



Comhairle Contae **Lú**  
**Louth** County Council

# CLIMATE CHANGE

## ADAPTATION STRATEGY

## **Acknowledgements**

The plan was developed in conjunction with the Climate Adaptation Group of Louth County Council which was chaired by David Hanratty, Senior Engineer, and co-ordinated by Dr Pamela Dagg, Climate Change Leader. The team members were Marguerite Quinn, Paddy Connolly, Helen Divilly, Brendan McSherry, Gerard Savage, Eamonn Woulfe, Pdraig O’Hora, Mary Deery, Riona McCoy Brian Lynch and Declan McMahon.

We wish to acknowledge the assistance of the CARO office, Cavan County Council, Monaghan County Council, Meath County Council and the Management Team of Louth County Council in preparation of this plan.

## Foreword

### Chief Executive



#### **Message from Joan Martin, Chief Executive**

Climate change is real and is happening now. People throughout Co. Louth have already experienced firsthand the potential impact of climate change, particularly through floods and storms and the damage that can ensue. Events like these, and the expected increase in their frequency, highlight the need for adaptation measures to help the Louth County Council cope with the effects of climate change.

Climate change presents very significant challenges for the organisation, both in terms of mitigating our emissions and achieving national binding targets, as well as adapting to the effects of a changing climate.

Louth County Council is fully committed to tackle climate change through these processes and thereby playing our part in contributing to county, regional and national climate action.

We have a vision of Co. Louth with a competitive, low-carbon, climate-resilient and environmentally sustainable economy. However, Louth Co. Council will still face substantial impacts of climate change due to past emissions. We need to prepare for these impacts in the years ahead and early action is imperative in order to minimise risks to the citizens, economic development, property, infrastructure and ecosystems and this Adaptation Strategy represents an important step in minimising the risks of climate change achieving our low carbon transition.

Joan Martin

Chief Executive

### Cathaoirleach



#### **Message from Cathaoirleach Liam Reilly**

I am delighted to present this Climate Change plan for Louth. Climate change is a local and global challenge which Louth County Council plays an important local role in adapting to climate change along with providing mitigation solution for this county.

Louth County Council has an important role in delivering climate change adaptation and mitigation actions. We have acknowledged the climate change is happening and have embraced climate change measures for example Louth County Council has already surpassed its target of 33% reduction in its energy consumption by 2020 and has already achieved 42% reduction in energy consumption by the end of 2018.

The actions presented in this plan will guide County Louth as we prepare for, respond to, and adapt to the impacts of climate change and facilitate a reduction in greenhouse gas emissions. The delivery of the short, medium and long term actions will enable the Council to become climate resilient going forward.

Louth County Council will continue to work with key stakeholders to influence and support carbon reduction and climate resilience across the County.

Liam Reilly

Cathaoirleach

## Executive Summary

The impacts of climate change are visible today and are expected to intensify over the coming decades. These extreme weather events create new challenges for Louth County Council and other state agencies for the delivery of services along with impacting on local communities and businesses.

As a response to the impact that climate change is having, and will continue to have, on the County of Louth and its citizens, Louth County Council has developed a Climate Change Adaptation Strategy. Climate change adaptation will allow Louth County Council to plan for these severe weather events and to make the organisation and its communities more sustainable and climate resilient going forward. This Strategy, while unique to our functional area is a collaborative approach to climate change adaptation across the Eastern and Midlands Region.

The adaptation baseline has identified that the effects of climate change are already impacting the Louth area at a significant rate and are very likely to increase in their frequency and intensity. Climate change is likely to have a considerable impact on flood risk in Co. Louth, such as through rising mean sea levels, increased wave action and the potential increases in winter rainfall and intense rainfall events, as demonstrated by storms of 2002 and 2005 where breaches of existing flood defence infrastructure causing property damage.

County Louth has also experienced extreme temperatures, as witnessed in 2010 and recently in 2018, with Met Éireann issuing its first ever Status Red warning for snow in February, followed by one of the hottest summers on record. All these extreme weather events clearly highlight the need to reduce the impacts that climate change is having on the citizens, environment and the economy of County Louth, and on the services Louth County Council provide.

This Adaptation Strategy is based around six thematic areas below that are developed as High Level Goals; these goals identify the

desired outcomes anticipated through the effective implementation of the climate change adaptation strategy. They are supported by specific objectives and adaptation actions to achieve their desired outcomes:

*Theme 1: Local Adaptation Governance and Business Operations*

*Theme 2: Infrastructure and Built Environment*

*Theme 3: Land use and Development*

*Theme 4: Drainage and Flood Management*

*Theme 5: Natural Resources and Cultural Infrastructure*

*Theme 6: Community Health and Wellbeing*

In order for Louth County Council to achieve these goals, this Climate Change Adaptation Strategy sets out the current and future climate change impacts in the County, through the development of adaptation baselines. It also examines the future impacts and risks that climate change may have on the County and then sets out a first iteration of actions that will be used to reduce our vulnerability to the effects of these impacts.

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# 1 Introduction

## 1.1 INTRODUCTION

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

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

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

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

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

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

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

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

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

### 1.3 The Challenge of Climate Change

*Climate* is described as the average weather prevailing in an area over a period of time. *Climate Change* is a significant change in weather patterns such as rainfall, temperature, and / or wind, which continue over an extended period of time (i.e. over decades or longer). The Earth's climate is constantly changing. Climatic fluctuations are known to occur from natural causes including the Earth's orbit and tilt, volcanic eruptions, variations in solar energy and other phenomena such as the El Nino effect<sup>1</sup>. However, in more recent times, there are growing concerns that natural fluctuations in climate are being overtaken by rapid human-related activities which are negatively influencing climate variability and giving rise to serious implications for the rate of global warming.

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

- Burning of fossil fuels such as oil, gas, peat, and coal resulting in carbon dioxide emissions,

- Agricultural activities that lead to methane and nitrous oxide emissions,
- Emissions from changes in land use such as urbanization, deforestation, reforestation and desertification.

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

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

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

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<sup>1</sup>El Nino is a climate cycle in the Pacific Ocean with a global impact on weather patterns.

<sup>2</sup>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.

<sup>3</sup>Greenhouse Gases include: water vapour, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and industrial gasses: Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF<sub>6</sub>), and Nitrogen Trifluoride (NF<sub>3</sub>). Carbon Dioxide emissions in the atmosphere are the main greenhouse gas caused by human activity

## 1.4 The challenge for Ireland

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

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

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

- Increase in average temperatures across all seasons. Heat waves are expected to occur more frequently.
- Significant reductions are expected in average levels of spring and summer rainfall with a substantial increase in the frequency of heavy precipitation events in Winter and Autumn
- Decrease in wind speed and an increase in extreme wind speeds. The number of very

intense storms is projected to increase over the North Atlantic region.

- Sea levels will continue to rise for all coastal areas. The south of Ireland will likely feel the impacts of these rises first. Sea surface temperatures are projected to continue warming for the coming decade.

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

All local authorities including Louth County Council provide a wide range of services, many of which are already and will increasingly be affected by climate change. It is most likely that we will continue to play a critical role in responding to the impacts of extreme weather events and other impacts that are likely to emerge over the coming decades through various implementation tools available as a local authority<sup>4</sup>.

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<sup>4</sup> 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. As a Local Authority we play a pivotal role in planning for, and responding to, emergency situations. We are best placed to react faster and more effectively to local climate events given our close relationship with communities and extensive knowledge of the local natural and built environment. This is demonstrated by our prompt and unrelenting emergency responses to varying and more frequent extreme weather events.

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

## 1.6 Adaptation and Mitigation

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

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

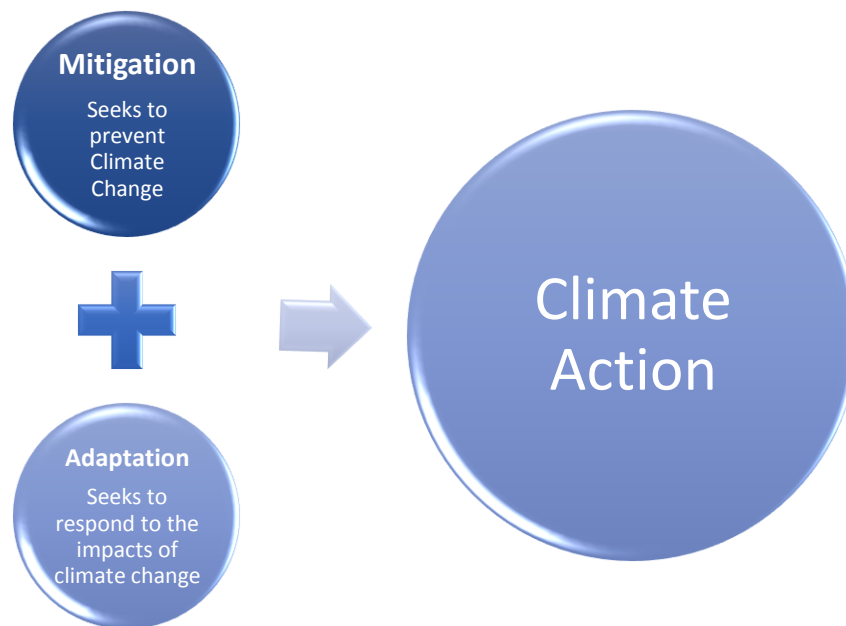
**While there is strong emphasis on local authorities through the NAF to develop and implement adaptation measures and actions, mitigation measures and actions that seek to combat, reduce or eliminate the emissions of greenhouse gases are also hugely important. Local authorities have a significant role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

There are positive interactions between adaptation and mitigation measures. Employing both adaptation and mitigation measures represents a robust climate action response in addressing the challenges associated with climate change at local level. The actions set out in Chapter 5 of this strategy reflect both adaptation and mitigation measures as a considered, relevant and integrated approach to combating the effects of climate change in County Louth.

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

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



## 1.7 Adaptation Policy Context

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

### International Context

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. The framework's objective is "to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." The framework set non-

binding limits on greenhouse gas emissions and contained no enforcement mechanisms. However the framework outlined how specific international treaties may negotiate further action towards its key objective. **The Paris Agreement 2015** is a protocol set within the context of the UNFCCC (ratified by Ireland on 4<sup>th</sup> November 2016) and it is aimed at:

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

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

#### 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.

#### National Context

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

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

**The Climate Action and Low Carbon Development Act 2015** was a landmark national milestone in the evolution of climate change policy in Ireland. It provides the statutory basis for the national transition objective laid out in the National Policy Position (as per above). Further to this, it made provision for and gave statutory authority to both the **National Mitigation Plan (NMP)**, published in 2017 and the **National Adaptation Framework (NAF)** published in 2018. This Local adaptation

Strategy forms part of the National Adaptation Framework.

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

#### Development Goals

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

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

Figure 1.2 National Adaptation Plan schematic

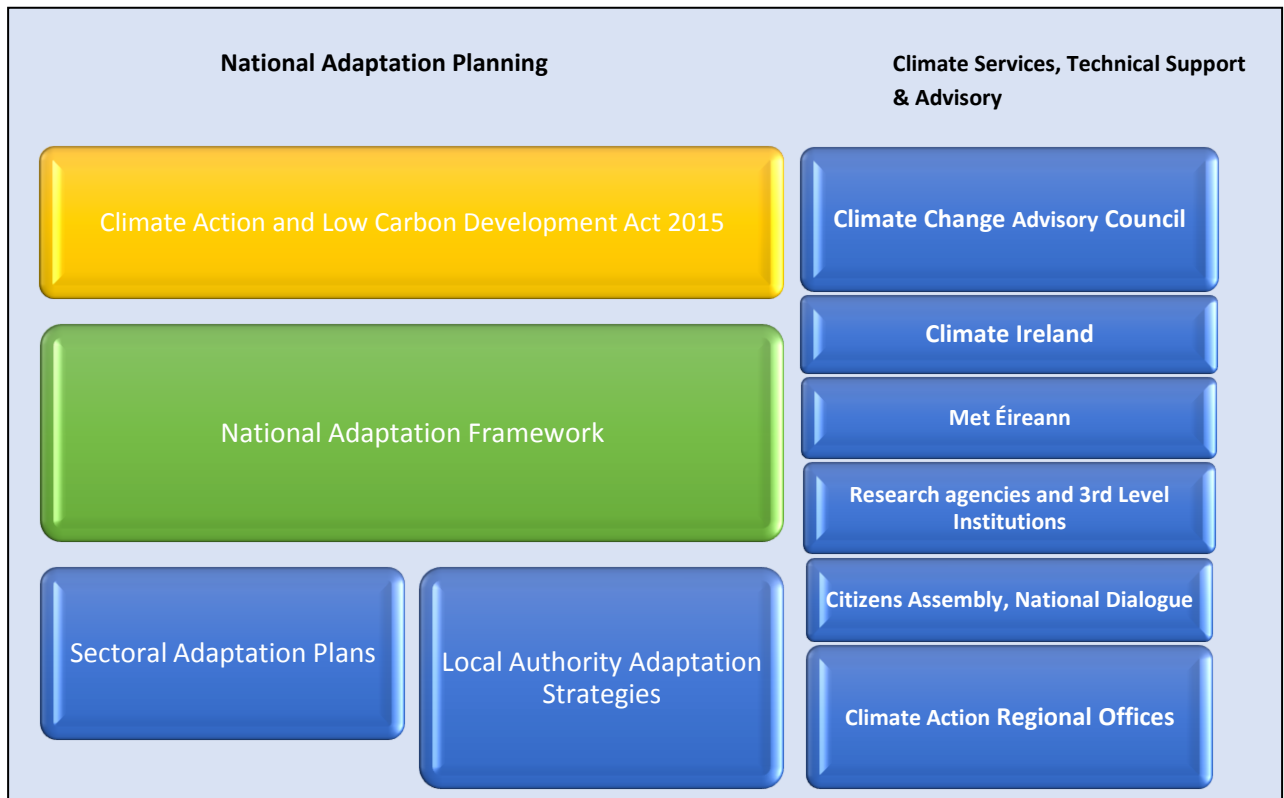
#### Relationship with other key climate related plans/strategies

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 Monaghan, Cavan and Meath County Councils and relevant cross border agencies.

2030 targets and to set a trajectory to meet



### 1.8 National climate Action plan

The all of government Climate Action Plan 2019 - To Tackle Climate Breakdown was published on Monday 17th June 2019. The plan sets out 183 individual actions over 12 sectors and charts an ambitious course towards decarbonisation. It acknowledges the failure to meet emissions targets to 2020, failure to address efforts to decarbonise particularly during the period of the economic downturn and failure in breaking the link between emissions and economic growth. In light of this, the ambition is clearly set out to deliver a step-change in emission performance over the coming decade to meet

2050 objectives. There is strong commitment under new governance arrangements to update the plan annually, to track performance of targets and revise or update the actions as necessary. To drive the successful and practical implementation of Climate Action towards achieving 2030 and 2050 targets, the Minister for Communications, Climate Action and Environment will bring forward a legislative framework through a new Climate Action Act.

Within the 12 Sectors described in the Plan, the Public Sector is identified as having a significant role in 'Leading by Example' to not only just reduce their own emissions but to

inspire climate action across communities and society. Local Government in particular is recognized for its pivotal role in stimulating climate action at community level. The Plan speaks also to the role of the Climate Action Regional Offices (CARO) in assisting local authorities in building capacity to engage effectively with climate change. There are a range of actions that are specific to and/or relate to local authorities as well as the CAROs.

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

- Reducing emissions by 30% and Improve energy efficiency of local authority buildings by 50% under the guidance of a new Public Sector Decarbonisation Strategy.
  - Setting a target to demonstrate leadership in the adoption of low emission transport options
  - Developing and implementing a Climate Action charter
  - Public buildings (all) to reach BER 'B' Rating
  - Building capacity through up-skilling and knowledge dissemination
  - Supporting and delivering projects that include strong ambition on climate action through funding resources from Project Ireland 2040
  - Developing robust community engagement on climate action by linking to existing and new networks and clustering initiatives using the National Dialogue on Climate Action and local authority structures.
  - Working with communities to expand Sustainable Energy Communities.

Continue to implement Adaptation Planning with emphasis on building Climate Resilience

and delivering the objectives of the National Adaptation Framework

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

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

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

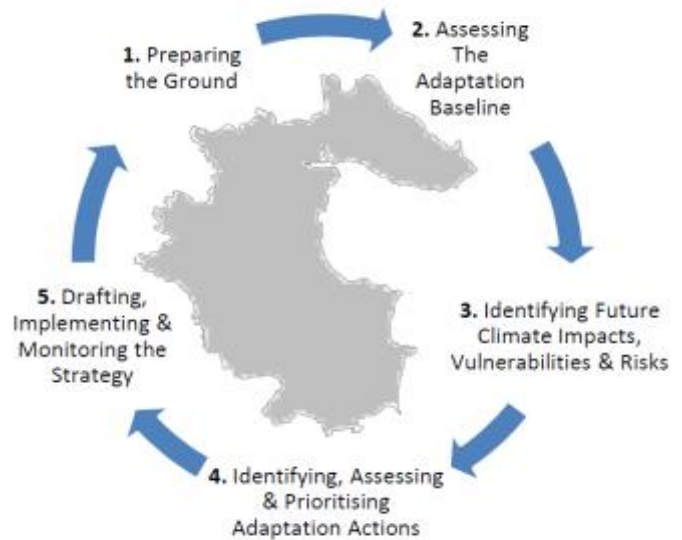
Local Authorities, through the process of Adaptation Planning are gaining a clear understanding of the risks presented by climate change and the current levels of vulnerability to such risks. Actions identified in the adaptation strategies are aimed at building climate resilience and integrating adaptation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

### 1.9 Methodology

The methodology used for this plan was initially based on the EPA's "Local Authority Adaptation Strategy Development Guidelines", however was subsequently aligned with the process as described in the Local Authority Adaptation Strategy Development Guidelines 2018. These guidelines are structured around a 5 step planning cycle, these are:

1. Preparing the Ground;
2. Assessing the Adaptation Baseline;
3. Identifying Future Climate Impacts, Vulnerabilities and Risks;
4. Identifying, Assessing and Prioritising Adaptation Actions;
5. Drafting, Implementing and Monitoring the Strategy.

Figure 1.3 shows these steps in sequence but adaptation decision-making is an iterative process and moving backwards or forwards to revisit a step or anticipate a future step may also be appropriate. The steps were further adapted to meet the specific needs of Louth County Council.



**Figure 1.3 Adaptation strategy development process**

#### Step 1:- Preparing the Ground

Louth County Council Senior Management was integral as an avid supporter of preparing for the impacts of climate change, ensuring resilient over time, and helping solidify awareness and commitment to adaptation planning within the organisation and ensuring the involvement of the right people at key stages of the process.

In June 2018, a Climate Adaptation Team was established made up of personnel at a senior level drawn from a wide range of disciplines across the Council. The adaptation team were introduced to Climate Change and garner their initial feedback on impacts and department specific actions. Existing and anticipated changes to climate variables (rain, wind, temperature, snow) was presented as a basis for impact identification by the team. The group also included a scan of existing policies, programs, plans and bye-laws to identify existing adaptation actions and opportunities to include adaptation considerations. Step 2 – Assessing the Current Adaptation Baseline

This step focused on the risk and vulnerability assessments which were completed by the Climate Adaptation Team through a series of meetings and workshops. A workshop was facilitated by the CARO office in Louth County Council on the 23<sup>rd</sup> January 2019 for the Climate Change Adaption Group and senior management of Louth County Council (see Figures 1.4, 1.5 below). This workshop focused on brainstorming actions to identify and assess the baseline for County Louth. A mapping exercise was then completed to identify Louth County Council assets which had potential to be vulnerable to severe weather events.

The Core Team also collaborated across authority boundaries and meetings were held by the climate change adaptation leader with Monaghan County Council, Meath County Council, Dundalk Institute of Technology, Newry Mourne District Council, Climate Change Regional Office for the Eastern and Midlands as well as internal meetings with section leaders.



Figure 1.4 Photograph of the internal workshop



Figure 1.5 Photograph of the internal workshop

### Step 3 Identify future climate change impacts, vulnerabilities and risks

After establishing the baseline for County Louth the core team through the workshop and meeting identified future climate change impacts on the council and the county. These vulnerabilities and risks of the future impacts were recognised so that strategy could be divided into thematic areas for actions to be proposed.

### Step 4 Identifying, Assessing & Prioritising Adaptation Actions

Once the baseline and all future impacts, vulnerabilities and risk were identified, the adaptation team assessed the range of services Louth Co. Councils provides and their ability to cope with projected climate changes. Following from this, a range of additional measures were identified for implementation in the short, medium and long term to help you cope with current and future climate impacts.

### Step 5 Drafting, Implementing and monitoring the strategy

With the bulk of the works completed in the previous steps, the information was collated into a draft Climate Adaptation Strategy, using

the suggested content for the strategy as outline in the guidelines.

How the strategy would be implemented, monitored and evaluated was also included within this step 5.

The strategy is required, under the National Adaptation Framework, to be reviewed every 5 years, however the adaptation strategy is a living document and it is essential that this document is updated to ensure that it stays up to date with evolving science, socio-economic considerations and experiences.

The draft plan will be placed on public display in line with provisions of public consultation and stakeholder communication plan. Consultation with prescribed environmental authorities for the purposes of Strategic Environmental Assessment will be undertaken in accordance with the provisions of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011).

#### **Environmental Assessment: SEA/AA**

##### ***Screening Overview for SEA***

Under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011), all plans which are likely to have a significant effect on the environment must undergo screening to determine whether a Strategic Environmental Assessment (SEA) is required. "Screening" is the process for making a determination as to whether a particular plan, would be likely to have significant environmental effects, and would thus warrant SEA. This strategy has been screened for SEA and it is determined that full SEA is

not required. The screening report accompanies this strategy.

##### ***Screening overview for AA***

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

## 2 Regional and Local Context

### 2.1 County Louth in Context

Louth County Council is located within the Eastern and Midlands Climate Action Region (CARO) and is one of 17 Local Authorities in the region. Louth County Council is located to the north east of this region. The Eastern and Midland CARO has assisted and supported Louth County Council in the development of this climate change adaptation strategy.

### 2.2 Background to the Eastern and Midland Climate Regional Office

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

The four CAROs have been established to drive climate action at both regional and local

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

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

The four CARO regions and constituent local authorities are illustrated in Table 2.1 as follows:

**Table 2.1**

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



### 2.3 Profile of Eastern and Midland Climate Action Region

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

The Irish Sea bounds the region to the east. Counties Louth, Wicklow, Wexford and Waterford are located to the east and south east of the region all with extensive coastlines along the Irish Sea.

The region with its extensive pattern of settlement areas and rural areas and has a population of almost 1.8 million people accounting for 37.7% of the total population of the state<sup>5</sup> and at 32,542 sq.km occupies 46.3% of the area of the state<sup>6</sup>. The region plays a significant role economically to the country hosting a range of sectors inclusive of multinationals, public service, private and small-medium

enterprises. Agriculture remains the prevailing sectoral landuse in the region.

There is a rich variety of landscapes and topographies across the region. A mostly flat low lying landscape sweeps through the midland counties. Significant areas of raised bogs occupy this central location in the country as well as the Curragh Plains extending towards the Curragh Plains in County Kildare. The Drumlin Belt across the northern aspect of the region, the Wicklow Mountains, Galtee Mountains and Slieve Bloom Mountains offer variation and punctuation in the landscape of the region.

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

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

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

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<sup>5</sup> Total population of E&M Region is 1,796, 923 persons. The state population is 4,761,865 persons (CSO, 2016).

<sup>6</sup> Total area of state is 70,282 sq.km

In 2016 Co. Louth was the sixteenth largest county (measured by population) in the State at 128,884 (CSO Census of Population). The county was the smallest of the 32 counties in area (827 sq. km). In 2016, the county had a population density of 156 persons per sq. km, compared to the state at 70 persons per sq. km.

Co. Louth’s population growth during the period 2002-2006 (26.6%) was stronger than that of the State at 8.2%. In the intercensal period 2011-2016, the population of the county grew by 4.9% compared to the State at 3.8% (slowest rate of growth in twenty years)

The County has two of the largest towns in the country, Dundalk (39,004) and Drogheda (42,347). Both towns are identified as regional centres in the National Planning Framework – Project Ireland 2040 (NPF) and have a key role in the Dublin-Belfast cross-border network. In addition to these major urban centres, the County also contains a number of substantial towns and villages including Ardee, Dunleer, Clogherhead and Carlingford. The County is strategically located along the Dublin-Belfast Economic Corridor and has strong links to Northern Ireland, and Newry in particular.

Quality road and rail networks that provide arterial connections to Dublin City, some 70 km distant, serve Co. Louth, placing it within commuting distance of the city. Belfast City is approximately 80 km distant.

Transport corridors within the County include a hierarchical road network, ranging from motorways to local access routes, in conjunction with cycle paths and footpaths. This transport corridor is also evident in the rail line which traverses the County on a north-south axis.

Motorway: M1 49km  
 National primary 22Km  
 National Secondary 26km

Louth falls within two river basin districts namely:

- Neagh Bann River Basin District (NBRBD),
- Eastern River Basin District (ERBD)

There is over 300km of rivers and watercourse in the county; however the 10 main rivers are as follows in Table 2.1:

Main Rivers in County Louth	
Big River	River Dee
Flurry / Ballymascanlan	Glyde River
Castletown River	Termofeckin
Fane River	River Boyne
White River,	Mattock River

**Table 2.1** Main Rivers in County Louth

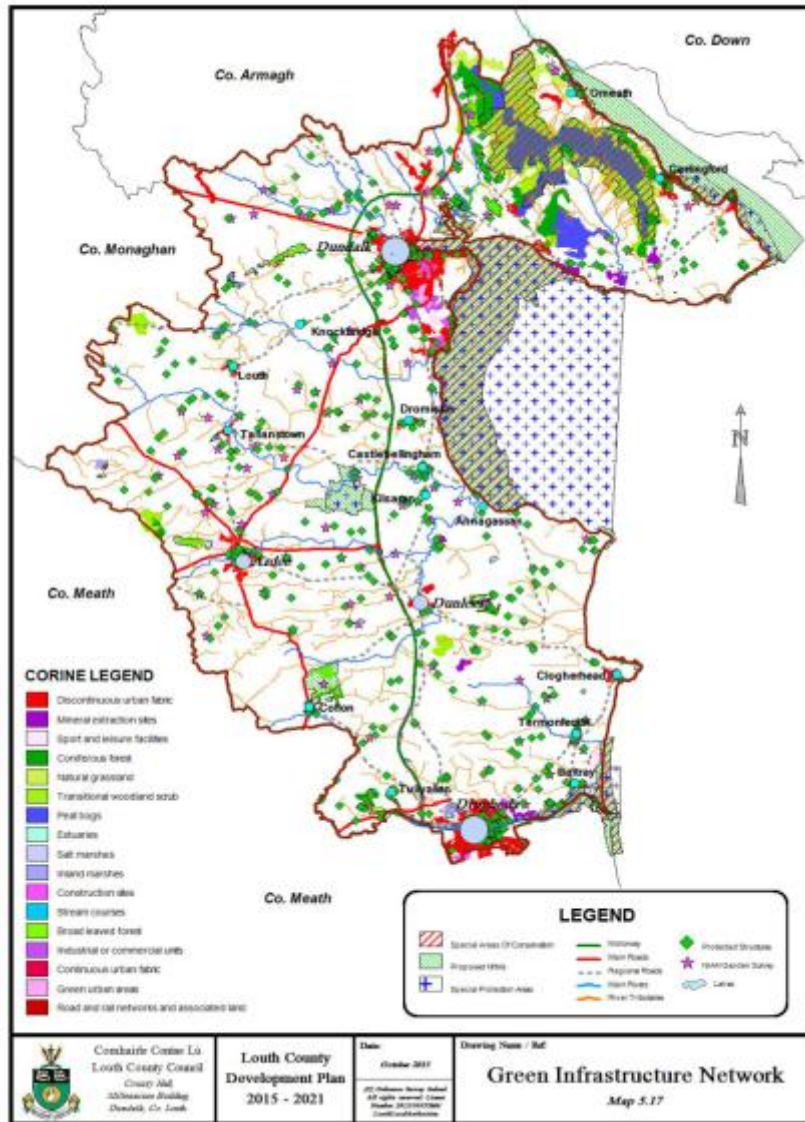
The coastline of Louth stretches from the County Armagh border, through Carlingford Lough, Dundalk Bay and as far south as the Boyne Estuary south of Drogheda over a length of 110km. The coastline is an important resource to protect and is one which is also subject to erosion from sea level rises due inter alia to climate change. Our existing coastal protection measures are located along the coast line at Blackrock, Salterstown, Port Beach, Baltray and Bellurgan, and Dundalk.

There is a rich variety of landscapes and topographies across the county it is evident that the north of the County is dominated by peat bogs and is, buffered by grassland and forestry. The Cooley mountain range covers most of the land cover in North Louth which is then bounded along the coast by the 3 settlements of Omeath, Carlingford and Greenore. The populated area in the north of the County is Dundalk. The Corine map illustrates a scattering of settlements which are also surrounded by agricultural lands. The coastline along the southern section is less



ecclesiastical sites, to architectural heritage of notable town centre buildings, tower houses, churches, country houses, demesnes and vernacular buildings. The County also contains many items of industrial heritage such as mills, road and rail bridges and associated infrastructure. The County's archaeological remains constitute important evidence of

Louth's past and are a finite and fragile resource, very vulnerable to modern development and land use changes and climate change. The Council considers that the archaeology of the County is an important asset.



Map 2.1 Green Infrastructure Network of County Louth

## 3 Adaptation Baseline Assessment

### 3.1 Introduction

Louth County Council has prepared this adaptation baseline assessment in line with the Local Authority Adaptation Development Guidelines issued by the Department of Communications, Climate Action & Environment in December 2018. The aim of the baseline assessment is to identify and document past severe weather events that impacted County Louth and to identify the risks associated with such events. In addition, the baseline assessment will also assist in highlighting the need for the Major Emergency Plan to be reviewed to incorporate severe weather events due to climate change that impact County Louth. From the baseline assessment Louth County Council can then assess current and future risks associated with severe weather events that may impact the County and consequently put in place appropriate actions to help ensure that the county is able to adapt to changes in climate by attempting to develop a more climate resilient County. Before progressing any adaptation baseline assessment, it is important to first identify and summarise the major climatic or severe weather events that have impacted County Louth.

### 3.2 Past Climate Events

#### Major Past Climatic Events

A timeline of severe weather events is shown in Figure 3.1 and Table 3.1 provides information and details of the severe weather events. The frequency of events has increased over the decades and severe weather events are becoming more common place. County Louth has experienced an increase in major climatic or severe weather events in more recent times. Although we cannot definitely

say that climate change was the cause of all these events, such events are the most likely consequence of climate change. In County Louth, the effects of these events are wide ranging and include heavy rainfall resulting in flooding (pluvial, fluvial and coastal), damaging gusts due to violent winds, periods of extreme heat resulting in gorse fires, roads melting, hose pipe ban, impact on delivery of services, and extreme cold resulting in extreme frost conditions and heavy snowfall in locations across the county.

Even within the past 5 years Co Louth has experienced a variety of extreme weather events and the cost of dealing with specific events are listed in Table 3.1. Louth's level of rainfall is also changing for example in 2014, the Ardee road in Dundalk, Co. Louth experienced severe flooding which resulted in 13 homes in a housing estate being isolated due to flood water, along with flooding of a neighbouring business park. (See case study number 1). The following Winter 2015/2016 saw a series of rainfall storms impact County Louth the most severe being Storm Desmond which impacted the county severely in early December 2015. This particular severe weather event saw significant flooding in the towns of Dundalk and severe damage to the county's infrastructure particularly the regional and local road network throughout the county. Data Met Éireann indicates that in the last decade, the number of days with rainfall greater than 10mm is increasing and their datasets indicates that there was a 20% increase in the average rainfall for the period 1961-2010<sup>2</sup>.

As Louth is a coastal county, the impact of weather events can be greater on its coastal area when combined with high tides. In 2015, the main street of Blackrock village was closed

due to storm surges and coastal flooding. (See Case study number 2)

In October 2017, the first red alert was issued across the country for Storm Ophelia (see case study 3), it had a major impact on local businesses, local communities, with public offices and schools closed. Louth's emergency services and outdoor staff called out to deal with a number of incidents including one fatality due to a fallen tree. This was closely followed in March 2018 when the Beast for the East (Storm Emma) (see case study 3) arrived, which resulted in public offices, schools, businesses, etc across the country being closed. There was disruption to communities and local business due to road

closures from heavy snowfall in various locations throughout the county.

The south of the county experienced its most significant snowfall since the great snowfall of 1982 that was attributed to the Beast from the East (see case study number 4) which also impacted a huge swathe of Europe. This event led to Met Éireann issuing a red warning for snow nationwide which led to significant disruption throughout the county including the closure of all public offices and schools with many businesses also forced to close. In addition, this event placed additional demand on the public and private water supplies throughout the county albeit this being less severe than experienced in other parts of the country.

Severe Weather Event	Description of damage	Cost (€)	Cost details
Big Freeze December 2010	Road closures, disruption to services	188,976	Watermain repairs and road repairs, winter gritting
Winter Storms December 13 to January 2014	Flooding	69,731	Clean up costs after severe flooding
Flooding event Dundalk 29-12-15-28-01-16	Flooding, Road closures	146,328	Flood relief and Clean up works
Storm Surges at Bellurgan 2002 & 2005	Breach of embankment. Flooding, road damage	800,000	Coastal Flood relief works
Flooding December 2016	Road closures, disruption to services	250,000	Flood damage repairs
Storm Ophelia October 2017	Road closures, disruption to services	9,385	Fallen Trees
November 2017 to May 2018	Damage to road networks	500,000	Road network repairs due to weather events
Storm Emma March 2018	Road closures, disruption to services	85,087	Clean up and call outs
Heat wave 2018	Road network damage with some roads being closed	20,000	Repair to heat damaged roads

**Table 3.1 Summary of past severe weather events and cost for Louth County Council.**

**Case Study 1: Flooding Ardee Road, Dundalk Co. Louth 2014**

This heavy rainfall event saw houses being flooded, 13 homes being isolated due to flooding along with a local business park being flooded. Road closures resulted from this flooding along with the impacts on local communities and businesses. Clean up works adapt to this events cost €69713. (See Figures 3.1 and 3.2 below)



**Figure 3.1.** Photograph of flooding of House Ardee Road Dundalk, Co. Louth



**Figure 3.2.** Photograph of business units being flooding in McArdle's Brewery Business Park, Ardee Road, Dundalk, Co. Louth.

**Case Study 2 Storm Surges – Blackrock**

Blackrock village has experienced a number of flooding events due to high spring tides and storm Blackrock Promenade (especially Main St.) High tide in February 2002 severely flooded this area. Houses along Main Street were damaged along with the Village Green/new Golf Links Road and Wallis Road /Rock Road junction. Floods impact approximately 1 in 5 years in this area. In 2015, Blackrock experienced storm surges which saw the main street being flooded and road closures (see Figure 3.3).



**Figure 3.3** Flooding in Blackrock Main Street due to storm surges in 2015.

### Case Study 3 Storm Ophelia (Fallen Trees)

There was widespread travel disruption in county Louth due to red alert for storm force winds which resulted in road blockages due to fallen trees.



**Figure 3.4** Fallen tree and damaged overhead wiring due to fallen tree in Omeath



**Figure 3.5** Fallen tree blocking Omeath to Newry road

### Case Study 4 Snow (Storm Emma)

This red weather alert caused a wide scale shut down of businesses, schools, public offices with wide spread disruption to local communities. Some local communities were closed off due to heavy snowfall in rural areas. (See photograph below Figure 3.6 to 3.7)



**Figure 3.6** Photograph of blocked road due to snow fall in the Cooley area



**Figure 3.7** Photograph of outdoor staff clearing road after Storm Emma in the Cooley Area of Louth.

### Common Climate Events / Climate Trends

A review of the weather events over the past 40 years in Ireland (see Table 3.2 and Figure 3.1) shows that there has been an increasing number of weather events in the last two decades. This change in weather events can be attributed to climate change. These severe weather events as previously described in section 3.1.1 have been used to formulate our baseline (See Section 3.2).

Extreme Weather Events for County Louth – Non Exhaustive List									
Year	Date	Event Type / Name	Outline Description	Climate Event					
				Strong Wind	Extreme rainfall	Heavy Snowfall / Low Temp	Sea Level Rise	Low rainfall / Drought	High Temp
2018	11 <sup>th</sup> October	Storm Callum	Orange wind warning – gale force winds up to 130km/hr- A lot of fallen trees disruption to power lines, roads, business, infrastructure, travel						
2018	September	Storm Ali	Orange Wind Warning – gale force winds of up to 120km/h, stormy conditions						
2018	Summer	High Temperatures, Heat wave & Drought	High Temperatures, Heat wave and drought – distribution to water supply, issues with road maintenance etc...						
2018	February / March	Storm Emma & Beast from the East	Blizzard / Heavy Snowfall / widespread heavy snow drifting. Disruption to business, emergency services, power cuts etc...						
2017	16 <sup>th</sup> October	Storm Ophelia (Ex-Hurricane Ophelia)	Red warning – gale force winds, heavy rain and storm surges along some coasts (flooding). Disruption to business, power cuts etc and a fatality in County Louth...						
2016	January	Heavy Rain	Wettest January of record – 126% of monthly long term average						
2014	12 <sup>th</sup> February	Storm Darwin	Orange warning for strong winds – classified as a 1 in 20 year event						
2013/14	Winter	Winter Storms	Winter storms – serious coastal damage and widespread, persistent flooding						
2010	Nov / Dec	Winter Cold Spell	Lowest temperatures on record in Dublin Airport (-8.4 <sup>o</sup> C) and Casemont Aerodrome (-9.1 <sup>o</sup> C)						
2009/10	Winter	Winter Cold Spell	Coldest winter in almost 50 years (Met Éireann)						
2009	November	Severe flooding	Rainfall totals were highest on record, extensive flooding						
2008	August	Heavy Rain and Flooding	Heavy rain and extensive flooding						
2006	Summer	High Temperature / Heat Wave	Warmest summer since record breaking 1996 (may have been exceeded by 2018)						
2002	1 <sup>st</sup> February	Coastal Flooding	Eastern and southern coasts – highest tide in 80 years						
1997	24 <sup>th</sup> December	Windstorm	Windstorm						
1995	Summer	High Temperatures, Heat wave & Drought	Warmest Summer on record. Mean temperatures over 2 <sup>o</sup> C above normal. Temp rises to 30 <sup>o</sup> C over a number of consecutive days						
1993	11 <sup>th</sup> November	Severe Flooding	In excess of 100mm of rain in 24 hour period in eastern and midlands						
1987	12-13 <sup>th</sup> January	Heavy Snowfall	12-19cm snow in the east and midlands						
1986	August	Hurricane Charley	Strong winds and rain, worst flooding in 100 years						

**Table 3.1** List of a non exhaustive Extreme Weather Events for County Louth



### 3.3 Assessment of Current Adaptation Baseline

#### Methodology

As previously described in Chapter 1, the methodology used was in accordance with the Local Authority Adaptation Strategy Development Guidelines 2018. The Core Team first reviewed the past weather events and their impacts on County Louth (see Section 3.1 above) and listed the impacts of by severe weather events had on the organisation (see Appendix 2 for 4 severe weather events, namely heatwaves, heavy rainfall, storms, extreme cold).

A workshop facilitated by the CARO office was completed on the 23<sup>rd</sup> January which established the baseline for the organisation. The findings from the workshop and from meetings with individual section by the climate change leader are summarized in Section 3.2.2 and Appendix 1 which forms the baseline for County Louth.

The team reviewed a wide range of reference source material used in the preparation of this plan such as Louth County Council Development Plan 2015-2021, Eastern Midlands Region Waste Management Plan 2015-2021, River Basin Management Plan for Ireland 2018-2021, Louth County Council Corporate Plan 2014-2019, National Adaptation Framework-Planning for a Climate Resilient Ireland 2018, Local Authority Adaptation Strategy Development Guidelines December 2018, [www.climateireland.ie](http://www.climateireland.ie), Flood Risk Management Plan Boyne 2018, Flood Risk Management Plan Neagh Bann 2018, [www.meteaireann.ie](http://www.meteaireann.ie), [www.floods.ie](http://www.floods.ie), Healthy Ireland for Louth Plan 2018-2022, Local

Economic Development Plan for Louth 2016-2021, Draft Biodiversity Plan for Louth, CFRAM, Eastern and Midlands Regional Assembly Draft Regional Spatial & Economic Strategy 2018, The County Louth Economic Development Strategy 2009-2015, along with utilising internal expert knowledge. Meetings were held with Monaghan County Council, Meath County Council, Newry Mourne District Council, Dundalk Institute of Technology (DKIT) and the CARO in preparation of the baseline and the strategic vision.

LCC works closely with Office of Public Works (OPW) in all matters relating for County Louth and their Flood Risk Plans and maps were reviewed in the formulation of the baseline assessment. The findings of the baseline assessment is detailed and summarised in Section 3.2.



Figure 3.9 Photograph of the internal workshop on the 23<sup>rd</sup> January 2019

## Chapter 3 Adaptation Baseline Assessment

### Baseline Assessment for County Louth

The following table summarises how services of the Louth County Council can be impacted by weather events with are linked to Climate change. This information was identified in the workshop (see appendix 1 for climate events risk register)

**Table 3.2 Baseline Assessment of Impacts for the delivery of services/functions of Louth County Council (non exhaustive)**

Services/Functions	Climate Hazard Impacts	Consequences
<b>Business operations/continuity</b>		
Business efficiency, effectiveness and emergency response	<ul style="list-style-type: none"> <li>• Building Closures – <b>storm, snow, extreme rainfall, drought conditions</b></li> <li>• Building damage, impacts on servers – <b>storm events.</b></li> <li>• Electricity supply affected – <b>storm events</b></li> <li>• Risks to staff welfare, public safety, local business and tourism assets - <b>storm, snow, rainfall, extreme heat events.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Service disruption to customers: motor tax, housing applications, scheduled meetings, arts/cultural events etc.</li> <li>• Inability to meet statutory deadlines e.g. planning applications – financial/reputational consequences, IT Services.</li> <li>• Resources stretched to deal with various impacts from extreme weather events above and beyond the performance of daily duties.</li> <li>• Increased pressure on emergency response and recovery operations.</li> <li>• Consequence to local/regional economies</li> <li>• Financial implications to local authority in clean up operations, staff overtime, unable to perform normal duties.</li> <li>• Economic impacts – longer term consequence to local economy and local authority in terms of rate collection.</li> </ul>
Business operations	<ul style="list-style-type: none"> <li>• Capitalising on opportunities arising from addressing the impacts of climate hazards.</li> </ul>	<ul style="list-style-type: none"> <li>• Positive</li> </ul>
<b>Infrastructure &amp; Built Environment</b>		
Roads/footpaths, bridges, project construction and maintenance	<ul style="list-style-type: none"> <li>• Changes in rates of deterioration - faster rate of deterioration in areas subject to <b>flooding, storm, rainfall, snow and heatwave events (combination events)</b></li> <li>• Infrastructure collapse, significant damage – <b>sustained duration and frequency of extreme events.</b></li> <li>• Blocked roads – <b>storm, snow, rainfall events</b></li> <li>• Impact on construction projects – <b>all extreme weather events.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Nuisance</li> <li>• Risk to public safety</li> <li>• Financial implications for unscheduled maintenance, repair, upgrade, new construction, staff overtime costs.</li> <li>• Reduced economic efficiency of road network for commuting traffic and emergency transport routes disrupted.</li> <li>• Time delays and cost implications in delivery of infrastructure.</li> </ul>

### Chapter 3 Adaptation Baseline Assessment

Services/Functions	Climate Hazard Impacts	Consequences
Building Stock – LA Buildings and social housing stock	<ul style="list-style-type: none"> <li>• Damage and deterioration of housing stock – <b>Storm, rainfall, snow and heatwave events (combination events)</b></li> <li>• Increased need for heat – <b>extreme cold events</b></li> <li>• Closure of Local Authority buildings – <b>storm, snow, rainfall events</b></li> <li>• Need for mechanical ventilation systems and cooling systems – <b>Heatwave events</b></li> </ul>	<ul style="list-style-type: none"> <li>• Cost of maintenance, safety implications to public, possible rehousing of tenants</li> <li>• Cost of fuel (negative or positive)</li> <li>• Service disruption</li> <li>• Pressure on housing staff to rectify reports issues.</li> </ul>
Flood defences & Coastal Infrastructure	<ul style="list-style-type: none"> <li>• Exceedance of existing flood defences – <b>storm surge, rainfall events (including all types of flooding events)</b></li> <li>• Increased coastal erosion and inundation – <b>storm surge, rainfall events</b></li> <li>• Increased frequency or permanent inundation of coastal infrastructure &amp; utilities i.e. water, sewerage, gas, communications, electricity, transportation routes – <b>storm surge, rainfall events</b></li> <li>• Destruction, damage, disturbance to council managed ports, piers, harbours, greenway and boat ramps - <b>storm surge, wind events.</b></li> <li>• Increased erosion and/or exceedance of seawalls, jetties and other coastal defences - <b>storm surge, sea level rise, rainfall and storm events.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Loss of capital infrastructure – cost of replacement.</li> <li>• Damage/loss of properties/lands take – displacement or isolation of communities</li> <li>• Disruption to commuting traffic, and utilities – economic impact.</li> <li>• Increased cost to local authority – repair, replacement.</li> </ul>
Community Infrastructure	<ul style="list-style-type: none"> <li>• Deterioration of community infrastructure eg, playgrounds, public parks, swimming pools, public realm spaces - <b>sustained weather extreme events.</b></li> <li>• Impacts on recreation amenities and tourism activities – <b>storm, rainfall, snow events.</b></li> <li>• Impacts on coastal recreational infrastructure and public areas – <b>sea level rise, storm surge.</b></li> <li>• Reduced water for swimming pools, irrigation of open spaces, parks etc - <b>drought conditions.</b></li> <li>• Beach closures, loss of blue flag beaches status eg. Due to e-coli levels after <b>storms, extreme heat events, heavy rainfall.</b></li> <li>• Risk to public safety in times of <b>high temperatures</b> for unsecured lakes, water spots (quarries).</li> </ul>	<ul style="list-style-type: none"> <li>• Cost of maintenance/upgrade.</li> <li>• Loss of revenue locally/regionally – tourism.</li> <li>• Closure of community infrastructure – short term.</li> <li>• Injury, illness or potential loss of life.</li> <li>• Loss of Reputation</li> </ul>

### Chapter 3 Adaptation Baseline Assessment

Services/Functions	Climate Hazard Impacts	Consequences
Cultural/Heritage	<ul style="list-style-type: none"> <li>Damage to cultural and heritage assets and cultural landscapes – <b>storm, rainfall, extreme cold and heat events</b></li> </ul>	<ul style="list-style-type: none"> <li>Negative impact on tourism – economic consequence locally/regionally.</li> <li>Loss of assets of intrinsic historical importance.</li> <li>Cost of maintenance/upgrade.</li> <li>Safety Implications</li> </ul>
<b>Water and Sewerage Services</b>		
Stormwater /sewerage	<ul style="list-style-type: none"> <li>Inundation of stormwater and sewerage infrastructure – <b>storm surge, rainfall events.</b></li> <li>Increased peak flows – <b>rainfall events</b></li> <li>Changes in groundwater levels – <b>drought conditions</b></li> <li>Changes in floodplains – <b>rainfall events</b></li> <li>Reduced dry weather sewerage flow performance - <b>drought conditions</b></li> <li>Reduced/unreliable power supply for pumping and treatment – <b>storm events</b></li> <li>Changes in mean and peak stream and river flows – <b>rainfall and drought events.</b></li> <li>Uncertain water availability – <b>drought conditions.</b></li> </ul>	<ul style="list-style-type: none"> <li>Disruption to communities</li> <li>Negative Environmental consequences - draw on staff resources to investigate/rectify.</li> <li>Additional demand on LA staff working under the SLA with Irish Water</li> <li>Local surface water flooding events.</li> <li>Loss of reputation</li> <li>Financial Implications</li> <li>Negative impact on tourism / business – economic consequence locally/regionally.</li> </ul>
Water Supply	<ul style="list-style-type: none"> <li>Increase in water demand and reduction in receiving water assimilative capacities during drought conditions – <b>drought events</b></li> <li>Flooding and inundation of wastewater treatment and water abstraction plants – <b>rainfall events</b></li> <li>Reduced availability of water supply sources during <b>low rainfall and drought events</b></li> <li>Loss of power supply during intense <b>storm events</b></li> <li>Increased potential for water contamination – <b>rainfall and drought events</b></li> <li>Salinisation of surface water and groundwater supplies in coastal areas – <b>storm surge</b></li> <li>Changes in availability of groundwater – <b>drought events</b></li> <li>Quality of water diminished – <b>rainfall, drought, heatwave events.</b></li> </ul>	<ul style="list-style-type: none"> <li>Nuisance to householders.</li> <li>Impact on economic development i.e. businesses and tourism.</li> <li>Health consequences with inadequate water quality.</li> <li>Additional demand on LA staff working under the SLA with Irish Water</li> <li>Additional demand on LA staff working on an emergency response</li> <li>Requirement for hose pipe bans and impacts on local communities including Local Authority parks and sports facilities</li> <li>Water pollution issues relating to reduction in surface water flows</li> <li>Network disruptions due to loss of power supplies.</li> <li>Loss of Reputation</li> </ul>

## Chapter 3 Adaptation Baseline Assessment

Services/Functions	Climate Hazard Impacts	Consequences
Wastewater	<ul style="list-style-type: none"> <li>• Inflow and infiltration to wastewater network – <b>rainfall events.</b></li> <li>• Interruption to anaerobic process – <b>heatwave events</b></li> <li>• Interruption to process – <b>freezing events.</b></li> </ul>	
Water Quality	<ul style="list-style-type: none"> <li>• Ground movement, in <b>high temps</b>, resulting in cracking of old wastewater pipe networks</li> <li>• <b>Increased flooding</b> mobilising runoff from land, including contaminants into surface waters</li> <li>• Changes in species distribution and phenology of river systems – <b>heatwaves, rainfall and cold events.</b></li> <li>• Low flows resulting in deterioration of water quality – <b>low rainfall/drought events</b></li> <li>• Saline intrusion of waters - <b>sea level rise and storm surge.</b></li> <li>• Beach closures, loss of blue flag beaches status e.g. due to e-coli levels after <b>storms, extreme heat events, heavy rainfall.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Increased discharges from drainage systems to ground-waters</li> <li>• Increased pollution of surface water systems</li> <li>• Changes to surface water habitats</li> <li>• Spread of pathogens and other contaminants</li> <li>• Impact on economic development i.e. businesses and tourism.</li> <li>• Inability to meet WFD requirements.</li> <li>• Inability to meet objectives to protect and conserve important habitats.</li> </ul>
<b>Natural Resources and Flood Management</b>		
Biodiversity	<ul style="list-style-type: none"> <li>• Shift in distribution of plant and animal species from heat and cold stress- <b>heatwaves and cold events.</b></li> <li>• Loss of bio-diversity - <b>all sustained extreme weather events.</b></li> <li>• Increased risk of disturbance to population and species leading to extinction – <b>heatwave events</b></li> <li>• Reduced ecosystem resilience to stress – <b>all extreme weather events</b></li> <li>• Increased ecosystem and species heat stress – <b>heatwave events.</b></li> <li>• Increased pressure on dune systems – <b>storm and heatwave events.</b></li> <li>• Increased bog and sand dune fires – <b>heatwave and drought events.</b></li> <li>• Invasive Species Management -Changes in rate of coverage and spatial distribution of invasive species – <b>change in average mean temperatures</b></li> </ul>	<ul style="list-style-type: none"> <li>• Inability to meet objectives to protect and conserve important habitats.</li> <li>• Negative consequence on health and wellbeing of communities.</li> <li>• Stretched emergency services in dealing with bog fires, fires on sand dune areas.</li> <li>• Economic impact – reduced tourism.</li> <li>• Cost and staff resources required to manage and deal with invasive species</li> <li>• Increase risk of flooding due to loss of natural attenuation</li> </ul>

### Chapter 3 Adaptation Baseline Assessment

Flood Management	<ul style="list-style-type: none"> <li>Increased flooding (fluvial, pluvial, coastal) events <b>all extreme weather events</b></li> </ul>	<ul style="list-style-type: none"> <li>Loss of capital infrastructure – cost of replacement.</li> <li>Damage/loss of properties/lands take – displacement or isolation of communities</li> <li>Disruption to commuting traffic, and utilities – economic impact.</li> <li>Increased cost to local authority and OPW – repair, replacement.</li> <li>Increased discharges from drainage systems to ground-waters</li> <li>Increased pollution of surface water systems</li> <li>Changes to surface water habitats</li> <li>Impact on economic development i.e. businesses and tourism.</li> <li>Inability to meet WFD requirements.</li> <li>Inability to meet objectives to protect and conserve important habitats.</li> </ul>
Services/Functions	Climate Hazard Impacts	Consequences
Coastal Management	<ul style="list-style-type: none"> <li>Increased coastal erosion and inundation – <b>sea level rise, storm surge, rainfall events.</b></li> <li>Undermining and loss of critical infrastructure such as roads, bridges, drainage systems – <b>sea level rise, storm surge, rainfall events.</b></li> <li>Loss of private property/community assets - <b>sea level rise, storm surge.</b></li> <li>Loss of beach width – <b>sea level rise, storm surge.</b></li> <li>Changes to wetlands, shoreline erosion and saltwater intrusion– <b>sea level rise, storm surge.</b></li> <li>Water quality – <b>storm surge, extreme rainfall.</b></li> </ul>	<ul style="list-style-type: none"> <li>Land take, loss of property, infrastructural assets.</li> <li>Economic impact – loss of tourism.</li> <li>Environmental impact – loss of biodiversity, loss of habitats, inability to meet requirements of WFD.</li> <li>Isolated communities.</li> <li>Cost and staff resources required to manage and repair/upgrade and deal with coastal management.</li> </ul>
Landuse and development policy		
Spatial Planning and landuse	<ul style="list-style-type: none"> <li>Inappropriate siting of urban expansion areas</li> <li>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.</li> <li>Loss of private property and community assets – <b>extreme rainfall events, sea level rise, storm surge.</b></li> <li>Early retirement of capital infrastructure - <b>all extreme weather events</b></li> </ul>	<ul style="list-style-type: none"> <li>Increased insurance costs</li> <li>Increased pressure on Major Emergency Response management and resources</li> <li>Long term economic cost to area and to general public.</li> <li>Impact on quality of life and communities</li> <li>Increased financial costs.</li> <li>Loss of Reputation</li> <li>Impact of attraction of businesses and tourism.</li> </ul>

## Chapter 3 Adaptation Baseline Assessment

### Community Health and Wellbeing

#### Community Development

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

## 4 Climate Risk Identification

### 4.1 Introduction

Chapter 3 presented a baseline assessment to identify past severe weather events that impacted County Louth and documented the risks associated with such events. An important consideration in the preparation of this strategy is to further consider how climate hazards are likely to evolve in the future so as to facilitate the identification of potential further risks from such events.

In order to achieve identify future and projected climate change risks, it is necessary to look at some scientific and expert evidence in respect of climatic projections and trends. This information is then considered for climate change projections and trends which are used to develop a Climate Risk register.

Climate risk is a global topic and to identify projections and trends relevant to Ireland, there are three main national sources namely Climateireland ([www.climateireland.ie](http://www.climateireland.ie)), Met Éireann ([www.met.ie](http://www.met.ie)) and the EPA ([www.epa.ie](http://www.epa.ie)).

### 4.2 Climate Projections

#### Temperature

According to Met Éireann, projections indicate an increase of 1–1.6°C in mean annual temperatures, with the largest increases seen in the east of the country. Warming is enhanced for the extremes (i.e. hot or cold days), with highest daytime temperatures projected to rise by 0.7–2.6°C in summer and lowest night-time temperatures to rise by 1.1–3°C in winter. Averaged over the whole country, the number of frost days (days when the minimum temperature is less than 0°C) is projected to decrease by 50% for the medium-low emission scenario and 62% for the high-emission scenario. The projections indicate an average increase in the length of the growing season by mid-century of 35 and

40 days per year for the medium-low emission and high-emission scenarios, respectively<sup>3,4</sup>. Milder winters will, on average, reduce the cold related mortality rates among the elderly and frail but this may be offset by increases due to heat stress in the warmer summers<sup>5</sup>.

#### Precipitation

According to Met Éireann, the down-scaled simulations show significant projected decreases in mean annual, spring and summer precipitation amounts by mid-century. The projected decreases are largest for summer, with reductions ranging from 0% to 13% and from 3% to 20% for the medium-to-low and high emission scenarios, respectively. The frequencies of heavy precipitation events show notable increases of approximately 20% during the winter and autumn months. The number of extended dry periods is projected to increase substantially by mid-century during autumn and summer. The projected increases in dry periods are largest for summer, with values ranging from 12% to 40% for both emission scenarios<sup>2</sup>.

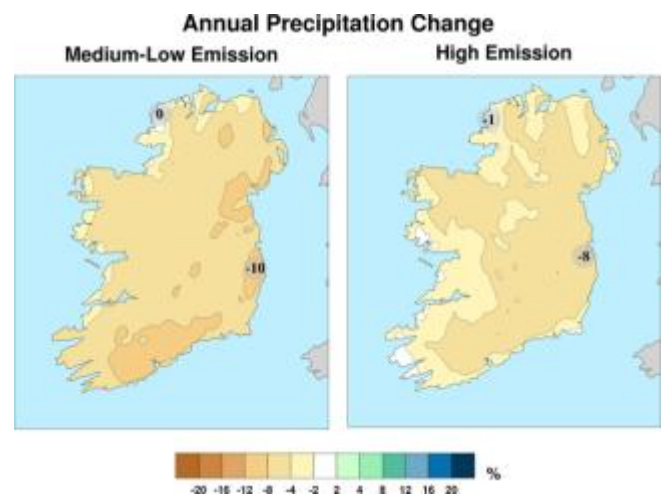


Figure 4.1 Annual Precipitation Change

Projected mean ensemble change (%) in annual precipitation for the medium-to-low and high emission ensemble scenario. In each case, the future period 2041–2060 is compared with the past period 1981–2000. The numbers included on each plot are the

minimum and maximum changes, displayed at their locations<sup>2</sup>

### Wind Energy and Storms

Studies have shown significant projected decreases in the energy content of the wind for the spring, summer and autumn seasons, with the projected decreases largest for summer and no significant trend in winter. The overall number of North Atlantic cyclones is projected to decrease by approximately 10 %. Results also indicate that the paths of extreme storms will extend further south, bringing an increase in extreme storm activity over Ireland, although the number of individual storms is projected to be quite small<sup>3</sup>. As extreme storm events are rare, the storm-tracking research needs to be extended. Future work will focus on analysing a larger ensemble, thus allowing a robust statistical analysis of extreme storm track projections<sup>2</sup>.

### Nature

Changes in the climate will bring changes in the behaviour of species. A spring warming in recent years has seen an advance in the timing of key phenological phases of a wide range of organisms, including trees, birds and insects. For example, higher temperatures in late winter or early spring results in butterflies appearing earlier in the year and birds shifting


their migration patterns. The pace of future change will cause stress to ecosystems which are unable to adapt quickly<sup>2</sup>.

It has been observed in Valentia, Co. Kerry for the tree species is Birch (*Betula pubescens*) that the beginning of the growing season is occurring approximately 10 days earlier now than when compared to the early 1970s which has resulted in an extension of the growing season. Projected changes in temperature are expected to result in a lengthening of the growing with spring occurring earlier. This is particularly the case for the northeast of the country where the timing of birch bud burst is expected to occur 10 days earlier in the 2080s than when compared to the 1990s<sup>2</sup>

### 4.3 Future Climate Risks

Future Climate risk to Louth County Council have been summarised below in Table 4.1. This Table describes the climate hazard, the area(s) of Louth County Council which could be impacted by the climate hazard with a corresponding risk statement.

Table 4.1 Impacts of Climate Change: Risk Register for Louth

Climatic Hazard	Impact area	Risk Statement
 All Weather events	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.
 All Weather events	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.
 All Weather 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.
 Storms	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 LA 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.
 Heavy Rainfall	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.
 Heavy Rainfall	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.



Extreme Heat/drought conditions

Environment, Biodiversity

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.



Extreme Heat/drought conditions

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.



All Weather events

Infrastructure

Structural, community, cultural

More **frequent and 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.



Extreme Heat/drought conditions

Emergency services

Environment



Biodiversity/Environment

Infrastructure

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



Storm Surges/Sea Level Rise

Roads, Water Services, Community

Significant threat to coastal communities by **sea-level rise**, giving higher **risk of flooding and inundation and more impactful storm surges**. This will result in significant impacts on property, land and critical infrastructure affecting the economic viability of certain areas and increasing further the vulnerability of coastal communities.



Storm Surges/Sea Level Rise

Emergency Services, Environment, Community

**Sea level rise and storm surges** may increase the risk of coastal hazards such as **storm tide inundation and erosion events**, resulting in degradation of natural environment through contamination (salination), result in loss of popular tourist areas (economic impact) and will increase clean-up and maintenance costs.



All Weather events

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).



Heavy Rainfall



Extreme Heat/drought conditions

**Bio-diversity  
Environment**

More climate extremes - **changes in rainfall variability and increased frequency of heatwaves** will impact on native species; encourage diseases, weeds, pests and invasive species which will need to be managed appropriately.



Heavy Rainfall



Extreme Heat/drought conditions

**Environment  
Bio-diversity  
Water Services**

Extreme **rainfall events, storm surges in coastal areas and heatwave/drought events** will increase the risk of impacting **water quality** and the ability of the local authority to meet the requirements of the **WFD**.



All Weather events

**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).

## 5 Adaptation Goals, Objectives and Actions

### 5.1 Introduction

The effects of severe weather events due to climate change have been identified in the previous chapters and a baseline for County Louth has been determined and assess. The next step in the process is to formulate a strategic vision for climate change adaptation which has key thematic areas and goals for the organisation and county. This strategic vision will be the vehicle that Louth County Council will use to improve its climate resilience and continue to deliver essential services to its communities. The thematic areas were developed in conjunction with the CARO office and from the baseline assessment of climatic hazards and risks identified in earlier chapters.

### 5.2 Strategic Vision for Louth County Council Climate Adaptation

Louth County Council will fulfil a leadership role in learning about and responding to the impacts of climate change, be fully engaged with the risks and opportunities of a changing climate and build a resilient future and together with, the communities of County Louth. The strategic vision is based around 6 thematic areas that are developed as High Level Goals which are described below. These goals identify the desired outcomes anticipated through the effective implementation of the climate change adaption strategy. They are supported by specific objectives and adaptation actions to achieve their desired outcomes. From these 6 thematic areas (see Figure 5.1), goals were devised which are listed in Table 5.1. The corresponding g actions for each thematic area in goals are detailed in Table 5.2 along with the timeframes for completion of the actions.



**Figure 5.2 Thematic Areas of Climate Adaptation Actions for Louth**

[Explore opportunities to maximize co-benefits and consider CUMULATIVE/in-combination](#)

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

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

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

***Flood Risk:***

The OPW CFRAM Study has identified that there are 5 areas in Louth to be prioritised for flood relief measures and Louth County Council are working with OPW to deliver these Flood Schemes. These are located in Dundalk, Drogheda, Carlingford, and Baltray & Ardee.

Louth County Council is also working with OPW on PFRA2, i.e. the review of the National Preliminary Flood Risk Assessment and the designation of Areas of Potentially Significant Flood Risk.

## Thematic Area and High Level Goals for Louth County Council

### Theme 1: Local Adaptation Governance and Business Operations

**Goal:** Climate change adaptations consideration re mainstream and integrated successfully into all functions and activities of the local authority ensuring operational protocols, procedures and policies implement an appropriate response in addressing the diversity of impacts associated with climate change

### Theme 2: Infrastructure and Built Environment

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

### Theme 3: Landuse and Development

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

### Theme 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.

### Theme 5: Natural Resources and Cultural Infrastructure

**Goal:** Fostering meaningful approaches to protect natural and key cultural assets through an appreciation for the adaptive capacity of the natural environment to absorb the impacts of climate change.

### Theme 6: Community Health and Wellbeing

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

**Table 5.1** Thematic Areas and Goals for Louth County Council Climate Adaptation Strategy.

**Timeframe** defined: i.e. Short term (S)1-3 years, Medium Term (M), 4-5 years, Long Term (L)5+ years

## Goal 1 Local adaptation Governance and Business Operations

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

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budgeted
1	Establish a Climate Action Steering Group with representatives from across key functions of local authority to ensure the successful implementation of the actions of this Climate Change Adaptation Strategy and to report on progress.	Management Team	S	✓
2	Mainstream Climate Action policy as integral consideration in the Corporate Plan objectives providing for the all local authority activities and the delivery of functions and services across the administrative area.	Corporate Services	S	✓
3	Review and implement a Business Continuity Plan to identify and address specifically, the impacts associated with extreme weather events on all functions/services of the local authority including: <ul style="list-style-type: none"> <li>• Preparing for critical services disruptions,</li> <li>• Mitigating/Minimising the impact of service disruption and,</li> <li>• Improving the capacity/ability to recover.</li> </ul>	Building Facilities	S	✓
4	Develop a Climate Action Policy for the organisation.	Management Team/ Steering Group	S	✓

**Objective: To implement an appropriate response in addressing diversity of climate change impacts**

<b>No.</b>	<b>Action</b>	<b>Lead &amp; Partner(s)</b>	<b>Timeframe S/M/L</b>	<b>Budgeted</b>
5	Establish a climate change champion within each section of the organisation	Management Team	S-L	✓
6	Ensure Green Procurement policies are implemented and all projects are designed to be climate resilient	Management Team, Procurement Officer & Climate Adaptation Steering Group	S-L	✓
7	Liaise, collaborate and work in partnership with the sectors identified in the National Adaptation Framework, subject to funding, in the delivery of the government approved sectoral adaptation actions, where they relate and are relevant to the functions and activities of the council at local level/in local communities.	Climate Adaptation Steering Group and Management Team	S-L	x
8	Through the work of the LEO, support businesses in integrating climate change considerations into existing business operations and in developing new ideas seeking to capture opportunity's associated with environmental and technological advances that support transition to low carbon/circular economy	LEO Office	S-L	x

## Goal 2 Infrastructure and Built Environment

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

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
1	Apply a robust risk assessment and management framework to Local Authority owned buildings and properties including Housing Stock to identify and protect against the key vulnerabilities to the impacts of climate change and mitigate against service disruption.	Building Facilities, Housing	S	✓
2	Integrate climate considerations into the design, planning and construction of all roads, footpaths, bridges, public realm and other construction projects. Make provision to incorporate green infrastructure as a mechanism for carbon offset.	Infrastructure, Operations, TII	S—L	✓
3	Undertake a Risk Assessment of road infrastructure in the area to identify the severity of climate change risks on their function and condition. The risk assessment should provide for an understanding and quantification of risks posed. The findings should be integrated into decision making processes, road infrastructure programmes and investment strategies. `	Infrastructure, Operations, TII, local communities.	M	X

## Goal 2 Infrastructure and Built Environment

Objective: To work towards the objective for a low carbon society

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
4	Implement and integrate the Green Infrastructure Strategy and policies into the activities of the organisation	Planning, Infrastructure	S-L	✓
5	Continue to link with the third level sector to encourage their involvement in the development of novel sustainable energy community initiatives with a goal of making all communities low carbon.	SEAI, Energy Section, DkIT	S-L	✓
6	Actively support the implementation of ISO50001 and explore the feasibility to expand to all Louth County Council Public Buildings	Energy Section	S-L	X
7	Integrate climate proofing of the Organisation's Energy Action plan	Energy Section	S-L	X

## Goal 3 Landuse and development

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

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
1	Identify and integrate climate change as a critical consideration and guiding principle informing core strategy, strategic objectives, policies and development control standards of the County Development Plan and Local Area Plans.	Planning section	S	✓
2	Promote the integrated planning, design and delivery of green infrastructure (including urban greening) through appropriate provisions in planning policies, development standards, and infrastructural, public realm and community projects.	Planning, Community Development, Tourism, Economic Development, Infrastructure, Operations, Heritage, Housing. Elected Members	S - L	✓
3	Research and incorporate, in the content of the County Development Plan, measures in accordance with section 10 (n) of the Planning and Development Acts 2000 (as amended) for: (n) the promotion of sustainable settlement and transportation strategies in urban and rural areas including the promotion of measures to— (i) reduce energy demand in response to the likelihood of increases in energy and other costs due to long-term decline in non-renewable resources, (ii) reduce anthropogenic greenhouse gas emissions, and (iii) address the necessity of adaptation to climate change; in particular, having regard to location, layout and design of new development;	Planning Section in consultation with external agencies and key stakeholders including E&M CARO.	S	✓

**Goal 3 Landuse and development**

<b>No.</b>	<b>Action</b>	<b>Lead &amp; Partner(s)</b>	<b>Timeframe S/M/L</b>	<b>Budget</b>
4	Encourage Green Businesses to be based in County Louth and promote circular economy business	Economic Development	S-L	X
5	Ensure that policies of the development plan are designed to have a high level of climate resilience for settlement, economic development, natural environment, built environment, cultural and natural heritage	Planning Section	S-M	✓

## Goal 4 Drainage and Flood Management

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

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
1	Undertake a surface water management plan for the assessment and management of flood risks with the aim of reducing the adverse consequences of flooding, to prioritise projects to reduce surface water flood risk and provide for detailed mapping of areas prone to surface water and groundwater flood risk.	Infrastructure, Operations	S - M	X
2	Stipulate the requirement for the design and specification of urban stormwater drainage systems for new development to take account of the potential future impact of climate change.	Planning Section	S	✓
3	Develop a Sustainable Urban Drainage Systems Strategy and incorporate the requirement for Sustainable Urban Drainage Systems where appropriate in local authority projects and private development sites	Infrastructure, Planning Section	S-L	✓

## Drainage and Flood Management

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
4	Ensure that potential future flood information is obtained / generated by way of a Flood Risk Assessment (FRA) and used to inform suitable adaptation requirements within the Development Management process in line with the Guidelines for Planning Authorities on Flood Risk Management (DoECLG & OPW, 2009).	Planning Section	S-L	✓
5	Ensure that all future proposed Infrastructural works are climate resilient and are designed in accordance with best practice guidelines	Infrastructure, OPW, Building Facilities. Water Services	S- L	✓
6	Ensure that potential future flood information is obtained /generated by way of a Catchment Flood Risk Assessment Management (CFRAM) and used to inform suitable adaptation requirements within the Development Management process in line with the Guidelines for Planning Authorities on Flood Risk Management (DoECLG & OPW, 2009).	Infrastructure, OPW, Building Facilities.	S-L	✓
7	Liaise and collaborate with the OPW in the implementation the Programme of Works for Flood relief in County Louth	Infrastructure, OPW, Central Government	S-L	✓

## Goal 5 Natural Resources and Cultural Infrastructure

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

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
1	Develop a strategy to undertake and implement an active Tree Planting programme in the context of climate adaptation in conjunction with an awareness campaign that informs of the benefits to communities in improving air quality, offsetting carbon emissions, promoting biodiversity, limiting flood risk, reducing urban heat, as well aesthetic value.	Waste Management & Environment, Community Development, Infrastructure, Planning	S	X

**Objective: To promote effective bio-diversity management and enhance protection of natural habitats and landscapes**

2	Review Bio-diversity Plans / habitat conservation strategies, plans and projects to ensure that: <ul style="list-style-type: none"> <li>all risks from adverse climate change have been identified;</li> <li>future changes are assessed and identify measures to address issues</li> <li>carbon capture within habitats is considered.</li> </ul>	Heritage, NPWS	S-L	✓
3	Research and map areas considered beneficial for use as local carbon offset through carbon sequestration and include in Green Infrastructure strategy.	Heritage, Planning Section, stakeholders	S-L	X
4	Explore the feasibility of research projects on climate action with third level education centres such as DKIT	Climate Change Steering Group/ DKIT,	S-L	✓
5	Promote protection of natural habitats and biodiversity with the organisation and within communities	NPWS, Teagasc, DKIT, LAWCO, Community, Heritage, Waste Management & Environment	S-L	X

## Goal 5 Natural Resources and Cultural Infrastructure

Objective: To protect Heritage and Cultural Infrastructure

Action	Lead & Partner(s)	Timeframe S/M/L	Budget	No.
6	Undertake a risk assessment of the Heritage and Cultural Assets in the county to assess the vulnerability and the risk to the historical environment from the impacts of climate change and to help build resilience to these important assets.	Heritage, Heritage Council,	M -L	X
7	Review the LECP 2016-2021 plan to ensure that climate change actions are integrated into the goals and objectives of the plan.	Community Section	M-L	✓

## Goal 6 Community Health and Wellbeing

Objective: To build capacity and resilience within communities

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
1	Through public participation network raise awareness of the impacts of climate change and ways for communities to increase response and resilience to these impacts.	PPN, Community	S	✓
2	Assess communities across the county in the context of their vulnerability to the impacts of climate change. Identify vulnerable communities and the risks to the community.	Operations, Community	S-M	✓
3.	<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"> <li>• help the vulnerable community to develop a stronger facilitating role for mitigating risks</li> <li>• provide advice on the risk of extreme events affecting their locality</li> <li>• Devise mitigating actions to enhance preparedness</li> <li>• provide support to develop appropriate resilience arrangements to enable response and recovery</li> </ul>	Operations, Community	S-M	✓

## Goal 6 Community Health and Wellbeing

Objective: To promote Health and well being within communities

No.	Action	Lead & Partner(s)	Timeframe S/M/L	Budget
5	Support the Implementation of the Healthy Ireland for Louth Plan 2018-2022 particularly where actions relate to reducing the impact of climate change.	Community Section	S-L	✓
6	Promote clean local environments by continuing to invest in Tidy Towns, tree planting and other environmental initiatives throughout the county.	Community Section, Tidy Towns together	S-L	✓

## 6 Implementation, Monitoring and Evaluation

### 6.1 Implementation

The objectives and actions of this plan will be incorporated into all relevant plans going forward as to be imbedded in the heart of the organisation. The implementation of this plan will be overseen by the Climate Action Steering group for Louth County Council who will working in close association with the CARO office the Director of services for Operations, Waste Management and Environment. The implementation will be co-ordinated by the Climate change leader, who will liaise with the various organisations, section, agencies and groups to champion the actions of this plan.

Goal one of Theme 1, (*Local Adaptation Governance and business operations*) endeavors through its first objective to establish a framework within the organisation to support the successful and practical implementation of adaptation actions. Given that this strategy represents all functions and operations of Louth County Council, it is important that the Climate Action Steering Group brings together representatives from all key functional areas with various technical, operational and management expertise who can successfully carry out the necessary tasks and implement the actions contained within strategy. The Management Team will nominate representation to the Climate Action Steering Group and assign its Chair. The Climate Action Steering Group will meet quarterly.

The tasks of the group are as follows:

- Prioritise actions within the short, medium and long term delivery timeframes,
- Develop an approach and initiate implementation of the actions,

- Liaise with other stakeholders and sectors, both locally and regionally, where required for the implementation of actions,
- Monitor and evaluate implementation of the actions and,
- Report on Progress to the Climate Change and Environment SPC and subsequently to full council.

The Eastern and Midland Climate Action Region Offices (E&M CARO) will continue to assist and provide guidance where possible in the practical implementation of the actions of this strategy. Louth County Council will continue the positive relationship, collaborate and engage with the E&M CARO as is necessary throughout the lifetime of this strategy. This will include submitting the annual progress report to the CARO if required.

### 6.2 Monitoring and Evaluation

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

The climate action steering group is encouraged to use results from the monitoring and evaluating program to:

- Revisit vulnerability and risk assessments conducted as part of adaptation actions.

- Make changes where appropriate based on monitoring results.
- Update observed changes.
- Include new climate science and recent extreme climatic hazards/events.
- Factor in changes to exposure and/or adaptive capacity.
- Evaluate the success or outcome of completed actions.

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

### Report on progress

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

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

The progress report should provide for, inter alia:

- Progress achieved on actions to that point (including key indicators as established).
- Extent to which actions have achieved and built new relationships with key stakeholders, agencies, communities

and identified new or emerging opportunities.

- Identification of funding streams used
- Inspired or encouraged positive community engagement.
- Reports on the outcomes of efforts to change behaviour.

The requirement to report on progress on an **annual** basis is also informed by Section 13, 14 and 15 of the ***Climate Action and Low Carbon Development Act 2015***. Overall, this Climate Change Action Plan will be monitored and evaluated on an ongoing basis and actions will be reviewed and updated annually. A full review and revision of the plan will take place every five years through the Director of the Operations, Waste Management and Environment Department who will report to the Planning and Environmental Services SPC who report to the full County Council on an annual basis on progress. The SPC, the Climate Change Steering Group and the Management Team of Louth County Council will monitor progress towards the set targets.

The review of this five year plan will take into account the demographic, technical and other changes that have occurred and any new targets that have been introduced by central government.

## 7 Mitigation

### 7.1 Introduction

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.

Louth County Council has a key leadership role to play locally in terms of climate mitigation. The council's commitment to this role is reflected by several nominations for national awards in recent years and it received a Special Recognition Award for Innovation in Social Housing and the Community at 2018.

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

### 7.2 Energy Reduction Targets

The Government of Ireland has committed to wider climate change goals whereby one of these goals is to achieve a 33% energy efficiency improvement by all Irish public bodies by the year 2030, as defined by SI 426 of 2014. This target was reinforced in 2017 through the publication of the "Public Sector Energy Efficiency Strategy". In its latest performance report entitled "Annual Report

2018 on Public Sector Energy Efficiency Performance", the Sustainable Energy Authority of Ireland (SEAI) have credited Louth County Council 42% energy savings against its average 2006-2008 energy usage baseline.

### 7.3 Louth County Council Mitigation Activities

The Council is corporately committed to mitigating the causes of climate change and to decreasing the organisations dependency on fossil fuels. This goal is defined in the Environmental & Sustainable Energy strategic objective of the Louth County Council Corporate Plan 2014 – 2019.

To provide for timely high quality water and waste services in conjunction with Irish Water to cater for the development needs of the County while promoting the use of sustainable energy resources and systems.

Promote the use of sustainable energy sources and systems.

Over the past number of years, the council

Develop an expertise in sustainable energy management as a resource for Council and other sectors.

Develop Louth County Council as an exemplar in energy efficiency.

Action energy saving initiatives within the organisation and the wider community.

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.

These programmes include-

- The construction of solar photo voltaic banks
- Switch to LED Public Lights and low energy lights
- Improved Building Management Systems
- Partnering with other Organisations to improve energy efficiency
- Leading by Example – applications for funding for Community Energy Projects
- Working with local community groups to expand the number of Sustainable Energy Communities

#### 7.4 Mitigation in Action

##### PV Panels on County Hall

In 2017 PV panels were installed on a section of roof of the County Hall building in Dundalk. This project demonstrates the Council's commitment to invest in energy improvement works to drive down our energy costs and to reduce our carbon footprint and thereby our impact on the environment. The new solar photo voltaic panels in County Hall generate 11KW of electricity. They are expected to generate some 8,500KW hrs of electricity of some 3% of the annual energy use in County Hall. As part of this initiative it is intended to provide an energy display panel where staff and the general public can see the energy generated and relate that to their daily energy use. This measure is expected to generate enough electricity to power the lights in the Council's car park for the year and to contribute some 50% of the Co. Halls existing lighting energy use.



Photograph 7.1 PV panels county hall

Each year the panels will produce enough electricity to prevent 4097kg of Green House gases entering the atmosphere. Over its typical 25 year lifetime it will

- Generate 2512,500kWh or units of electricity
- Generate enough electricity to power 53 typical Irish homes
- Offset the production of 102,425kg of greenhouse gases

This is the second solar bank at Council buildings, with a solar bank previously provided at the roof of the County Museum, Dundalk. The council continues to look at measures to lead by example.

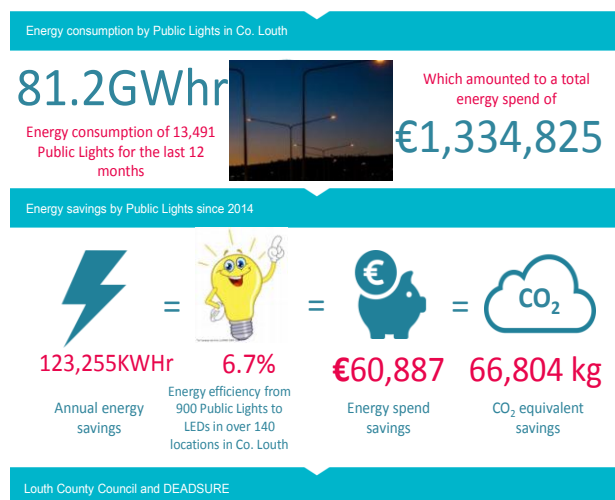
##### The Switch to LED Public Lights

Louth County Council have been shifting towards more sustainable public lighting for improved quality lighting in our public road network for significantly reduced cost and which reduces the Council's carbon footprint. High quality LED lighting designs, are presently being retro-fitted to public lights in Co. Louth. To-date, over 140 locations has been completed across the county. New LED lights offer improved visibility and better quality driving conditions, helping to reduce

traffic accidents. The enhanced colour quality and ambience helps reduce fear of crime and provides for improved detection of crime leading to safer streets. Financial savings in reduced lighting bills enable better delivery of public services. There are also environmental benefits from reduced energy consumption and reduced carbon emissions. The graph below shows the huge savings and reduction in greenhouse emissions that have been achieved by simply making the switch to LED.



Photograph 7.2 LED lights at the town square in Dundalk



Optimising Power at Work programme

Louth County Council signed a Service Level Agreement with OPW to participate in OPWs’s

Optimising Power at Work Programme, for two of its 4 Significant Energy Users namely Dundalk Town Hall and County Hall. Dundalk Town Hall joined the OP@W programme in 2014 and County Hall joined in 2017. The aim was to assist the Council to manage and improve its energy use. The energy conservation campaign was targeted at behavioural change. It has provided an ideal vehicle to promote energy efficiency in the organisation with the Council’s staff.

In 2018, carbon emissions prevented from entering the atmosphere as a result of energy saving measures implemented in Dundalk Town Hall was the equivalent to planting 2683 tree seedlings and letting them grow for 10 years. Dundalk Town Hall reached its energy reduction target of 33% savings in March 2019, which is two years ahead of target. In addition to the climate benefit, €66,149.37 in savings was generated from energy efficiency measures implemented in Dundalk Town Hall between 2014 and 2019.

Community Energy Projects

The Council is leading by example by obtaining funding for community energy projects and itself undertaking projects as part of that process.

The Council obtained funding for community energy projects from SEAI each year from 2015 – 2019 for public, private sector and community organisations across the region to undertake energy works.

The typical works cost for beneficiaries in 2016, for example, ranged from €9.5K to €1.9m. That demonstrates the commitment by beneficiaries in the region to energy improvement to seek to reduce their energy costs and particularly their impact on the environment. The Council’s role is to act as grantee and to manage the grant application and claim process for beneficiaries and to

make the job of funding the works somewhat easier.

This has enabled over 10 GWHrs of energy savings in the region between 2015 and 2018 with total expenditure by beneficiaries of some €8,550,000 (€8.5m) funding by energy grants from SEAI of some €3,346,693 (c.€3.3m)

**Estimated actual energy savings achieved 2015 – 2018 Projects = 10,700,000KWhrs = 10.7GW hrs**

Estimated Total Expenditure – €8,550,000 (€8.5m)

#### Sustainable Energy Communities

The Council was a key partner in Dundalk 2020 Project and has participated in the EU Funded Concerto Project as a result. Dundalk 2020 Project formed the basis of Sustainable Energy Communities and the community energy management system from that project was the first such energy masterplan.

Louth County Council is a member of SEAI's SEC Network. Louth County Council also agreed to mentor Blackrock Tidy Towns (BTT) as an SEC member and BTT has become an SEC member as a result. The plan is to develop this model to other Tidy Towns groups in County Louth.

The community engagement of this programme has, at its core, an energy master plan (EMP). Louth County Council promotes its EMP as a model for business to develop and plan a similar system. It does so by having regular energy displays at events by Chambers of Commerce, LCC events etc. within Co. Louth.

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## Appendix

### Appendix 1: Climate Risk Register

Baseline assessment Table No 1 : Increase in summer heat wave events and drought conditions.

Climate Hazard (Event): Heat Wave Conditions						
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Road Section	Deterioration of road surfaces (rutting) due to prolonged exposure to high temperatures.	Local roads situated across the county, comprising of tarred and chipped surfaces.	Chipping and emergency works.	2	Increased maintenance costs and staff overtime.	Deterioration of road surfaces (rutting) due to prolonged exposure to high temperatures.
	Increased deterioration of roads as a result of ground movement/shrinkage	Roads situated across the county.	Engineered solutions to reduce effect of ground shrinkage/movement	2	Increased repair costs	Department of Transport, Tourism and Sport, TII
Fire and Emergency services	Increase frequency and intensity of fires	Forestry area, upland areas, gorse and bog areas and amenity/ recreational areas.	Emergency response by fire services.	3	Increased callout of fire services.	Adjacent Fire services.
	Reduced availability of water sources to combat fires.	Areas with limited water supplies particularly in rural areas where waterbodies may go dry.	Securing water from alternative waterbodies.	2	Increased costs	Inland Fisheries Ireland EPA, Adjoining local authorities.
Health and Wellbeing	Increased levels of sunburn and heat stress (heat stroke/dehydration) as a result of prolonged exposure to high temperatures.	Outdoor (particularly in urban areas due to UHI), Council Staff	Provision of Water and sunscreen stations.	2	Increased costs for protection of staff from heat stress and/or Staff fatigue. Staff on subsequent sick leave.	HSE Unions
	Increased levels of heat stress in staff working inside council buildings due to inadequate ventilation or heat controls	Indoor staff with respiratory issues.	Provisional of fans/cooling equipment	3	Staff fatigue Staff on subsequent sick leave. Increased energy costs for cooling	HSE Unions

**Appendix**

Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Environmental Services	Increased demand for bathing waters	Popular bathing areas in the County.	Continuation of the non-designated bathing waters sampling program.	2	Reduction in the quality of bathing waters due to increased usage and reduced water levels.	EPA Sampling and analysis contractor.
	Reduced flow in rivers and streams.	Waterbodies sensitive to reduced flow conditions.	Monitoring and sampling of designated rivers and lakes in Monaghan	2	Reduced assimilative capacity in rivers and lakes to handle polluting matter.	EPA, Irish Water, Inland Fisheries Ireland, EPA, LAWPRO
Biodiversity	Wild fires in areas of high biodiversity and habitat value.	Upland areas, comprising of gorse, forest and bog particularly in the Cooley area.	Emergency response by fire services. Fire breaks.	3	Loss of priority habitats and species. Increased callouts of emergency services.	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
	Increase in Invasive species best suited to higher temperatures and drier conditions.	Sensitive flora and fauna	Liaison with National Parks and Wildlife	3	Loss of native species and priority habitats in the county.	National Parks and Wildlife.

## Appendix

Baseline assessment Table No 2: Increase in precipitation during the winter months resulting in milder and significantly wetter winters.

Climate Hazard (Event): Extreme Precipitation Events						
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Operations Section	Increase in damage to transport infrastructure including flooding of roads and damage to bridge structures and potential landslides. Increase in river levels bursting banks and causing flooding of roads & footpaths, or rivers so high so as to prevent surface water drainage freely flowing away from road surfaces	Roads and bridges in low lying vulnerable areas throughout Louth	Maintenance of road river and stream drainage systems. Provision of warning signage and sandbags as needed by outdoor staff. Implementation of severe weather Plan. Engage contractors to carry out minor works on site to open channels to alleviate flooding and remove debris.	3	Increased costs and staff overtime. Isolation of families/communities. Reputational damage of transport disruption. Increased maintenance and repair costs	Dept of Transport, Tourism and Sport, TII Civil Defence Army
Fire and Emergency services	Increased attendance and response to flooding events.	Dwellings, business, and community and public facilities located in vulnerable areas in Louth.	As per existing Emergency response	2	Increased staff overtime costs. Increased H&S considerations	Roads staff Neighbouring fire services
	Increased need for additional equipment (e.g. additional pumps, booms)	Dwellings, business, and community and public facilities located in vulnerable areas.	Having well stocked and maintained equipment in place	2	Increased equipment costs	MD Staff. Civil Defence. Neighbouring Fire Authorities
Housing	Requirement to Rehouse families impacted by flooding.	Families living in areas prone to flooding.	Provision of suitable short-term alternative accommodation for affected families.	2	Increased costs associated with provision of alternative accommodation	

**Appendix**

Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Environmental Services	Increased surface run-off resulting in nutrients being washed into rivers, streams, and lakes .	At risk waterbodies in the Louth.	Enforcement of the Water Pollution Act and the Good Agricultural Practice Regulations.	2	Pollution of our waterbodies and increase in risk of waterbodies failing to achieve good status as per requirements of the Water Framework Directive. Reputational damage.	Department of Communications Climate action and environment. EPA, LAWPRO Dept of Agriculture. IFI Public and Group water Supply Schemes
	Changes to River morphology (eg Bank erosion) caused by increased flow rates.	At risk waterbodies in the Louth.	None in place	2	Pollution of our waterbodies and increase in risk of waterbodies failing to achieve good status as per requirements of the Water Framework Directive. Reputational damage.	Department of Communications Climate action and environment. EPA, LAWPRO Dept of Agriculture.
Biodiversity	Loss of biodiversity and habitats in flooded areas.	Wetlands and low-lying lands	None in Place	2	Loss of locally important habitat and biodiversity.	

## Appendix

Baseline assessment Table No 3: Increase in extreme wind events particularly during the winter months.

Climate Hazard (Event): Extreme Wind Events						
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Operations Section	Increased frequency of road and bridge infrastructure due to fallen trees and fallen power and communication overhead lines. blocking of roads by fallen trees and debris.	Roads situated across the county. Exposed Bridges. Roads adjacent to power lines	Implement severe weather plan. Emergency response by appropriately trained and competent outdoor staff. Engagement of local contractors. ESB and communication service providers contacted.	3	Increased staff costs/overtime. Additional repair costs incurred through engaging specialist contractors. Reputational damage of transport disruption Increased potential for serious injury and also loss of life.	Department of Transport, Tourism and Sport, TII ESB networks Eircom. Fire Services
	Increased frequency of wind damage to road signage, street furniture and public lighting.	Exposed locations throughout the county.	Response by outdoor MD staff Response by specialist contractors	2	Increased staff costs/overtime. Additional repair costs incurred through engaging specialist contractors. Reputational damage of transport disruption & public lighting outages.	Department of Transport, Tourism and Sport, TII Fire Services.

**Appendix**

Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Fire and Emergency services	Increased frequency of responding to accidents caused by debris and falling trees and overhead lines.	Whilst exposed locations likely to be most affected all of the county may potentially be impacted. Likely to have a county wide effect	Emergency response by Fire Services Staff.	3	Increased staff costs/overtime. Increased potential for serious injury and also loss of life.	ESB networks Eircom networks Roads staff Neighbouring fire services
Housing	Increased frequency of damage to council housing stock	Housing stock particularly in exposed parts of the county.	Response by housing tradesmen and specialist contractors.	2	Increased staff costs/overtime. Additional repair costs incurred through engaging specialist contractors.	Dept of Housing.
Environment	Increased risk of being unable to carry out sampling of rivers.	EPA Water Framework Directive Program.	Unable to take samples in the main river channel due to flooding of river banks.	1	Unable to complete the WFD sampling program on behalf of the EPA.	EPA LAWPRO

## Appendix

Baseline assessment Table No 4: Extreme cold and/or snow events.

Climate Hazard (Event): Extreme Cold and/or snow events						
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Operations Section	Increased frequency of roads closed by snow.	Roads situated across the county particularly in elevated locations.	Snowplough and salt treatments. Severe Weather Response Plan	2	- Increased costs and staff overtime.	Department of Transport, Tourism and Sport, TII, Fire Services & Civil Defense, Army,
	Increased road and bridge infrastructure deterioration due to freeze/thaw conditions	All road infrastructure in the county.	Road repair	2	-Reputational damage of transport disruption. - Increased repair costs	Department of Transport, Tourism and Sport, TII, Fire Services and Civil Defence. Irish Water
	Damage to underground utility services located under or adjacent to roads	All road infrastructure in the county.	Road reinstatement works via road opening licenses.	1	-Reputational damage of transport disruption. - Increased repair costs	Utility service providers (e.g. ESB, Eircom, Irish Water, Bord Gais.
Fire and Emergency services	Increased vehicular accidents. Increased time to reach call out destinations or destinations may be inaccessible. Water hydrants and/or equipment frozen making it impossible to tackle fires.	county wide effect	Emergency response. Snow socks, snow chains. Water checks on pumps. Hydrant maintenance. Ensuring water supply to stations.	4	Increased costs and staff overtime. - Increased repair and maintenance costs	HSE Roads staff Neighbouring fire services

**Appendix**

Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Housing	Damage to housing stock such as burst pipes	Housing stock particularly in exposed locations.	Repairs by council tradesmen and specialist contractors	2	Increased costs and staff overtime. - Increased repair and maintenance costs.	Contractors. Dept of
Environment	Low temperatures will result in an increase in polluting carbon sources being burned which will have a consequence for air quality and public health.	Particularly urban conurbations throughout the county	Enforce smoky coal regulations	2	Increased costs and staff overtime.	HSE. Northern Ireland authorities. EPA