountyCouncil

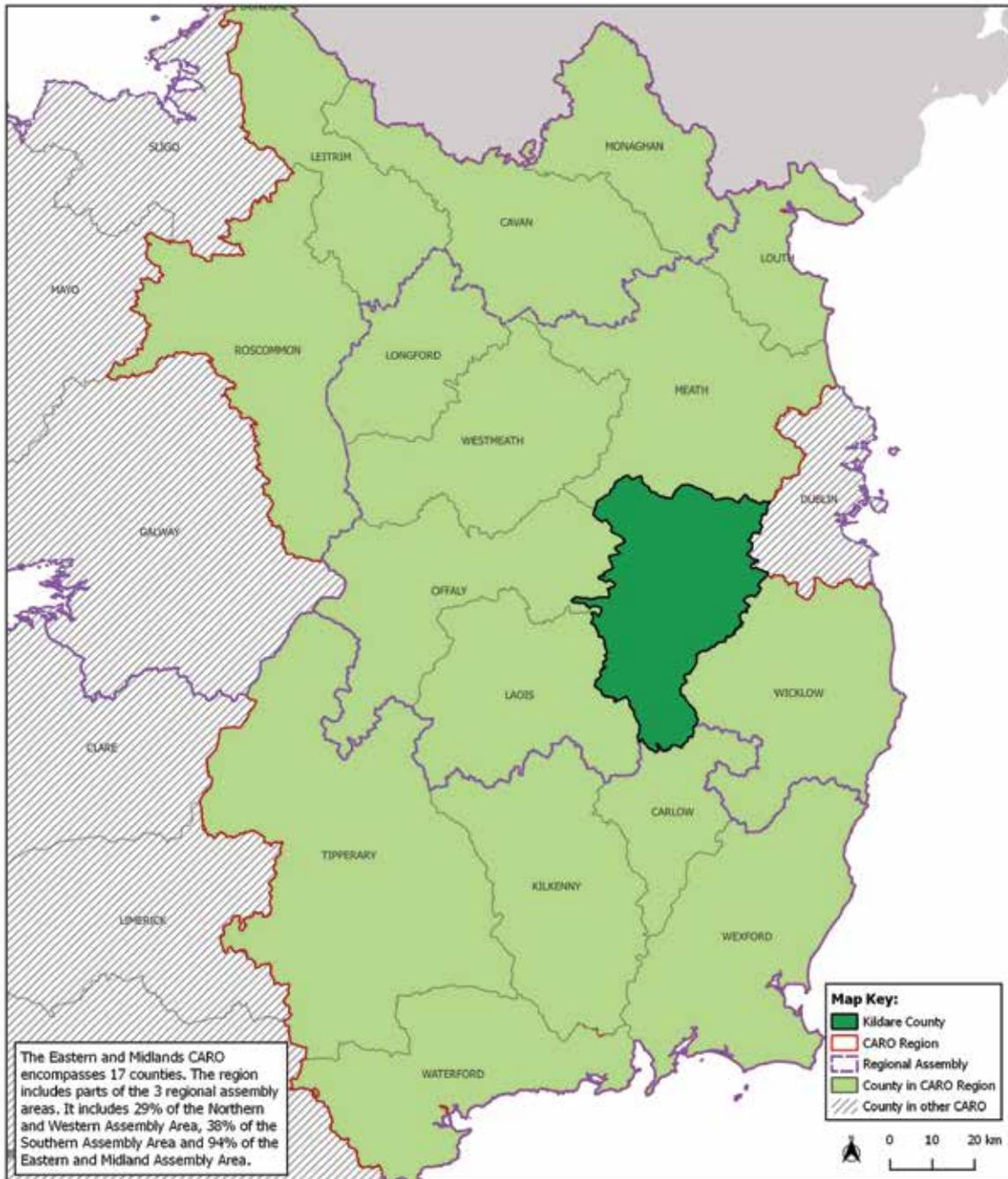


Climate Change Adaptation Strategy Kildare County Council 2019 - 2024



Scale: N.T.S	Map Name: Administrative Boundaries / Management Units		
Date: 13-09-2019	Map No: 010		
Data Source: OSI, KCC, CARO, OSNI	DB: BW	PE: PR	AE: JB
File Path: \\Kewinfs1\data\users\GIS\Task\36_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map highlights County Kildare's Current Municipal Districts, Council Buildings within these Districts and bordering Counties.



DS2 COM 2019/26/COM/KildareCountyCouncil



**Climate Change Adaptation Strategy
 Kildare County Council
 2019 - 2024**



Scale: N.T.S	Map Name: Eastern and Midlands Climate Action Region		
Date: 29-03-2019	Map No: 011		
Data Source: OSI, KCC, CARO, OSNI	DB: BW	PB: PR	AB: JB
File Path: \\Wexford\data\users\GES\Task\38_CARO\Maps	This drawing is to be read in conjunction with the written statement		

This map shows County Kildare within the Eastern & Midlands Regional Climate Action Region and within the Eastern & Midlands Regional Assembly.





Climate Change and Adaptation Background

The Earth's climate is changing with global temperatures rising at a rate far greater than experienced in recent history.

Changes in weather patterns have been observed around the world including changes in the frequency and intensity of extreme weather events.

Ireland's climate is changing in line with global trends with temperatures expected to rise even further intensifying the changes already experienced at a local level.

This in turn will have impacts on an environmental, economical and societal level.



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