



**Roinn Cumarsáide, Gníomhaithe  
ar son na hAeráide & Comhshaoil**  
Department of Communications,  
Climate Action & Environment

**Local Authority Adaptation  
Strategy Development  
Guidelines**  
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## Ministers' Foreword

The decisions we make now in tackling climate disruption will define the next century. This government wants to make Ireland a leader in responding to climate change, not a follower. That will require a significant step change across government.

Being a leader means acting now, stretching ourselves and seizing the enterprise opportunities in a low carbon economy, including the new circular and bioeconomies. Being a follower means the final costs of adjustment are much higher and opportunities much lower or completely lost.

We are already dealing with the realities of the impacts of climate change in terms of the floods experienced in 2015/16, extreme weather events such as Storm Ophelia in 2017 and Storm Emma this year. We know from these past events that the potential costs, both economic and social, of climate change are significant. We also know that early intervention and well planned adaptation is crucial in this regard.

As the level of government closest to communities, local authorities have a key role to play in this. In partnership with other first responders, local government has responded effectively to extreme weather events in Ireland over recent years. The recent establishment of four Climate Action Regional Offices (CAROs) with support from our Department will now enable the sector to build on this expertise and experience so as to drive climate action at local level.

We are publishing these "Local Authority Adaptation Strategy Development Guidelines", to provide a consistent and coherent process for local authorities in helping them develop local adaptation strategies. We will review these local strategies once completed, with a view to mainstreaming effective initiatives and sharing learnings both locally and regionally.

We would like to thank all who inputted into preparing these Guidelines and we look forward to seeing strong local adaptation strategies in practice across the country.



Richard Bruton T.D.  
Minister for Communications,  
Climate Action & Environment



Sean Canney T.D.  
Minister of State for Community Development,  
Natural Resources & Digital Development

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## Executive Summary

The impacts of climate change are already visible today and are expected to intensify over the coming decades. The most immediate risks to Ireland which can be influenced by climate change are predominantly those associated with changes in extremes, such as floods, precipitation and storms. It has been estimated that 2018's heatwave has been made twice as likely because of climate change and we have also seen intense rainfall and unprecedented flooding, while rising sea levels coupled with storm surges have contributed to waves breaching coastal defences on Atlantic coasts.

While creating great challenges for society, these impacts haven't yet caused the key services that we all rely on upon to fail. In the wake of extreme events the emergency response from local authorities and the relevant government agencies has been very effective in terms of clean up, repair and rebuilding affected areas. This will however become increasingly difficult in the future. The costs of maintaining a reactive approach to the impacts of climate change will continue to increase as extreme events become more severe, and the gaps between events shorten. This will also likely reduce the economic, physical and psychological capacity of affected communities to recover between events.

Climate change mitigation – efforts to prevent the concentration of greenhouse gases in the atmosphere from reaching a dangerous tipping point - remains an urgent priority. The Paris Agreement of December 2015 agreed in principle a number of actions intended to limit global greenhouse gas emissions and the resulting climate change to more manageable levels. Successful implementation of the Paris Agreement will reduce the risk of climate change impacts overwhelming the capacity of societies and ecosystems to adapt. However, it is important to note that even if the goals of the Paris Agreement are met, some impacts are now locked into the climate system because of the delayed impacts of past and current emissions. Planning and preparing for such impacts is therefore both urgent and necessary.

Early planning for adaptation will ensure we have sufficient time to plan in a considered and coherent way for how we adapt our towns, cities and communities, and the support systems they rely on, to the future impacts of climate change. A key step in achieving this requires the development of long-term, wide-ranging strategies, setting out high-level visions of how we might effect a transition towards a climate resilient future. A key component of this is how we develop strategies for climate adaptation at local level.

As the level of government closest to local communities and enterprise and as first responders in many emergencies, local authorities are uniquely placed to effect real positive change on the ground, contributing both to the delivery of the national transition objective of low carbon, climate resilience in the long term and also improving our ability to plan for and respond to severe weather events in the shorter term.

Ireland's national strategy for climate adaptation is laid out in the National Adaptation Framework (NAF), which was approved by Government in December 2017, and was published and laid before the Oireachtas on 19 January 2018 in line with the Climate Action and Low Carbon Development Act 2015 (The Climate Act). The NAF requires that each local authority should make and adopt local adaptation strategies. The deadline for the completion of these strategies is 30 September 2019.

Ensuring climate resilience at local level will require difficult decisions and a high degree of cross sectoral coordination and cooperation. The four Climate Action Regional Offices (CAROs) established in 2018 will provide support to local authorities in the development of their strategies, however the development of each strategy itself will be undertaken by a team within each local authority. The completed strategy should then be used to mainstream adaptation over time into the plans and policies of the local authority (i.e. during the review of local authority development plan or other plans and policies). The strategies are not part of a hierarchy of plans but instead seek to inform and "climate proof" existing plans and policies, providing a high level guide on how climate change can be integrated into all the relevant operations of the local authority over time.

Building a climate resilient Ireland will be a long term process that will require a sustained and planned response and the local authority adaptation strategies prepared under the National Adaptation Framework will play a key role in preparing Ireland for an effective climate resilient transition. Given the scale and importance of this transition it is important that elected members of the local authority are given the opportunity to develop the local response and adopt the final local authority adaptation strategy. The NAF states that local authorities should consider bringing any proposed local adaptation strategy, be it regional or local authority based, before elected members at city, county or city and county level. These Guidelines are restating this objective.

These *Local Authority Adaptation Strategy Development Guidelines* have been developed for, and are primarily intended for the use of local authorities required to prepare adaptation strategies under the National Adaptation Framework. The Guidelines were originally developed as part of an Environmental Protection Agency (EPA) research project “Local Authority Adaptation Strategy Development Guideline” ( 2012-CCRP-FS-14) under the EPA Climate Change Research Programme.

In their structure and content, the Guidelines draw heavily on the 2013 *Guidelines on Developing Adaptation Strategies* provided to European Union Member States by the European Commission (SWD (2013) 134 final), with the aim of fostering coherence between strategies developed at local and national scale. These Guidelines have been updated and edited by the Climate Ireland research team in MaREI (Centre for Marine and Renewable Energy) to reflect changes that have occurred in adaptation policy at national level since the original research Guidelines were published in 2016.

The Guidelines are broken down into six chapters, with Chapters 2–6 dealing with distinct phases of the process of developing an adaptation strategy.

**Chapter 1** provides background information on what adaptation entails and provides the rationale behind implementing a local scale adaptation strategy.

**Chapter 2** outlines the initial steps required in launching a strategy development process, describing key roles and who can fulfil them, and setting out important factors to consider in the early stages of strategy development.

**Chapter 3** explains how to assess the role that weather extremes and periods of climate variability currently play within the local jurisdiction, and it describes why doing so is a fundamental element of working towards a more climate-resilient future.

**Chapter 4** moves from the present to the identification of future climate risks, describing a staged risk assessment process and positioning the adaptation strategy within more detailed risk assessments undertaken during shorter term decision-making processes such as statutory plan-making.

**Chapter 5** on the basis of the risk assessment process undertaken in the previous chapter, this chapter describes the determination of adaptation goals and objectives and the types of

adaptation actions that are available and outlines how each might be identified, assessed, prioritised and implemented.

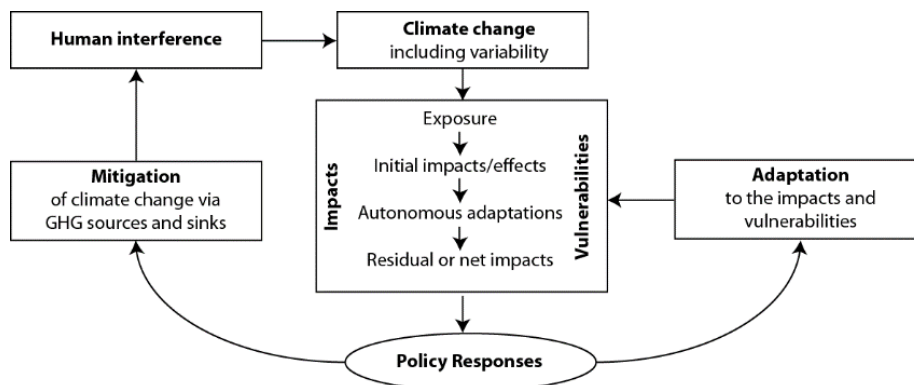
**Chapter 6** outlines the steps required to move from a phase of planning to one of implementation, and it explains the importance of monitoring and evaluation in ensuring that the strategy is achieving its anticipated adaptation objectives.

# 1 Background

## 1.1 Introduction

Human activities are estimated to have already caused approximately 1.0°C of global warming above pre-industrial levels (IPCC, 2018). The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea levels have risen, and the concentration of greenhouse gases has increased (IPCC, 2013). Globally and for Ireland, climate is changing and the impacts of these changes are already being felt, and are expected to continue and intensify for many decades to come. If the current rate of warming continues, the world would reach human-induced global warming of 1.5°C around 2040. Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C and increase further with 2°C warming, with higher risks than previously thought on the global aggregate economy and global biodiversity under 2°C global warming (IPCC, 2018).

Climate change is now recognised as a global challenge with policy responses required in terms of both mitigating the causes of climate change but also in adapting to the now inevitable consequences of these changes (Figure 1.1 Summary diagram illustrating policy responses (mitigation and adaptation) to climate change.). The first policy pursued in response to climate change, mitigation, has been defined as an “A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs)” (IPCC, 2014) and aims to limit climate warming through the reduction of GHG emissions and the increase in carbon sinks. However, even if contemporary actions aimed at mitigating the causes of climate change are successful, many of the impacts are locked-in for some decades to come and are expected to continue and intensify. The second policy response, adaptation, aims to better prepare society to cope with, manage or adjust to changing climatic conditions and has been defined by the IPCC (2014) 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”.



**Figure 1.1 Summary diagram illustrating policy responses (mitigation and adaptation) to climate change.**

## 1.2 Climate adaptation

Sufficient robust information now exists nationally to further progress the process of implementing mitigation and adaptation actions and increasing social, economic and environmental resilience to climate change. The most immediate risks to Ireland which can be influenced by climate change are predominantly those associated with changes in extremes, such as floods, precipitation and storms (the potential impact of which has recently been seen with Storm Ophelia in 2017 and Storm Eleanor in 2018). We now need to consider our response to the more immediate short term impacts of climate change (e.g. on emergency planning and how we respond to extreme weather events) while also building our long-term climate resilience into the future.

Local government plays a pivotal role in planning for, and responding to, emergency situations. Given their close relationship with the community, local authorities can react faster and more effectively to local climate events than other government agencies. This has been demonstrated in their response to extreme weather events in Ireland over recent years. They have essential local knowledge of the natural and manmade environment and have a critical role to play in managing climate risks and vulnerabilities and identifying adaptation actions within their administrative areas. They also deliver key services to the public either directly or in partnership with other Government Departments such as housing, planning, sanitation and maintenance of local roads, parks and waterways.

Climate adaptation involves taking steps to adjust human and natural systems in response to existing or anticipated climatic change, in order both to avoid unwanted impacts and to take advantage of new opportunities that may arise. Ideally, adaptation should take place in a pro-active and anticipatory manner, thereby preventing the worst of the risks to society that

accompanies climate change. Scientific research into the impacts of climate change for Ireland has been under way for some time. A broad understanding of the probable temporal and spatial distribution of changes in temperature, precipitation, sea levels and flood risk that will be brought about by climate change is now beginning to emerge. These projections are now sufficient to allow us to begin the process of adaptation planning.

The need to adapt to climate change should now be a crucial consideration for local authorities, businesses and the general public in their decision making processes. It is crucial that climate change adaptation is mainstreamed within all areas of existing and planned local authority activity. This will require awareness raising, capacity building and training of those tasked with planning for the impacts of climate change.





Climate change may also bring opportunities for cost savings, may allow new businesses to emerge or may make new ways to foster environmental sustainability possible. Those who have adapted to change in the most far-sighted and cost-effective manner will likely enjoy a competitive advantage over those who have failed to act.

### **1.3 How do we know that Ireland's climate is changing?**

Research has improved our understanding of projected climate change for Ireland and has provided critical insights into how climate change will impact us into the future. Sophisticated computer modelling of the projected impacts of increased concentrations of greenhouse gases (GHGs) in the atmosphere has been undertaken, and this has been calibrated against the observed changes in climate over the last century. These models suggest that increases in energy-trapping gases in the atmosphere will result in an upwards trend in temperature, coupled with a significantly more extreme climate than that to which human civilisation has grown accustomed (IPCC, 2014).

Observed changes in Ireland's climate are in line with global trends. Temperatures are increasing, sea levels are rising and seasonal patterns of storms and precipitation are changing (Dwyer, 2013). Projections indicate that this trend will continue and intensify into the future; on average, Ireland's climate is projected to become warmer and drier, rates of sea level rise will increase and the frequency of extreme weather events are also expected to increase (Nolan, 2015; EEA, 2017). These changes will have a wide range of consequences for Ireland's social, environmental and economic sectors, some positive, others negative. Within individual sectors, a range of consequences both positive and negative may be present. For example, winters will become on average warmer and would

likely benefit the agriculture sector due to less frost, but this benefit may be offset by heatwaves/drought during the summer months. A summary of the most recent climate projections for Ireland are provided below in Table 1.1.

Parameter	Observed	Projected	Example of Biophysical Impacts
 <b>Temperature</b>	<ul style="list-style-type: none"> <li>Average temperatures have increased by 0.8°C since 1900, an average of 0.07°C per decade.</li> <li>The number of warm days (over 20°C) has increased while the number of cold days (below 0°C) has decreased.</li> </ul>	<ul style="list-style-type: none"> <li>Projections indicate an increase in average temperatures across all seasons (0.9-1.7°C).</li> <li>The number of warm days is expected to increase and heat waves are expected to occur more frequently.</li> </ul>	<ul style="list-style-type: none"> <li>Incidences of cold stress are likely to decrease while incidences of heat stress will increase.</li> <li>The duration of the growing season will increase, occurring earlier and extending farther.</li> </ul>
 <b>Precipitation</b>	<ul style="list-style-type: none"> <li>Increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30-year period 1961-1990.</li> <li>The largest increases are observed over the west of the country.</li> </ul>	<ul style="list-style-type: none"> <li>Significant reductions are expected in average levels of annual, spring and summer rainfall.</li> <li>Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approx. 20%).</li> </ul>	<ul style="list-style-type: none"> <li>The increased occurrence of dry spells will result in increased pressure on water supply.</li> <li>An increase in the frequency of extreme precipitation events will result in increased fluvial and pluvial flood risk.</li> </ul>
 <b>Wind Speed and Storms</b>	<ul style="list-style-type: none"> <li>No long-term change in average wind speed or direction can be determined with confidence.</li> <li>The number and intensity of storms in the North Atlantic has increased by approx. three storms per decade since 1950.</li> </ul>	<ul style="list-style-type: none"> <li>Projections indicate an overall decrease in wind speed and an increase in extreme wind speeds, particularly during winter.</li> <li>The number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.</li> </ul>	<ul style="list-style-type: none"> <li>Increases in extreme wind speeds may impact on wind turbines and the continuity of power supply.</li> <li>Infrastructure will be at risk due to the increased occurrence of intense storms (e.g. winter 2013/2014).</li> </ul>
 <b>Sea Level and Sea Surface Temperature</b>	<ul style="list-style-type: none"> <li>Historically, sea level has not been measured with the necessary accuracy to determine sea level changes around Ireland. However, measurements from Newlyn, in southwest England, show a sea level rise of 1.7cm per decade since 1916. These measurements are considered to be representative of the situation to the South of Ireland.</li> <li>Sea surface temperatures have increased by 0.85°C since 1950, with 2007 the warmest year in Irish coastal records.</li> </ul>	<ul style="list-style-type: none"> <li>Sea levels will continue to rise for all coastal areas, by up to 0.8 m by 2100. The south of Ireland will likely feel the impacts of these rises first.</li> <li>Sea surface temperatures are projected to continue warming for the coming decade. For the Irish Sea, projections indicate a warming of 1.9°C by the end of the century.</li> </ul>	<ul style="list-style-type: none"> <li>Significant increase in areas at risk of coastal inundation and erosion.</li> <li>Increased risk to coastal aquifers and water supply.</li> <li>Change in distribution fish species;</li> <li>Implications for fisheries and aquaculture industries.</li> </ul>

**Table 1.1 Summary of projected climate impacts for Ireland (Source: National Adaptation Framework, 2018)**

## 1.4 Policy background

### Paris Agreement

The Paris Agreement of 12 December 2015 committed 195 countries, including Ireland, to the mitigation goal of limiting the increase in global temperature to well below 2°C above pre-industrial levels. The agreement also places significant importance on actions needed, both nationally and globally, to help people adapt to climate change. Successive COPs (Conference of Parties) since then have reaffirmed commitments in this regard.

The Paris Agreement has pushed adaptation up the international agenda giving it equal standing with mitigation. Article 2(1) of the Paris Agreement establishes a global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing



vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal.

Article 7 of the Paris Agreement recognises that adaptation is required at national, regional and local levels and that action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems. In accordance with Article 7, each country must formulate and implement national adaptation plans including assessments of climate change impacts and vulnerability and build the resilience of socioeconomic and ecological systems, including through economic diversification and sustainable management of natural resources.

This global goal explicitly links adaptation to the mitigation goal of limiting global temperature rise to well below 2°C and makes clear that if mitigation activities succeed in limiting the rise in global temperature, less adaptation will be needed. The 2018 IPCC Special Report on Global Warming of 1.5°C further discusses the requirements of adaptation in a world with 1.5°C or 2°C warming.

According to the 2018 report, climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options. Limiting global warming to 1.5°C compared to 2°C is projected to reduce increases in ocean temperature as well as associated increases in ocean acidity and decreases in ocean oxygen levels. Consequently, limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems, and their functions and services to humans, as illustrated by recent changes to Arctic sea ice and warm water coral reef ecosystems.

### **EU Adaptation Strategy**

At EU level, the European Commission published a White Paper on adapting to climate change in 2009 which was followed by publication of a strategy on adaptation in April 2013. The EU Adaptation Strategy has an overall aim of contributing to a more climate-resilient Europe and focuses on three key objectives: -

**Promoting action by Member States** - the Commission has been encouraging all Member States to adopt comprehensive adaptation strategies and provides funding to help member states build up their adaptation capacities and take action. It also

supports adaptation in cities and local and regional Government through the Covenant of Mayors initiative.

**'Climate-proofing' action at EU level** – the Commission has promoted the integration of adaptation into EU policies in key vulnerable sectors such as agriculture, fisheries and cohesion policy to help to ensure that Europe's infrastructure is made more resilient. They are also promoting the use of insurance against natural and man-made disasters.

**Better informed decision-making** – the Commission is attempting to address gaps in knowledge about adaptation and has developed a European climate adaptation platform (Climate-ADAPT) as a 'one-stop shop' for adaptation information in Europe.

The European Commission published an evaluation of the strategy in November 2018.<sup>1</sup> The evaluation process was to assess the EU Adaptation Strategy in the context of the 2015 Paris Agreement, and ensure the EU remains on track with the Paris Agreement global adaptation goal. Ireland contributed to the evaluation, with both the Department of Communications, Climate Action and Environment (DCCAE) and the Environmental Protection Agency (EPA) engaging with the Commission and European Environment Agency in relation to the process. The analysis resulted in a report on lessons learned and reflections on improvements for future action, accompanied by a staff working document presenting the evaluation in detail and assessments of each of the Member States' national adaptation strategies.

After the adoption, in 2008, of the 2020 EU Climate and Energy Package, the European Commission launched the Covenant of Mayors to endorse and support the efforts deployed by local authorities in the implementation of sustainable energy policies. The Covenant of Mayors was a unique bottom-up movement that succeeded in mobilising a great number of local and regional authorities to develop action plans and direct investments towards climate change mitigation measures.

Building on the success of the Covenant of Mayors, the Mayors Adapt initiative was launched in 2014, relying on the same governance model, inviting cities to make political commitments and take action to anticipate and prepare for the unavoidable impacts of climate change. In 2015, the initiatives merged under the newly integrated Covenant of

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<sup>1</sup> [https://ec.europa.eu/clima/policies/adaptation/what\\_en](https://ec.europa.eu/clima/policies/adaptation/what_en)

Mayors for Climate and Energy, adopting the EU 2030 objectives and an integrated approach to climate change mitigation and adaptation.

### **National Policy Context**

The *National Policy Position on Climate Action and Low Carbon Development* published in April 2014 establishes the fundamental national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050.

The National Policy Position provides a high-level policy direction for the adoption and implementation by Government of plans to enable the State to pursue the transition to a low carbon, climate resilient and environmentally sustainable economy by 2050; statutory authority for these mitigation and adaptation plans was subsequently provided for in the Climate Action and Low Carbon Development Act 2015 (“The Climate Act”).

As envisaged by the National Policy Position, the evolution of climate policy in Ireland will be a dynamic, iterative process, based on the adoption by Government of a series of national mitigation plans and national adaptation frameworks over the period to 2050 with the ultimate objective of achieving the National Transition Objective by 2050. Ireland’s first National Mitigation Plan (NMP) was published on 19 July 2017. The mitigation plans and adaptation frameworks will be continually updated, as well as being reviewed at appropriate intervals, and at a minimum, every five years.

### **National Adaptation Framework**

Ireland’s first statutory National Adaptation Framework (NAF), prepared under Section 5 of the Climate Action and Low Carbon Development Act 2015, was approved by Government on 19 December 2017 and was subsequently published and laid before both Houses of the Oireachtas, in line the Climate Act, on 19 January 2018. This statutory Framework replaced the non-statutory National Climate Change Adaptation Framework (NCCAF) from 2012.

The Framework and its successors set out the context to ensure local authorities, regions and key sectors can assess the key risks and vulnerabilities of climate change, implement climate resilience actions and ensure climate adaptation considerations are mainstreamed into all local, regional and national policy making. The NAF will also support local and regional adaptation action and the development of local authority climate change adaptation strategies. Completed local strategies should then be used to inform development plans and other statutory plans and policies of the local authority. The Framework does not identify specific locations or propose adaptation measures or projects in individual sectors.

Respecting the principle of subsidiarity, detailed adaptation measures will be developed across sectors and local government, in accordance with the NAF.

Under the Framework, Government Departments (or Agencies, where appropriate) with responsibility for priority sectors are required to prepare sectoral adaptation plans in line with the requirements of the Climate Act. The NAF identifies 12 key sectors under the remit of seven Government Ministers where sectoral adaptation plans are to be prepared. The sectoral plans will specify the adaptation policy measures the Minister in question proposes to adopt. The statutory deadline for the submission of completed sectoral adaptation plans to Government for approval is 30 September 2019.

The sectors and lead Government Departments required to prepare sectoral adaptation plans under the Framework are as follows:

1. Seafood - Department of Agriculture, Food and the Marine
2. Agriculture - Department of Agriculture, Food and the Marine
3. Forestry - Department of Agriculture, Food and the Marine
4. Biodiversity - Department of Culture, Heritage and the Gaeltacht
5. Built and Archaeological Heritage - Department of Culture, Heritage and the Gaeltacht
6. Transport infrastructure - Department of Transport, Tourism and Sport
7. Electricity and Gas Networks - Department of Communications, Climate Action and Environment
8. Communications Networks - Department of Communications, Climate Action and Environment
9. Flood Risk Management - Office of Public Works
10. Water Quality - Department of Housing, Planning and Local Government
11. Water Services Infrastructure - Department of Housing, Planning and Local Government
12. Health - Department of Health

Work by national sectors under the NAF to date has identified local authorities as a key stakeholder responsible for implementing adaptation actions in their area and ensuring coordination and coherence in this regard is key. For example, in the flood risk management sector, they are a key stakeholder in the preparation of flood emergency response plans. In the biodiversity sector they are a key stakeholder in the control of invasive species and in the transport sector they are a key partner in the management of fluvial flooding on local roads. It is vital that local authorities and their role be considered as part of the development of sectoral adaptation plans to ensure coordination and efficiency with actions delegated to the local level when appropriate.

Ultimately, national policy on adaptation will continue to ensure that the appropriate tools and guidance are provided to the local authority sector to enable them to plan effectively for the impacts of climate change and to ensure that climate change adaptation is a key issue that is considered by each local authority in the formulation of their own plans and programmes.

### **Project Ireland 2040**

Ireland's National Policy Position will fundamentally shape investment choices over the coming decades guided by the ongoing implementation of both the National Mitigation Plan and National Adaptation Framework. As part of Project Ireland 2040, the National Planning Framework (NPF) outlines the role of the planning system in facilitating climate change mitigation and adaptation. In this regard National Strategic Outcome 8 is dedicated to achieving transition to a Low Carbon and Climate Resilient Society. The themes highlighted in the National Planning Framework are focused on the role of spatial policy in influencing where we live, where we work, and how we travel.

The principal statutory purpose of the Regional Spatial and Economic Strategies (RSESs) being prepared by the Regional Assemblies is to support the implementation of Project Ireland 2040 and the economic policies and objectives of the Government by providing a long-term strategic planning and economic framework for the development of the regions. The RSES is required under the Planning and Development Act 2000 (as amended) to address employment, retail, housing, transport, water services, energy and communications, waste management, education, health, sports and community facilities, environment and heritage, landscape, sustainable development and climate change. The RSES is a link between the National Planning Framework, the City and County Development Plans and the Local Economic and Community Plans.

The National Development Plan (NDP) includes objectives in relation to the aim of transitioning to a low carbon and climate resilient society, including €940 million for flood risk management projects. The NDP also established a Climate Action Fund with an allocation of at least €500 million to 2027. The Climate Action Fund will support initiatives from the public and private sector that will help Ireland reach its climate and energy targets. The Fund has the objective of funding initiatives that contribute to the achievement of Ireland's climate and energy targets in a cost effective manner. It also offers the potential for innovative interventions which, in the absence of support from the Fund, would not otherwise be developed.

In addition, the Fund will seek to facilitate projects that contribute to other Government policy priorities including to: support innovation and capacity building towards the development of climate change solutions capable of being scaled and delivering benefits beyond a once off impact; generate wider socio-economic benefits such as job creation, air quality improvements, reduction in fuel poverty, biodiversity and community resilience and development; and leverage non-exchequer sourced investment.

### **SEA/AA**

The work undertaken to develop a local adaptation strategy should inform development plans and other statutory plans of the local authority. It will be a matter for the local authority to decide whether or not the adaptation strategy needs to undergo a Strategic Environmental Assessment (SEA) or Appropriate Assessment (AA). The SEA Regulations, S.I. No. 435 of 2004 as amended by S.I. No. 200 of 2011, set out the relevant SEA procedures and notifications. Information on SEA pre-screening checks and the SEA screening process are provided in the EPA report [\*Development of Strategic Environmental Assessment \(SEA\) Methodologies for Plans and Programmes in Ireland - Synthesis Report\*](#). In terms of the application of AA, the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477 of 2011) transposes Article 6 (3) of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.

### **Climate Action Regional Offices (CAROs)**

While the structure of local government facilitates independent adaptation planning and action on the part of individual local authorities, it is clear that many authorities are facing similar challenges to neighbouring local authorities.

Reflecting this, in line with the NMP and NAF, four Climate Action Regional Offices (CAROs) have been established to drive climate action at regional and local level in Ireland. Their establishment recognises the significant obligation which has been placed on local government to develop and implement its own climate action measures, as well as the need to build capacity within the sector to engage effectively with climate change.

As set out below, the CAROs are operated by a lead local authority in four different regions grouped according to shared climate change risks. The establishment of these offices will enable a more coordinated engagement across the whole of government and will help build on the experience and expertise which exists across the sector.

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

Through these offices the local authorities can play a crucial role in driving practical policy and behavioral changes within our communities to encourage both businesses and citizens to embrace the need for climate action. Their role is discussed further in Section 2.2.

### **Local Adaptation Strategies**

The NAF sets out the national strategy for the application of adaptation measures by a local authority in its administrative area in order to reduce the vulnerability of the State to the negative effects of climate change and avail of any benefits that may occur.

Under the NAF each local authority should make and adopt a local adaptation strategy. These strategies are to be completed by 30 September 2019.

In addition, Section 15 of the Climate Act provides that a ‘relevant body’ (the definition of which includes a local authority) must have regard to the most recently approved NMP and NAF in the performance of its duties.

Local authorities will be supported in developing their adaptation strategies by the Climate Action Regional Office (CARO) in their region. The development of strategies must be

undertaken in accordance with the process described in these guidelines, the National Adaptation Framework and the requirements of the Climate Action and Low Carbon Development Act 2015. In preparing local adaptation strategies, the NAF recognises the influence such strategies will have in shaping key functions of local government and states that;

*“local authorities should therefore consider bringing any proposed strategy, be it regional or local authority based, before elected members at city, county or city and county level, as appropriate”.*

Given the scale and importance of the climate transition it is therefore strongly recommended that elected members of the local authority are given the opportunity to input into the local response to climate change and also to adopt the final local authority adaptation strategy prepared using these Guidelines.

#### **National coordination structures for adaptation**

At national level, sectoral coordination has taken place since 2015 under the auspices of the National Adaptation Steering Committee, which is chaired by the Department of Communications, Climate Action and Environment. The local authority sector is represented on the Committee at Director of Service level. In addition, the Regional Assemblies are represented at Director level. As a key action under the NAF, the National Adaptation Steering Committee has been reviewed and restructured to ensure that a coordinated, comprehensive and coherent approach continues to operate in implementing actions under the NAF. This review also included ensuring that CAROs are appropriately represented on national coordination structures. The need for appropriate cross sectoral coordination and consultation is identified as crucial in the NAF and the Climate Act and the Steering Committee will have a key role to play in promoting and encouraging work in this regard.

The National Adaptation Steering Committee reports to the High Level Climate Action Steering Group which is chaired by the Minister for Communications, Climate Action and Environment. The local authority sector is represented on the high level group at Chief Executive level. In terms of adaptation, the High Level Steering Group will:

- monitor progress by sectors and agencies in delivering on climate change adaptation actions for which they are responsible; and
- ensure that a coordinated and coherent approach is adopted and maintained towards achieving a climate resilient Ireland.



The CAROs are coordinated by a National Local Authority Climate Action Steering Group.

## 1.5 Guidelines: purpose and structure

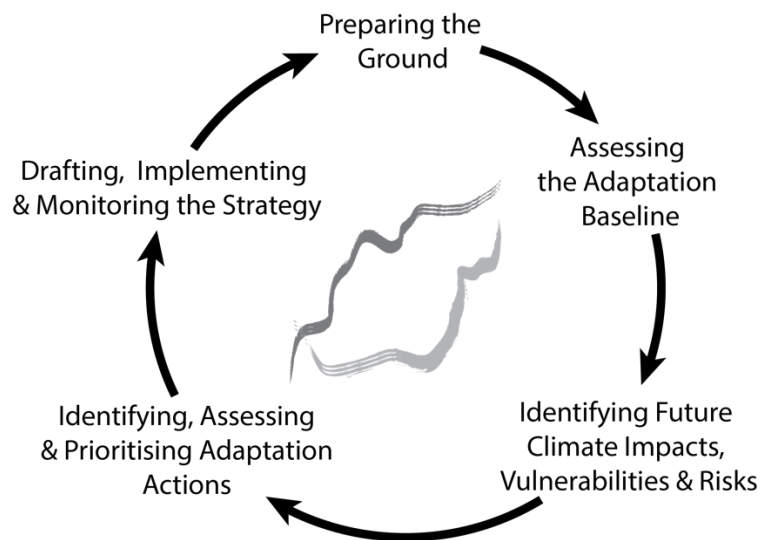
The Department of Communications, Climate Action and Environment has been engaging closely with the local authority sector, in collaboration with the EPA, the Centre for Marine and Renewable Energy and UCC to ensure that appropriate guidance is provided and capacity within local authorities is strengthened. The original version of these Guidelines, *Local Authority Adaptation Strategy Development Guidelines* (Gray, 2016) was published in May 2016 as research Guidelines under the EPA Climate Change Research Programme.

In line with key action 4 of the NAF, those Guidelines have been reviewed, updated and formalised as statutory Guidelines. The Guidelines now reflect national policy as provided in NAF as well as other developments in the Local Government sector including the development of CAROs and their role in the adaptation strategy development process. Existing statutory planning processes are unable to account for the long-term nature and broad scale of the adaptation challenge. A separate and distinct adaptation strategy at local authority level is therefore required to build their resilience as organisations as well as in terms of service delivery.

These Guidelines are designed to assist local authorities to develop their own adaptation strategies and to ensure that they will complement sectoral adaptation plans to be prepared under the NAF and aim to ensure that a coherent and consistent approach to adaptation planning is adopted by local authorities in Ireland.

### How to use these Guidelines

The 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 1.2 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. Table 1.2 which is also in Chapter 6 of the Guidelines outlines a suggested structure of a completed strategy developed using these Guidelines.



**Figure 1.2 Schematic diagram of the adaptation strategy development process with the five steps included**

Each CARO will have a key role in ensuring that a consistent approach is taken to the development of local adaptation strategies across their region in line with these Guidelines, including through additional guidance in collecting information and assistance in carrying out some of the steps described. CAROs will also have a role in developing overarching material on national policy and on their region, particularly where this will limit duplication of effort across the constituent local authorities. It is expected that each local authority would liaise with the CARO in their region in respect of the strategy development process.

### **Climate Ireland’s Local Adaptation Support Wizard**

Through support from the EPA and DCCAE, a centralised information resource, “Climate Ireland” ([www.climateireland.ie](http://www.climateireland.ie)), has been developed by researchers at UCC and provides support to decision makers in the development of their adaptation strategies. This is achieved through the provision of:

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

In supporting local authorities in developing their adaptation strategies, an online *Local Authority Adaptation Wizard* has been developed and deployed on Climate Ireland. The

wizard is based around the 5 steps of the adaptation decision making process described in these guidelines and provides further support to local authorities by identifying and providing access to key sources of the most up-to-date climatic and adaptation information and through the provision of templates to support information and data collection.

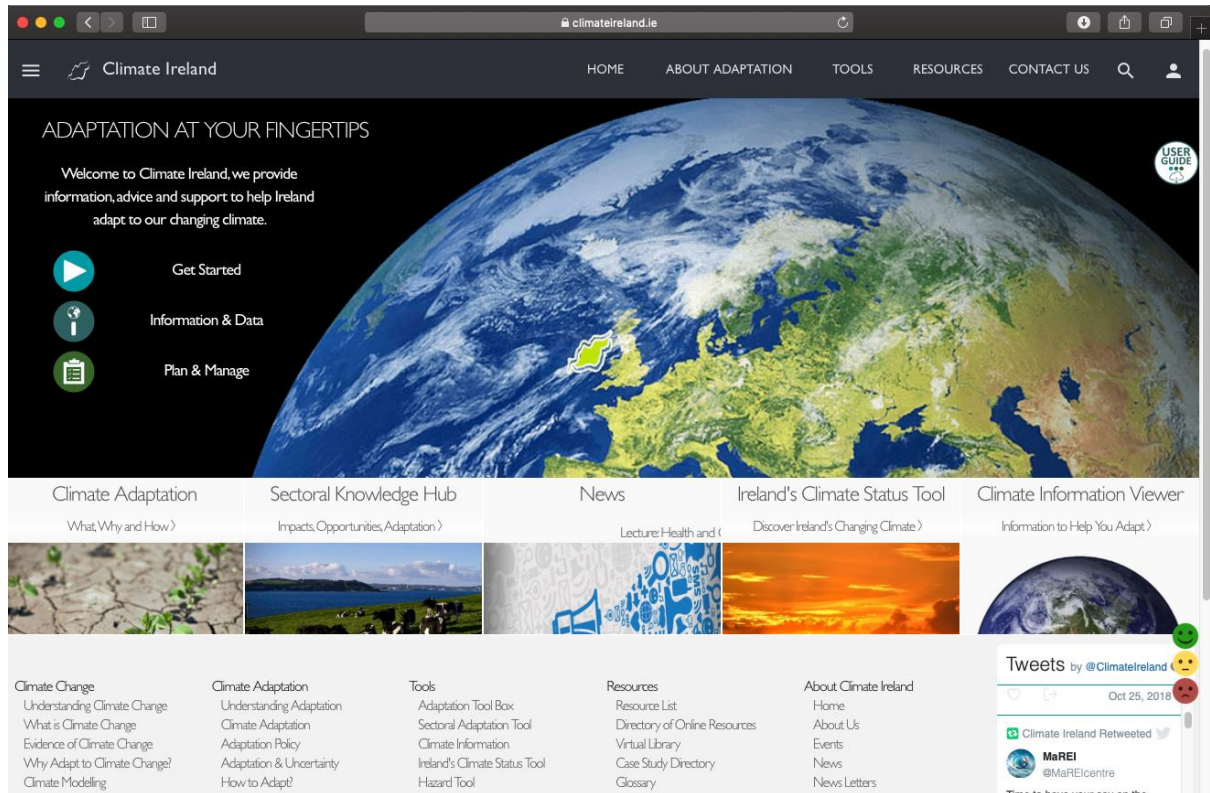


Figure 1.3 Climate Ireland Web Resource

<b>Strategy section:</b>	<b>Suggested contents:</b>
<b>1. Introduction</b>	<p>The introductory chapter should provide a brief contextual overview of climate change, policy and adaptation and include information on:</p> <ul style="list-style-type: none"> <li>• Climate change, evidence of Ireland’s changing climate and action (adaptation, mitigation and co-benefits);</li> <li>• Adaptation policy, the requirement and benefits of planning for adaptation at the local scale;</li> <li>• The methodology employed in developing the adaptation strategy;</li> <li>• Acknowledge the contribution of adaptation team members and any other internal/external contributors to the strategy.</li> </ul>
<b>2. The Regional and Local Context</b>	<p>The second chapter should provide an overview of the relevant CARO and the local authority. Key information will include:</p> <ul style="list-style-type: none"> <li>• An overview of the CARO region;</li> <li>• A description of the county under investigation including topographic, demographic and socio-economic information (e.g. key areas of enterprise and jobs) and an overview of assets and infrastructure (e.g. transport).</li> </ul>
<b>2. Adaptation Baseline Assessment</b>	<p>This chapter should provide an overview of climate hazards to have affected the authority and provide a description of the local scale impacts and consequences for the delivery of services by the local authority. Key information will include:</p> <ul style="list-style-type: none"> <li>• A timeline of climate hazards to have impacted upon the authority;</li> <li>• An overview of the impacts and consequences of these hazards according to the key operational areas of the authority. It is important to include as much quantitative information as possible (e.g. number of houses/people affected, financial costs, staff costs);</li> </ul> <p>For those hazards considered of particular relevance to the local area, it can be useful to develop case study examples around specific events.</p>
<b>3. Climate Risk Identification</b>	<p>This chapter should provide an overview of the relevant projected climate changes and impacts according to the key operational areas of the local authority and where opportunities/benefits have been identified, these should also be noted (1 page per operational area). The Risk Register should be presented and priority risks highlighted (1 page).</p>
<b>4. Adaptation Goals, Objectives and Actions</b>	<p>This chapter should outline adaptation goals and objectives and provide an overview of the adaptation action plans developed and how the implementation of adaptation actions will be managed, referring to spatial planning mechanisms, instruments of local and national policy implementation as appropriate</p>
<b>5. Implementation, Monitoring and Evaluation</b>	<p>This chapter should describe the mechanisms put in place to monitor the impacts of climatic events and trends as they occur and describe the scheduling of evaluation of the strategy.</p>

**Table 1.2 Suggested Sections and Contents of a Local Authority Adaptation Strategy**

## 2 Preparing the Ground (Step 1)

### Overview

One of the most crucial elements in developing an adaptation strategy is ensuring the involvement of the right people at key stages of the process. At local authority level, the nature of the tasks that are required to adapt to climate change dictate that “the right people” will be drawn from a wide range of disciplines, that different sectors are included at different times and also the importance of including senior management figures, in order to secure access to sufficient resources to ensure that the strategy is implemented.

#### Key tasks of Step 1

- Convene the adaptation team.
- Develop a clear regional and sectoral collaboration plan.
- Develop a clear stakeholder engagement and communication plan.

#### 2.1 Convene an adaptation team

Adaptation is a cross-cutting issue that requires an integrated and explicitly collaborative approach. The types of measures that must be implemented to adapt to climate-related issues (such as flood management) involve multiple fields of expertise. Accordingly, it is essential to use a broad spectrum of knowledge when formulating adaptive responses to climate change (EC, 2013). It is therefore crucial for local authorities, when developing an adaptation team, to take appropriate steps to ensure that all relevant departments of a local authority are represented and that such representation is at an appropriately senior level.

#### *Core Team*

The Core Team will do the majority of the work in developing the adaptation strategy and will conduct the majority of the tasks required in developing a strategy, e.g. scheduling meetings, communicating the adaptation planning process and preparing drafts. They will also be required to interact with stakeholders in the local area, other local authority administrations and the CARO in their region. Key skillsets to consider for inclusion in the planning team include: GIS, data analysis, communication and public engagement expertise.

There is growing evidence that the inclusion of a highly motivated, dedicated and knowledgeable individual to serve as a catalyst to others involved in an adaptation process is extremely beneficial. If such a “climate champion” is available, then the local authority

should consider involving them on the adaptation team, whether in a lead role or as another important member of the team. This is more likely to be beneficial to the overall strategy development process than a prescriptive approach to selecting a team leader based upon a particular function alone.

### **Planning Team**

The adaptation Planning Team (PT) will support the Core Team in developing the adaptation plan by bringing their knowledge and experience to bear on the adaptation planning process. It is also important that the PT includes members at a senior management level so as to ensure buy-in to the adaptation planning process. As a result, the adaptation planning team should attempt to draw on all relevant departments, skillsets and disciplines across the authority (Table 2.1).

<b>Internal departments, knowledge domains and disciplines to consider for inclusion in the adaptation PT:</b>	
<ul style="list-style-type: none"> <li>• Biodiversity</li> <li>• Building control</li> <li>• Coastal management</li> <li>• Recreation</li> <li>• Environment</li> <li>• Economic development</li> <li>• Finance and Corporate services</li> <li>• Heritage</li> </ul>	<ul style="list-style-type: none"> <li>• Housing</li> <li>• Information systems</li> <li>• Planning policy</li> <li>• Roads/transport</li> <li>• Waste</li> <li>• Educational and community services</li> <li>• Emergency response</li> </ul>

**Table 2.1 A (non-exhaustive) list of the disciplines, knowledge domains and departments from which to seek representation when convening the adaptation PT**

## **2.2 Plan collaboration with the Climate Action Regional Offices (CAROs), other Local Authorities and National Sectors**

Collaboration across authority boundaries is advisable at various stages throughout the adaptation strategy development process. Local authorities will be assisted in connecting with adaptation teams located in neighbouring local authorities by the CARO in their region. There are numerous reasons why inter-authority collaboration on climate adaptation is important, including:

- To ensure adaptation actions taken in one authority do not result in negative consequences for another.

- To capitalise on economies of scale and build adaptive capacity where an adaptation measure might span multiple authorities.
- To widen the pool of knowledge and experience upon which the core adaptation team may draw in drafting their strategy.

### *CAROs - a regional approach to climate action*

Local authorities in Ireland have well-established regional collaborative fora, focusing on topics such as energy efficiency, renewable energy and spatial planning. The CAROs will facilitate the adoption of a similar regional partnership approach to the development of adaptation strategies. Each CARO will adopt an annual work programme with a view to carrying out actions that:

- Provide expertise and capacity at local/regional level to contribute effectively to the national transition to a low carbon and climate resilient economy.
- Provide a more focused approach for how local government liaises centrally with relevant Government Departments/Regional Assemblies/Agencies on climate related matters and with sectors in the preparation of Sectoral Adaptation Strategies under the NAF.
- Ensure efficient use of resources in the formulation of local authority adaptation strategies through elimination of duplication in preparation of individual strategies.
- Improve efficiency in risk assessment, option assessment and adaptation strategy and action development.
- Develop links with Regional Waste Management Offices, Waste Enforcement Regional Lead Authorities, River Basin Management Committees, Flood Risk Management Offices, OPW, SEAI, EPA etc.
- Develop common public education and awareness initiatives, as agreed with the Department of Communications, Climate Action and Environment.
- Consider the development of a 'Centre' or 'Centres of Excellence' with potential linkages to third level institutions and other organisations for EU Interreg or LIFE funded projects and other opportunities in the area.
- Contribute to the National Dialogue on Climate Action on a local and regional basis and lead on local/regional transition to a low carbon and climate resilient future acting as a regional focus for schools, NGOs and any others engaged in driving the climate action agenda, as agreed with the Department of Communications, Climate Action and Environment.

When pursuing regional collaboration, individual local authorities should identify the interdependencies (e.g. geographic) of the Authority starting with other local authorities in their CARO region, considering for example: natural resources, catchments, coastal cells, or habitats that span multiple jurisdictions. On the basis of these physical interdependencies, sketch an appropriate geographical boundary for collaboration, noting the authority jurisdictions it spans. These are the authorities that will need to be involved at various points in the development of your adaptation strategy.

Though, due to its focus on geographical and topographical risk regions, the CARO regional structure does not align with the Regional Assemblies, representing the Northern and Western, Eastern and Midlands, and the Southern Regions and engagement with the Regional Assemblies is not a formal part of the process in formulating local adaptation strategies, CAROs and local authorities should explore synergies and collaboration that may be mutually beneficial and ensure adaptation strategies are aligned with the forthcoming Regional Spatial and Economic Strategies prepared by the Regional Assemblies.

### ***Collaboration with national sectors***

It will also be important that completed local adaptation strategies align with sectoral plans being completed under the NAF. For the purposes of the NAF, 12 key 'sectors' under the remit of seven Government Ministers have been identified which must prepare adaptation plans of their own. These adaptation processes will carry a number of critical implications for adaptation planning at local authority level (and vice versa). In an effort to ensure that any necessary sectoral input is obtained as efficiently as possible coordination between sectoral and local scale adaptation efforts will be facilitated via each CARO.

## **2.3 Develop a stakeholder engagement and communication plan**

Stakeholder participation is stipulated under the NAF, principally in order to:

- promote the integration of a range of knowledge and values in adaptation.
- build support for the adaptation process through embedding it in local interests and concerns.
- ensure that adaptation processes at the local scale are aligned with similar processes that are under way in neighbouring authorities and relevant sectors.



The adaptation strategy development process must therefore include a structured and substantive programme for the engagement of stakeholders from the elected members and within the local authority, the local community, relevant non-governmental organisations and state sector bodies and particularly those who will be expected to play a role in the implementation of plans.

### *Plan community engagement points*

There are likely to be a number of key stages in the adaptation strategy development process where input from the local community will be of particular relevance and value. For example, stakeholder knowledge and opinions regarding the impacts of extreme weather events and periods of climate variability, sensitivity to climatic factors, or prioritisation of adaptation actions may be beneficial to elicit via workshops or surveys.

Key issues to consider when planning community engagement include the following:

- Clarifying what must be achieved from the engagement process, taking a strategic and cost-effective approach regarding who is engaged and how. In the interests of efficiency, adaptation may fit on the agenda within existing meeting groups or communication contexts.
- Framing climate change in order to clarify the impacts of relevance to participants. Stakeholders will more readily identify with locally focused problems than the more generalised national climate change impacts.
- Using local contacts and networks to provide entry points for the recruitment of wider groups, where wider involvement is practical and desirable. In many cases, carefully targeting smaller groups of those who are most willing and most influential for ongoing interaction may lead to the most effective use of time and resources.
- Being forthcoming and transparent with respect to the degree of influence that contributors will have at specific stages of the process and its overall outcome (Gardner et al., 2009).

### *Before moving on:*

It is important to try to ensure that a Core Team has been established and that as broad a range of departments as possible are represented on the PT, and that senior management are aware of the strategy development process and will be offered opportunities to contribute to it. Raising the profile of the team's work within the authority will help in securing access to meet with people during the baseline assessment that follows.

Key outputs of Chapter 2 to include in the strategy:

- A list of contributing adaptation team members (Core and PT)
- A clear statement of the authorities with which to collaborate in the development of the strategy.
- A clear statement of the national level sectors with which to collaborate in the development of the strategy.
- A plan of how and at which stages in the development of the strategy external stakeholders will be engaged.

## 3 Assessing the Current Adaptation Baseline (Step 2)

### Overview

Understanding how well adapted an authority is to current climate hazards is a crucial first step in developing an adaptation strategy. For the purposes of developing adaptation strategies at the local scale, climate hazards include extreme weather events and periods of climate variability (i.e. periods of above or below average climate conditions). When assessing the current adaptation baseline, it is also important to consider extreme weather events that result from the interaction or combination of climate hazards (compound events). For example, flood levels in an estuarine environment may be determined by increased levels of freshwater inflows from high levels of precipitation and elevated sea levels due to low atmospheric pressure.

- The term extreme weather event (or climate extreme) is defined as ‘the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable’ (IPCC, 2012).
- The term climate variability denotes deviations from average climatic conditions over a given a period of time when compared to long term averages for the same calendar period such as a month, season or a year, e.g. periods of above or below average temperature.

This assessment should account for the range of climate hazards to have affected the authority in the past and assess the consequences of these for services and functions of the local authority. When considering the range of climate hazards to have affected your authority, it is important to remember that recent experiences of climate hazards may not be fully representative of the long term climatology. As a result, the focus should be on identifying the full range of hazard events to have affected your local area and authority rather than limiting the assessment to a particular time period, e.g. the preceding 30 years. It is also important, where applicable, that this assessment includes, at the local scale those impacts and vulnerabilities being considered a priority at the sectoral level and identified through the development of sectoral adaptation plans.

The purpose of the assessment is to provide a more detailed understanding of local level vulnerability to climate hazards and identify which hazards are a concern in terms of impacts and the costs (economic and otherwise) they carry for the local area and for the delivery of the functions and services of the local authority. Finding out in explicit detailed terms which climate hazards and impacts *are not* a concern as part of this process is also vital given the need to prioritise resources available to enhance climate resilience.

### Key tasks of Chapter 3

- Identify climate hazards (extreme weather events and periods of climate variability) that are relevant to the local area.
- Gain a clear understanding of local level vulnerability to the impacts of climate hazards.
- Assess the consequences of these for the delivery of services and functions of the local authority.
- Identify the actors relevant to the management of vulnerability and impacts.

In addition to conventional desk study, much of the information required to characterise the vulnerability to climate hazards can be elicited from local sources using simple participatory, qualitative data-gathering approaches such as workshops, meetings and interviews (UKCIP, 2009). Potential sources of information are outlined in Table 3.1.

#### Key sources of information to use when characterising the local climate impact regime

- Local expert stakeholders
- Local media archives
- National media archives
- OPW (<http://www.floodinfo.ie>)
- Met Éireann (<http://www.met.ie>)
- Climate Ireland (<http://wwwclimateireland.ie>)
- Insurers
- Emergency service providers, HSE
- Reports, records and databases held within the authority
- Expertise of the adaptation team

**Table 3.1 Suggested sources of recent weather and climate impact information**

### 3.1 A baseline assessment: what is likely to emerge?

Conducting a baseline assessment involves assessing local level vulnerability to the impacts of climate hazards and identifying the consequences of these for the delivery of services and

functions by the local authority (Table 3.3 provides an example of an adaptation baseline assessment). This assessment may well illustrate that an authority's capacity to cope with existing extreme weather events and periods of climate variability falls short of what might be considered optimal, either in terms of what current policies or legislative instruments stipulate, or simply in terms of internal expectations regarding the resilience of key services to climate hazards.

As a result of historical patterns of development, most cities around the world function under a substantial adaptation deficit (Burton, 2004). As a result, the early phases of an adaptation strategy are therefore typically focused on simply taking steps to address an existing adaptation deficit, i.e. addressing local level vulnerability to extreme weather events and periods of climate variability. Doing so enhances the local authorities and societal short-term coping capacity, buying valuable time to effect a transition towards greater resilience in the face of a more severe future climate impact regime (Moser and Ekstrom, 2010).

### **3.2 Develop a Profile of Climate Hazards that have Affected the Authority**

The adaptation team should identify recent weather extremes and periods of climate variability (climate hazards) that have been of local significance and identify the climatic and meteorological conditions associated with the event or period of climate variability. Extreme weather events may have included periods of extreme rainfall, flooding, storms, heatwaves or dry spells. Periods of climate variability may refer to periods of above or below average conditions in the spatial and/or temporal distribution of precipitation, or changes in average temperature. Figure 3.1 provides an example of a local level profile to weather extremes and periods of climate variability.

A useful starting point in attempting to identify events and periods of climate variability and associated climatological and meteorological information is the Met Éireann website, which provides a comprehensive list of “Major Weather Events” to have affected Ireland, as well as detailed breakdowns of many of the key phenomena which in combination constituted the event (Met Éireann, 2015).



[National level information on gradual changes in Ireland’s Climate can be accessed through Climate Ireland’s Status of Ireland’s Climate Tool;](#)



Met Éireann provides a wide range of information through the [met.ie](#) website including:

- [Past Weather Statements](#)
- Information on [Major Weather Events](#) and [Extremes](#)
- [Meteorological and climatological data](#)



The OPW provide information on past flood events, flood maps and management plans through the [floodinfo.ie](#) website.

## Cork County Extreme Weather Events

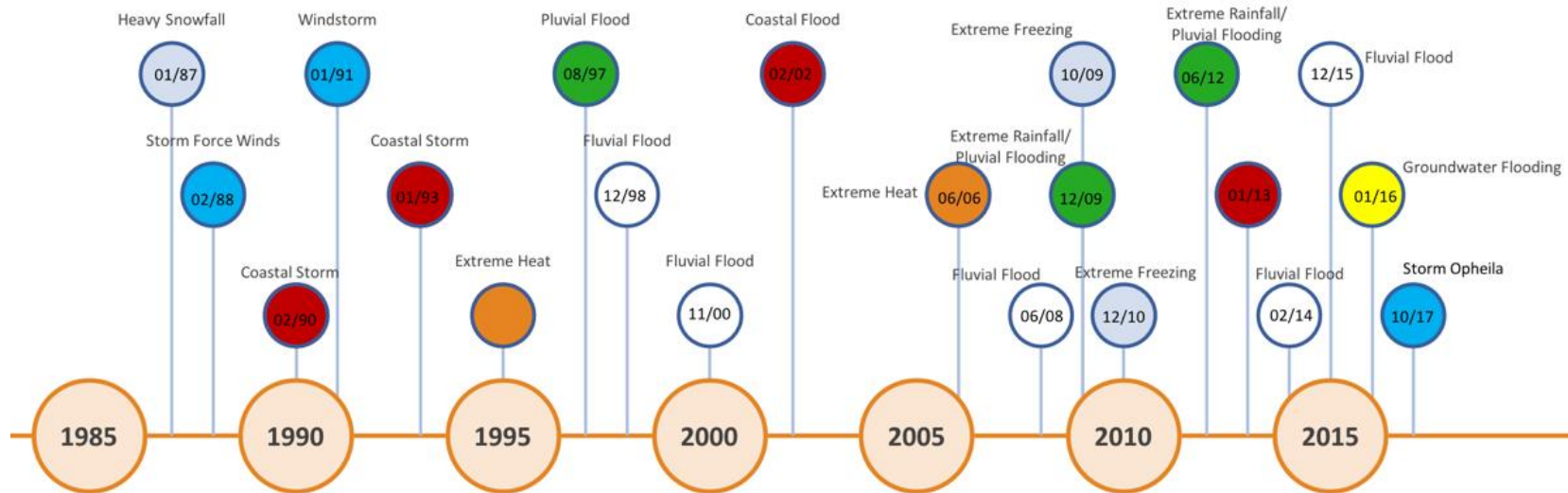
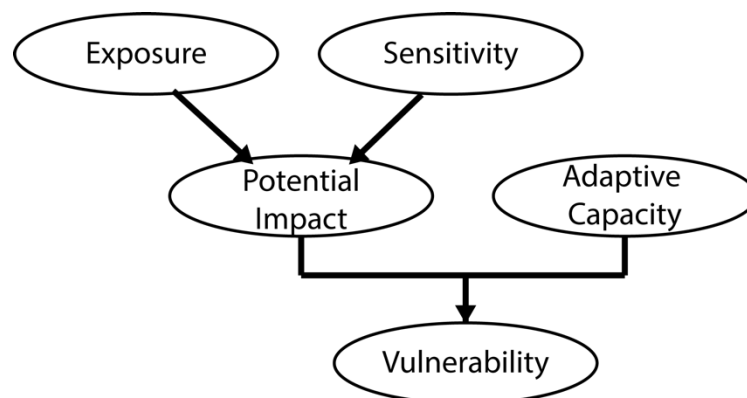


Figure 3.1 An example of profile of recent extreme weather events and periods of climate variability developed for Cork County

### 3.3 Characterise the local level vulnerability to the impacts of Climate hazards

Having developed a local level profile of climate hazards, the next step is to develop an understanding of the local level impacts and vulnerabilities to these hazards. In the context of adaptation planning, the term 'vulnerability' refers to the susceptibility of a system to be adversely affected by climate and weather related impacts. Vulnerability is specific to particular sectors and places and can be broken into three components: 1) exposure , 2) sensitivity and 3) adaptive capacity (Figure 3.2). For the purposes of developing a local level adaptation strategy:

- Exposure refers to the people, livelihoods, species of ecosystems, environmental functions, services and resources, infrastructure or economic, social or cultural assets subject to current and future climate variability and extremes;
- Sensitivity refers to the susceptibility to harm of exposed receptors (people, livelihoods, species of ecosystems, environmental functions, services and resources, infrastructure or economic, social or cultural assets);
- Adaptive capacity refers to the ability of a system, institutions, humans and other organisms to adjust to potential damages, to take advantage of opportunities, or to respond to consequences.



**Figure 3.2 A schematic diagram illustrating vulnerability to climate hazards and the three components (Exposure, Sensitivity and Adaptive Capacity)**

For each of the extreme weather events and periods of climate variability identified through the profile of climate hazards the impacts of these should identified, areas of exposure and the receptors that were affected (sensitivity), and any existing measures in place to offset



these (adaptive capacity/adaptive responses). When doing so, provide as much quantitative information as possible (e.g. number of houses flooded, kilometres of roads impacted). It can be useful to categorise impacts according to the operational areas of the local authority (e.g. Habitats, Parks and Green Spaces; Buildings and Infrastructure, Health and Well-Being and Emergency Response).

### **3.4 Assess the consequences of the impacts of climate hazards for the delivery of services by the Local Authority**

The impacts of extreme weather events and periods of climate variability will have consequences for the delivery of services and functions by the local authority and these should be considered and described as part of the assessment. When providing a description of consequences, it is also important to consider why the climate hazard was so disruptive to the authority. For example, during and in the aftermath of the extreme weather events and as a result of periods of climate variability:

- Were core services disrupted, which services in particular and why?
- Were particular service areas put under increased pressure (e.g. as a result of providing increased levels of emergency response)?
- Were economic costs incurred in order to maintain a requisite level of service to the community, what were the costs and where were these costs incurred?

In addition to a description of consequence, indicate the level of disruption associated with the hazard for the delivery of services by the local authority. Table 3.2 Broad categories of service disruption that may assist in determining how to characterise the consequences of climate risks for your local authority (Edinburgh Sustainable Development Partnership, 2016) provides a relatively simple, high-level means of assessing the level of disruption caused across the authority (Edinburgh Sustainable Development Partnership, 2016).

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

**Table 3.2 Broad categories of service disruption that may assist in determining how to characterise the consequences of climate risks for your local authority (Edinburgh Sustainable Development Partnership, 2016)**

### **3.5 Identify other actors relevant to the management of impacts**

To ensure that adaptation processes at the local scale are aligned with similar processes that are underway in neighbouring authorities and relevant sectors, it is important to identify what other actors, groups and sectors have responsibility for managing the impact under investigation. There may be synergies to realise across adaptive actions, or potential conflicts to avoid in the use of shared resources. In some cases CAROs could facilitate such engagement also.

<b>Climate Hazard (Event):</b>		Heatwave (Summer 2018)				
<b>Meteorological/ Climatological Conditions:</b>		On a national basis, temperatures were above normal with heat wave conditions recorded at various times and stations between the 24 <sup>th</sup> of June and 4 <sup>th</sup> July. Absolute drought conditions were reported at 21 stations (May 22 <sup>nd</sup> to 14 <sup>th</sup> July) with partial drought conditions being reported for some stations between the 18 <sup>th</sup> of June and the 14 <sup>th</sup> of July (Source: Met Éireann).				
Operational Area	Impact	Exposure & Sensitivity	Existing Adaptive Response	Consequence		Other Relevant Actors
				Level	Description	
Habitats Parks and Green Spaces	Increased frequency of wild fire due to prolonged periods of high temperatures and below average rainfall.	Upland areas, comprising of gorse, forest and bog.	Emergency response by fire services. Fire breaks.	3	- Loss of priority habitats and species. - Increased callouts of emergency services.	NPWS, Department of Cultural, Heritage and the Gaeltacht, Coillte.
Buildings and Infrastructure	Deterioration of road surfaces (rutting) due to prolonged exposure to high temperatures.	Local roads situated across the county, comprising of tarred and chipped surfaces.	Chipping and emergency works.	2	- Increased maintenance costs and staff overtime. - Reputational damage of transport disruption.	Department of Transport, Tourism and Sport, National Roads Authority
Health and Wellbeing	Increased levels of sunburn and heat stress (heat stroke/dehydration) as a result of prolonged exposure to high temperatures.	Outdoor (particularly in urban areas due to UHI), Council Staff	Water and sunscreen stations.	2	- Increased costs for protection of staff from heat stress. - Staff fatigue.	HSE
Emergency Services	Increase frequency and intensity of fires in dunes at beach sites due to increased recreational pressures.	Beach sites with dune systems.	Emergency response by fire services.	2	- Increased callout of fire services.	Fire services.

**Table 3.3 An example of a baseline assessment**

### *Before Moving On*

Review the various steps taken to complete the baseline assessment. Ensure that there is a clear understanding of which climate hazards (extreme weather events periods of climate variability) have impacted upon the local area and the local scale vulnerabilities to these. Noting costs, making an estimation of the level of disruption caused and the various actors with management responsibility will be useful in clarifying which impacts are of greatest concern.

Key outputs of Step 2 to include in the strategy

- A local level profile of climate hazards that have impacted the area.
- An assessment of vulnerability to the impacts of the identified climate hazards.
- An assessment of consequences for the delivery of services by the local authority.
- A list of actors relevant to the management of identified climate impacts.

## 4 Identifying Future Climate Impacts, Vulnerabilities and Risks (Step 3)

### Overview

Understanding how the impacts of climate hazards are likely to evolve in the future is a crucial element of adaptation strategy development. Chapter 3 dealt principally with what is known about the present and recent past. This chapter will shift the focus towards what might occur in the future, with the aim of identifying potential future climate impacts, vulnerabilities and risks that are of greatest relevance to the authority. It is also important to remember that projected changes in climate may result in additional benefits and opportunities for both the local area and local authority and these should be highlighted as part of adaptation strategy development process. For example, projected increases in annual average temperature will make Ireland a more attractive tourism destination. However, it should also be noted that projected decreases in levels of summer rainfall and an increasing tourist population will put increased pressure on available water resources. At this stage of the analysis, clear communication and consultation with relevant stakeholders will be of particular importance.

#### Key tasks of Chapter 4

- Assessment of potential future climate impacts and vulnerabilities;
- Develop a climate change risk register;
- Prioritise climate risks.

#### 4.1 Assessment of future climate hazards, impacts and vulnerability

Any identification of the climate impacts that are likely to be of significance in the future should begin with those that are significant in the present. To understand how climate impacts might change into the future, it is useful to first consider how levels of vulnerability to climate hazards might change into the future - this involves assessing potential future levels of exposure and sensitivity to climate hazards. For the purposes of local authority adaptation strategy development, it is recommended that you assess levels of adaptive capacity based on their current levels. This is to allow you identify additional measures to enhance adaptive capacity as part of adaptation planning (Step 4).

At this stage of the assessment, it is important that you consider any new or emerging climate impacts and vulnerabilities. Although some activities and services may not currently be impacted upon by climate hazards, they may be sensitive to projected changes in climate and may experience impacts in the future. As a result, it is important to consider the full range of projected changes in these, the impacts of these changes and whether any thresholds or tipping points might be exceeded leading to significant increases in levels of impacts and associated consequences.

### ***Examine Available Climate Projection Data***

In order to understand how levels of exposure to climate hazards might change into the future, it is important to examine available climate projection information to understand how the frequency and intensity of extreme weather events and periods of climate variability might change in the future. The information required has been produced through nationally funded research projects (e.g. Nolan, 2015; Desmond et al. 2018) and is summarised online through Climate Ireland.



National level information on projected changes in Ireland's Climate can be accessed through [Climate Ireland's Essential Climate Information Tool](#).



National level information on projected changes in the biophysical impacts of climate change can be accessed through [Climate Ireland's Climate Hazard Scoping Tool](#).



The OPW provide [predictive flood mapping through the floodinfo.ie website](#).

These maps show possible flooding from rivers, extreme sea levels and pluvial (for certain areas).

For the purposes of adaptation strategy development, fine scale climate information and data is not required and national statements of projected climate changes and impacts are considered appropriate. More detailed assessment and appraisal should be employed when specific plans or measures are to be implemented and more detailed information is necessary. Where uncertainty exists in projected changes in climate variables, these should be noted as part of the adaptation strategy development process.

### ***Assess potential future changes in sensitivity to climate hazards***

Vulnerability to climate hazards will be determined not only by future changes in exposure to climate hazards but also by changes in sensitivity to these. For example, Ireland's population is projected to increase to between 5.58 and 6.69 million people by 2051 with a

substantial rise in our older populations (aged 65 years and older) which is expected to increase from 13.3% of the population in 2016 to between 23.9% and 27.4% by 2051 (CSO, 2018). This will result in a higher level of sensitivity to climate hazards such as heatwaves and associated impacts (heat-related illness).

In order to establish future levels of sensitivity local authorities and in addition to stakeholder knowledge, the adaptation team should examine available projections of non-climatic factors on a local (e.g. Local Authority Development Plan, Local Economic and Community Plans, Tourism Strategies), regional (e.g. Regional Spatial and Economic Strategies) and national basis (e.g. National Planning framework). For some impacts, there may be little existing information to support future impact and vulnerability assessment. This should be noted as part of assessment and may form a priority for future investigation or research.



Climate Ireland's [Sectoral Knowledge Hub](#) provides an overview of key climate changes for Ireland and the potential sectoral impacts of these.

### ***Assess Potential Future Changes in Levels of Consequence***

Having developed an understanding of potential future levels of vulnerability to the impacts of climate hazards, assess the potential future levels of consequence for the delivery of services by the local authority.

## **4.2 Develop a climate risk register and prioritise risks**

Having developed a profile of current and potential future locally-relevant climate hazards, impacts and vulnerabilities and assessed the consequences for the delivery of services by the local authority, the next step involves summarising this information through the development of a climate risk register and then prioritising these risks.

As part of the development of the risk register and prioritisation of risks, all stakeholders should be consulted, the results of the adaptation baseline and future impact and vulnerability assessment should be presented and discussed and any limitations of the assessment clearly noted and rationalised. It is also important to note cross authority and sectoral dependencies and interdependencies, as some risks may not be a priority for a specific sector or local authority but addressing the risk may be a priority for another local authority or sector.

### ***Develop a Climate Risk Register***

This register should summarise information gained through the baseline assessment and future impact and vulnerability assessment through a series of climate risk statements, associated time frames and projections of future changes in these risks (See Table 4.1 for an example of a local authority climate risk register). These statements should be developed according to individual climate hazards, the key operational areas of the local authority and be detailed enough so that they identify the **hazard**<sup>1</sup>, **risk**<sup>2</sup> and **consequence**<sup>3</sup> for the local authority in question. An example of a risk statement for heatwaves is:

***Increased frequency of extreme hot days**<sup>1</sup>, leading to **increased staff discomfort**<sup>2</sup>  
resulting in **increased mechanical cooling costs** for the authority<sup>3</sup>*

### ***Prioritise Climate Risks***

Having developed a register of climate risk, the next step is to prioritise these risks. When prioritising climate risks, it is important to consider:

- The timing of impact – It is important to differentiate between impacts that are of immediate concern (i.e: over the next 5 years) and risks that are more relevant to the authority over the medium to long term. When considering the immediacy of climate risks, the following timescales can be employed: Short (<5 years), Medium (5-10 years) and Long (>10 years).
- The magnitude of current impacts and consequences for the local authority now and into the future - The adaptation baseline and future impacts and vulnerability assessment undertaken in previous steps should allow for a prioritisation of those risks based upon the assessed magnitude of current and future impacts on the local authority. It is also useful to consider how the level of impact/consequence might increase/decrease under projected climate change and to account for non-climatic drivers where relevant.
- The impact on existing policies, plans and objectives – The impacts of climate change will have direct relevance to the achievement of the objectives and priorities of the local authority. By applying a climate lens to existing local policy, aims and objectives, you will increase your understanding of how projected changes in climate, and their associated impacts and consequences, can either challenge or facilitate the achievement of local development policy, strategies and action plans. For example, the potential future impacts of climate change (projected increases in the frequency of extreme precipitation events) could lead to increased compliance difficulties with



the EU Bathing Water Directive due to increased levels of runoff while projected increases in the frequency of heatwaves will have implications for road works programmes due to increased maintenance costs.

*Before moving on*

Ensure that the evolution of risk over time is well understood, both within the team and, where appropriate, among senior management and the wider authority. Keeping a watching brief is a minimum requirement for future risk to be managed coherently, which will require dedicated resources in order to sustain long-term observation and data collection.

Management buy-in over the long term is therefore essential.

Key outputs of Chapter 4 to include in the strategy

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

<b>Climate Hazard:</b>	Heatwaves				
<b>Observed and Projected Information:</b>	Climate Projections indicate an increase in average summer temperature and with an increase in the frequency of heatwaves by mid-century.				
<b>Operational Area</b>	<b>Risk Statement</b>	<b>Timing of Risk</b>	<b>Projected change in level of risk (to 2050)</b>	<b>Relevant Policy, Plans and Objectives</b>	<b>Priority</b>
Habitats, Parks and Green Spaces	Increased frequency of high temperatures leading to increased pressure on tourism resources resulting in increased upkeep and maintenance costs.	Short, medium and long term.	Increase	Tourism Strategy, County Development Plan, Local Development Plan.	Low
Health and Wellbeing	Increased frequency of high temperatures leading to increased staff discomfort resulting in increased mechanical cooling costs.	Medium and long term.	Increase	Health and Safety. Energy Use Policy.	Low
Buildings and Infrastructure	Increase in frequency of prolonged exposure of road surfaces to high temperatures leading to road damage (rutting of tarred and chipped surfaces) resulting in increased roads maintenance costs.	Short, medium and long term.	Increase	Roads Maintenance Programmes.	High
Emergency Services	Increase in frequency of above average and extreme temperatures leading to the increased occurrence of wildfire resulting in increased callout of fire services and associated costs to the authority.	Short, medium and long term.	Increase	Emergency Planning, Parks Policy.	High

**Table 4.1 An example of a local authority climate risk register**

## 5 Identifying, Assessing and Prioritising Adaptation Actions (Step 4)

### Overview

With the risks posed by climate change prioritised at the local scale, attention can be turned to identifying adaptation goals and objectives. This in turn facilitates the identification and assessment of appropriate adaptation actions. Opportunities to work towards greater climate resilience over the medium to long term should be clearly identified and planned for at this stage of the strategy development process.

Key tasks of Chapter 5:

- Adaptation goals and objectives should be identified to support the authority in achieving climate resilience.
- A range of potentially appropriate adaptation actions must be identified to enhance the capacity of the local authority and community to adapt to climate change impacts and to address priority climate risks.
- Adaptation actions should be prioritised and implementation and monitoring plans developed.

#### 5.1 Identifying adaptation goals and objectives

The risk register and priority risks developed during the previous step will help to develop a better understanding of potential climate change impacts and their consequences for the authority.

The next step is to use this information to identify goals and objectives for adaptation. Goals are general guidelines which are presented as high level long term statements, while objectives outline the steps necessary to achieve these. It is important to note that some objectives will be common across a range of adaptation goals (e.g. actions to raise awareness of climate change impacts and the need for adaptation) and due to the overarching nature of climate change impacts, adaptation goals can involve a broad range of scopes. For example, some adaptation goals may only be relevant to the local authority or shared on a regional (with neighbouring authorities) or national level (e.g. State Agencies and Sectors under NAF).

Adaptation Goal:	Adaptation Objectives:	Relevant Operational Areas
To maintain the authorities ability to provide the required level of service provision in the face of climate impacts:	<ul style="list-style-type: none"> <li>• <i>Objective 1:</i> Increase understanding of the operational risks posed by current and projected climate hazards;</li> <li>• <i>Objective 2:</i> Increase capacity for climate adaptation planning across all service areas;</li> <li>• <i>Objective 3:</i> Mainstream climate adaptation considerations across all operations and procedures.</li> </ul>	<i>All of Authority</i>
To increase the resilience of council owned building stock to climate change impacts:	<ul style="list-style-type: none"> <li>• <i>Objective 1:</i> Confirm an inventory of council owned building stock;</li> <li>• <i>Objective 2:</i> Assess the vulnerability of building stock to climate risks;</li> <li>• <i>Objective 3:</i> Identify, prioritise and implement alleviation measures.</li> </ul>	<i>Buildings and Infrastructure</i>
To maintain transport network integrity in the face of climate change impacts.	<ul style="list-style-type: none"> <li>• <i>Objective 1:</i> Identify vulnerable transport infrastructure;</li> <li>• <i>Objective 2:</i> Identify feasible adaptation/maintenance actions to maintain resilience despite climate change impacts;</li> <li>• <i>Objective 3:</i> Implement sustainable cost effective and adaptation/maintenance measures drawing on risk register outputs.</li> </ul>	<i>Buildings and Infrastructure</i>

**Table 5.1 Examples of adaptation goals and objectives with relevant operational areas indicated**

It is important to consider that adaptation goals and objectives will call for a range of actions that will require varying levels of investment and resources in terms of time, finances, data and personnel requirements. As a result, it is important to identify the relevant actors responsible for the achievement of local level goals and objectives. Actions required to fulfil goals and associated objectives will also range from short (less than 5 years), medium (>5 to 10 years) to longer term (>10 years). The following section will examine the selection and identification of adaptation actions further.

## 5.2 Identifying adaptation actions

Adaptation actions will help you to achieve your adaptation goals and associated objectives. It is important to note that it is highly likely that no single adaptation action will help you to achieve your objectives but that a portfolio of adaptation actions delivered over a range of timeframes (working in concert) will be required. Adaptation actions can be usefully classified into those that either build adaptive capacity or deliver progress in responding to climate change risks.

Adaptive capacity refers to your ability or potential to respond successfully to climate change. Building adaptive capacity refers to measures that develop your capacity to adapt and includes actions such as:

- Raise awareness and understanding of climate change and adaptation – Adaptation is a societal issue and is the start of an in-depth long term process to ensure national and local scale climate resilience that will likely include a degree of social and systemic transformation. To ensure that actions in the plan are implemented, there is a requirement to embed adaptation across all areas of the local authority and community. It is therefore crucial that actions are taken to communicate and raise awareness of climate change, the effects of these changes on the local area and community and the benefits of proactively planning for adaptation. The work of the National Dialogue on Climate Action through the CAROs is also of relevance.

*Examples of actions to raise awareness and understanding of adaptation include:*

Launch the adaptation strategy, develop in-house summaries, develop an outreach and communication strategy.

- Identify, monitor, and assess climate hazards, impacts and consequences: To increase the capacity of the local authority to plan effectively for climate adaptation, there is a requirement to increase knowledge and skills including understanding the ongoing and potential future impacts and consequences of climate change and hazards at the local scale, including thresholds, sensitivities, dependencies and interdependencies. As such, there is a requirement to ensure that evidence is developed and updated on how the climate is changing, the impacts of these changes on the local area and the consequences of these for the delivery of services by the local authority. This will likely necessitate undertaking research to fill any knowledge gaps identified.

*Examples of actions to monitor current and projected impacts and consequence of climate change include:* Catalogue costs to the local authority associated with

extreme weather events and periods of climate variability; Working with third level institutes and national level sectors (for example Biodiversity, Agriculture, Transport) conduct research to determine the future evolution of vulnerability at the local scale; Coordinate with spatially adjoining local authorities, facilitated by relevant CAROs, to map out future climate risk across the region.

Delivering adaptation actions involves taking practical actions to reduce vulnerability to the negative impacts of a changing climate and enhance opportunities or benefits. It is important to note that adapting to climate change is no more novel or complex than many other tasks of local governance. A large number of the adaptation actions available to planners and policymakers at the local scale are already in use in some form, requiring little more than a change in the scale or focus of existing management efforts to orient them towards greater climate resilience. Delivering adaptation actions encompasses taking a wide range of actions that can be classified as soft, green or grey and may range from simple solutions realisable in the immediate term to large scale longer term transformational projects.

- “Soft” adaptation actions involve alterations in behaviour, regulation or systems of management, such as land-use planning policy. As such, soft measures have the potential to be relatively flexible and inexpensive to progress. They are therefore often considered the most tractable first steps in taking action on climate adaptation.
- “Green” adaptation actions are those that seek to use ecological properties to enhance the resilience of human and natural systems in the face of climate change. Green action examples include efforts to reinstate dune systems to act as buffers against coastal storm damage, or the creation of green spaces and parks to counteract urban heat island effects.
- “Grey” adaptation typically involves technical or engineering-oriented responses to climatic impacts. Examples of grey adaptation include the construction of sea walls or tidal barrages in response to a sea-level rise (Figure 5.1), or the replacement of traditional sprinkler systems with drip-feed irrigation schemes in the face of water shortages.

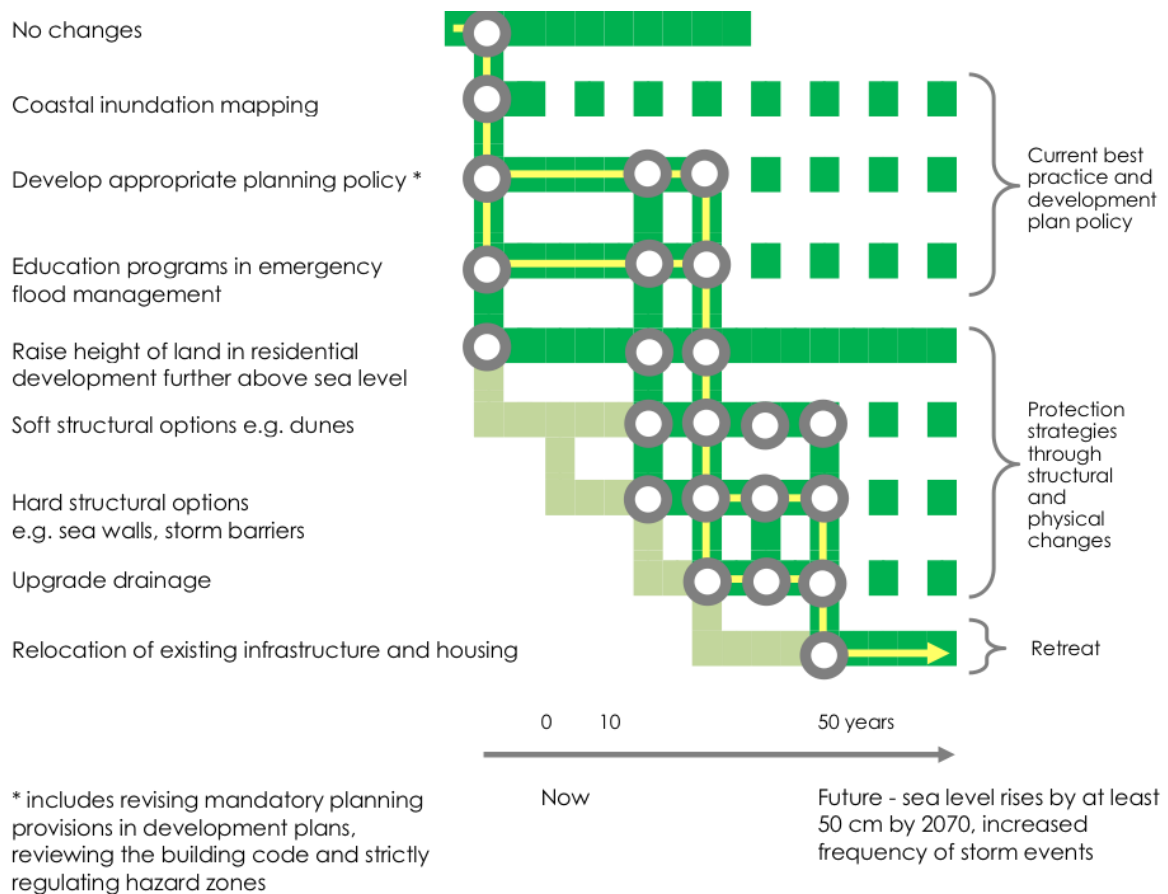
In addition to the mechanisms listed above, over the medium to long term, statutory planning processes offer considerable potential as vehicles of adaptation implementation (Gleeson *et al.*, 2013). Much of what adaptation seeks to enhance or amend is already subject to planning legislation, thereby creating clear synergies between plan making and the implementation of preferred adaptation actions. As a result, it is important that the work undertaken to develop a local adaptation strategy should inform development plans and other statutory plans of the local authority.

At this stage of the assessment and when planning your climate actions, identify as many actions as possible consistent with and capable of contributing to your climate adaptation goals and objectives in the short (five years or less), medium (>5 and less than 10 years), and long term (>10 years). When identifying potential adaptation actions:

- It can be useful to first identify the range of additional actions required to offset current impacts and then with reference to future vulnerabilities and projections of climate change, identify additional actions. It is important to note many of the early stage actions will most likely be centred on policies, procedures and plans that are already in place. These will have been identified during the baseline assessment. Unless it is considered both desirable and feasible to attempt a sharp change of direction, these policies and measures will form the basis of early-stage adaptation.
- For those measures for implementation in the medium to long term and in order to address emerging climate risks, it can be useful to identify the full range of actions required to address long term objectives and work backwards from these to identify what might be needed in the short term and to establish the timing of these adaptation actions sequentially.

As illustrated in Figure 5.1, an adaptation pathways approach is one potential means by which to structure the delivery of adaptations identified (short, medium and long term) and subsequently communicate this information (Siebentritt et al., 2014). An adaptation pathways map is a schematic diagram of adaptation actions and the relationships between them, similar in nature to a decision tree. The map starts at the present and plots multiple different pathways to the future, each employing a different combination of adaptation actions. The advantages of adopting an adaptation pathways approach include the following:

- Managing uncertainty - pathways support a structured approach to the modification of adaptation responses in light of new information, changing circumstances and societal priorities;
- Transparency - pathways make explicit the assumptions, trade-offs and aims of adaptation efforts in a way which is communicable;
- Risk-based decision thresholds - thresholds of acceptable risk can be explicitly used as decision trigger points, with alternative adaptation measures being flagged as necessary in advance of risk thresholds being reached.



**Figure 5.1 An example adaptation pathway from the Eyre Peninsula, for Agriculture/Urban Infrastructure (source Siebentritt et al. 2014)**

The map identifies adaptation actions on the y-axis while the x-axis represents the time and a general trend in changing climate which should be read as indicative (e.g. decades) rather than precise in terms of timing of the adaptation actions. A solid dark green line indicates the time period over which an action could usefully address the relevant decision, a lighter green line indicates time before an action occurs and where preparatory work is required. A dashed thick green line indicates that the action contributes to the adaptation solution but only in part. Circles indicate a decision point, where a choice between different actions might need to be made while the yellow lines with arrows indicate an emerging pathway.



### 5.3 Assess and prioritise adaptation actions and develop local scale adaptation action plans

Having identified a wide range of adaptation actions for potential implementation in the short and medium to long-term and on the basis of your identified adaptation goals and objectives, the next step is to develop your adaptation action plans.

On the basis of the actions identified, decisions will have to be made on which of the actions are suitable for implementation in the current planning cycle (i.e. in the next 5 years) and with a view to the evolution of climate risk in the medium (5 – 10 years), and long term (>10 years). This will involve undertaking an assessment of the identified actions. A useful method to assess identified actions is to use a method that considers the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic and **E**nvironmental opportunities and constraints of each action. The results of the assessment will help the planning team decide on the benefits and disadvantages of each action and to determine which actions are best suited to current capacity and resources. At this stage of the assessment, however, it must be remembered that there are no right or wrong answers.

<b>Consideration</b>	<b>Key Questions:</b>
<b>Social</b>	<ul style="list-style-type: none"> <li>- Will the action be socially acceptable?</li> <li>- Is it compatible with community values?</li> </ul>
<b>Technical</b>	<ul style="list-style-type: none"> <li>- Is the action technically feasible?</li> <li>- Will the action reduce long-term loss?</li> <li>- Are there any indirect effects?</li> </ul>
<b>Administrative</b>	<ul style="list-style-type: none"> <li>- Can the local authority meet the staffing and funding needs of the action or does it need to be obtained elsewhere?</li> </ul>
<b>Political</b>	<ul style="list-style-type: none"> <li>- Is there political support for the action?</li> <li>- Is there enough public support to ensure the success of the action?</li> </ul>
<b>Legal</b>	<ul style="list-style-type: none"> <li>- Does the local authority have the remit to implement the action?</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>- Is the action cost-effective and likely to pass a cost-benefit analysis?</li> <li>- What benefits will the action provide?</li> </ul>
<b>Environmental</b>	<ul style="list-style-type: none"> <li>- How will the action affect the environment?</li> <li>- Is the action consistent with environmental goals?</li> </ul>

**Table 5.2 Evaluating adaptation actions: considerations and key questions**

Once you have prioritised and agreed your adaptation actions with which to move forward, a brief action plan should be developed for each action. These will establish accountability and ease tracking and evaluation as outlined in the next step. Information that could be captured includes:

- Title
- Responsible Body(s)
- Priority
- Cost-benefit Analysis
- Assumptions that were considered when identifying the action
- Risks associated with implementation
- Barriers and enablers to implementation
- Additional adaptation measures that may need to be included
- Milestones
- Evaluation Plan
- Description
- Other Players
- Costs
- Potential Funding Source(s)
- Maintenance Needs
- Goals Addressed

Once you have provided detail for the adaptation actions prioritised to meet your adaptation goals and objectives, it can be useful to develop an implementation and monitoring plan which sequences the full range of adaptation actions over the short, medium and long term. This is useful in helping to guide and evaluate the progress of the plan (Step 5). The implementation plan should also play a role in communicating your adaptation strategy and should include an engagement and dissemination plan.

This programme should identify schedules and milestones for individual adaptation actions and there should be a clear identification of responsibilities for monitoring and evaluating, and clear criteria for signalling that the specific actions need reconsideration. As the impacts of climate change remain uncertain, however, it may be difficult to assess the level of success or lack of success of some adaptation actions in the early years.

#### *Before moving on*

Be clear on your adaptation goals and objectives and the various actions to pursue in the short, medium and long term to achieve these. It is important to also bear in mind that the actions that most closely fit the needs and constraints of the present are by no means guaranteed to be those that will do so in the future, even over relatively short time scales. For this reason, having a strong well selected suite of actions, and the depth of knowledge required to discern when and how they might best be employed is crucial.

Following Step 4, you will have:

- Identified local level adaptation goals and objectives.
- Identified a wide range of actions to help you meet these goals and objectives.
- Develop adaptation action plans and an implementation and monitoring plan to support delivery of these actions.

## 6 Drafting, Implementing and Monitoring the Strategy (Step 5)

### Overview

The bulk of the work required in developing an adaptation strategy has now been completed. The final stages of the process involve bringing together the outputs of the adaptation baseline assessment, future climate impact and vulnerability assessment, the risk register and adaptation action plans to develop a draft strategy.

Key tasks of Chapter 6:

- Develop a draft local authority adaptation strategy.
- Finalise and adopt the draft strategy.
- Schedule strategy review and update.

#### 6.1 Bringing it all together: drafting an adaptation strategy

The information gathered through the previous steps of the strategy development process can now coalesce to provide a framework for the adaptation strategy. The strategy must focus on the achievement of high-level, long-term adaptation goals and objectives.

Table 6.1 suggests content for each section of the strategy. The aim is to provide a relatively brief, broad and long-term strategic guide to operational decision-making processes taking place over shorter timescales. As a result, much of the more detailed information collated through the strategy development process (e.g. vulnerability assessment) should be used as supporting evidence and contained in appendices where appropriate. A detailed analysis of each adaptation action can be undertaken more coherently at the time at which a decision is taken to implement it.

#### 6.2 Moving from a working Draft to a plan of Action

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

### 6.3 Finalising the draft strategy

The strategy should be presented in draft form to key stakeholders, senior management etc. for amendment and validation, with the schedule of implementation, monitoring and review appended. It is strongly recommended that the strategy should be adopted by the elected members.

### SEA/AA

The work undertaken to develop a local adaptation strategy should inform development plans and other statutory plans of the local authority. It will be a matter for the local authority to decide whether or not the adaptation strategy needs to undergo a Strategic Environmental Assessment (SEA) or Appropriate Assessment (AA). The SEA Regulations, S.I. No. 435 of 2004 as amended by S.I. No. 200 of 2011, set out the relevant SEA procedures and notifications. Information on SEA pre-screening checks and the SEA screening process are provided in the EPA report [\*Development of Strategic Environmental Assessment \(SEA\) Methodologies for Plans and Programmes in Ireland - Synthesis Report\*](#). In terms of the application of AA, European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477 of 2011) transpose Article 6 (3) of the Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.

### 6.4 Update the strategy

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. As a result, in addition to reviewing the adaptation strategy on a regular basis and where and when the monitoring and evaluation identify the need, it is also important that you schedule full scale updates (noting that the National Adaptation Framework is to be reviewed every 5 years). It is important that you plan ahead for these updates and ensure that all relevant data, e.g. monitoring or data from performance indicators, is collated through time. When developing your tracking and evaluation programme, things to consider include:

- How often should the planning team meet to review progress?
- How will the planning team keep senior management and elected members updated on progress?
- How will other sectors be kept informed of plan progress to ensure that synergies and cross-benefits between plans are fully realised?
- How should progress be reported to the stakeholder group, e.g. progress reports?
- What are the key signals (thresholds) for updating the plan?

<b>Strategy section:</b>	<b>Suggested contents:</b>
<b>1. Introduction</b>	<p>The introductory chapter should provide a brief contextual overview of climate change, policy and adaptation and include information on:</p> <ul style="list-style-type: none"> <li>• Climate change, evidence of Ireland’s changing climate and action (adaptation, mitigation and co-benefits);</li> <li>• Adaptation policy, the requirement and benefits of planning for adaptation at the local scale;</li> <li>• The methodology employed in developing the adaptation strategy;</li> <li>• Acknowledge the contribution of adaptation team members and any other internal/external contributors to the strategy.</li> </ul>
<b>2. The Regional and Local Context</b>	<p>The second chapter should provide an overview of the relevant CARO and the local authority. Key information will include:</p> <ul style="list-style-type: none"> <li>• An overview of the CARO region;</li> <li>• A description of the county under investigation including topographic, demographic and socio-economic information (e.g. key areas of enterprise and jobs) and an overview of assets and infrastructure (e.g. transport).</li> </ul>
<b>2. Adaptation Baseline Assessment</b>	<p>This chapter should provide an overview of climate hazards to have affected the authority and provide a description of the local scale impacts and consequences for the delivery of services by the local authority. Key information will include:</p> <ul style="list-style-type: none"> <li>• A timeline of climate hazards to have impacted upon the authority;</li> <li>• An overview of the impacts and consequences of these hazards according to the key operational areas of the authority. It is important to include as much quantitative information as possible (e.g. number of houses/people affected, financial costs, staff costs);</li> </ul> <p>For those hazards considered of particular relevance to the local area, it can be useful to develop case study examples around specific events.</p>
<b>3. Climate Risk Identification</b>	<p>This chapter should provide an overview of the relevant projected climate changes and impacts according to the key operational areas of the local authority and where opportunities/benefits have been identified, these should also be noted (1 page per operational area). The Risk Register should be presented and priority risks highlighted (1 page).</p>
<b>4. Adaptation Goals, Objectives and Actions</b>	<p>This chapter should outline adaptation goals and objectives and provide an overview of the adaptation action plans developed and how the implementation of adaptation actions will be managed, referring to spatial planning mechanisms, instruments of local and national policy implementation as appropriate</p>
<b>5. Implementation, Monitoring and Evaluation</b>	<p>This chapter should describe the mechanisms put in place to monitor the impacts of climatic events and trends as they occur and describe the scheduling of evaluation of the strategy.</p>

**Table 6.1 Suggested content of a local authority adaptation strategy**

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## Abbreviations

<b>AA</b>	Appropriate Assessment
<b>CARO</b>	Climate Action Regional Office
<b>COP</b>	Annual Conference of Parties (COP) that ratified the UN Framework Convention on Climate Change (UNFCCC)
<b>CSO</b>	Central Statistics Office
<b>EC</b>	European Commission
<b>EPA</b>	Environmental Protection Agency
<b>EU</b>	European Union
<b>GIS</b>	Geographical Information System
<b>HSE</b>	Health Service Executive
<b>ICIP</b>	Ireland's Climate Information Platform
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>NAF</b>	National Adaptation Framework
<b>NCCAF</b>	National Climate Change Adaptation Framework
<b>NGO</b>	Non-Governmental Organisation
<b>NMP</b>	National Mitigation Plan
<b>NPF</b>	National Planning Framework
<b>NPWS</b>	National Parks and Wildlife Services
<b>OPW</b>	Office of Public Works
<b>PT</b>	Planning Team
<b>SEA</b>	Strategic Environmental Assessment
<b>SEAI</b>	Sustainable Energy Authority of Ireland
<b>SLR</b>	Sea level rise