



Comhairle Cathrach Chorcaí
Cork City Council



Climate Change Adaptation Strategy 2019-2024

September 2019



We are Cork.

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Abbreviations

CARO: Climate Action Regional Office
CAT: Climate Action Team
CCiC: Cork City Council
CCEA: Cork City Energy Agency
CCET: Cork City Energy Team
CCMA: County and City Management Association
CDP: City/County Development Plan
CFRAMS: Catchment Flood Risk Assessment and Management Study
CODEMA: City of Dublin Energy Management Agency
COM: Covenant of Mayors
CSO: Central Statistics Office
DCCAE: Department of Communications, Climate Action and Environment
DEHLG: Department of the Environment, Heritage and Local Government
DTTAS: Department of Transport, Tourism and Sport
EPA: Environmental Protection Agency
ESB: Electricity Supply Board
FEWS: Flood Early Warning System
GDP: Gross Domestic Product
HSE: Health Services Executive
IPPC: Intergovernmental Panel on Climate Change
KPIs: Key performance Indicators
LAP: Local Area Plan
LGMA: Local Government Management Agency
LLFRS: Lower Lee Flood Relief Scheme
MaREI: Marine and Renewable Energy Ireland
NAF: National Adaptation Framework
NASA: National Aeronautics and Space Administration
NCCAF: National Climate Change Adaptation Framework

NEEAP: National Energy Efficiency Action Plan

NMP: National Mitigation Plan

NOAA: National Oceanic and Atmospheric Administration

NRA: National Roads Authority

OPW: Office of Public Works

OSI: Ordnance Survey Ireland

SEAI: Sustainable Energy Authority of Ireland

SECAP: Sustainable Energy and Climate Action Plan

SMT: Senior Management Team

SPCs: Strategic Policy Committees

SuDS: Sustainable Drainage Systems

TII: Transport Infrastructure Ireland

WERLA: Waste Enforcement Regional Lead Authorities

WMO: World Meteorological Organization

EXECUTIVE SUMMARY

This Cork City Climate Change Adaptation Strategy 2019-2024 is a response to the impact that climate change is already causing and will continue to cause into the foreseeable future on the citizens and infrastructure of Cork City should no mitigation efforts be undertaken. Cork City Council is committed to leading the way in dealing with this recognised global issue at the local level. The two main goals of this strategy are:

- To make Cork city as climate-resilient as possible, reducing the impacts of current and future climate change-related conditions and events; and
- To pro-actively engage with all citizens on the subject of climate action, such as climate change, climate change adaptation and climate change mitigation.

This strategy sets out adaptation action items, grouped into appropriate objective areas, across the following seven key thematic areas that are of equal priority:

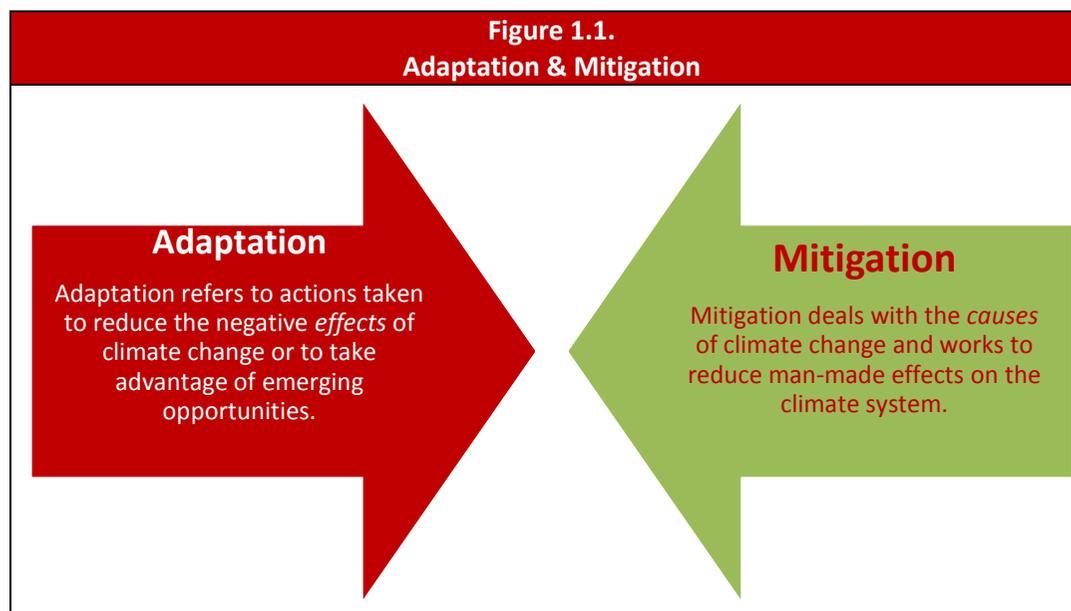
1. Local Adaptation Governance and Business Operations;
2. Infrastructure and Built Environment;
3. Land Use and Development;
4. Drainage, Water and Flood Management;
5. Nature, Natural Resources and Cultural Infrastructure;
6. Citizen Safety, Health and Wellbeing; and
7. Partnerships with other Sectors and Agencies.

These adaptation actions are Cork City Council's template for the future development of climate change resilience, improving our understanding of climate disruption and allowing us to respond appropriately. Cork City Council will build on past and current climate change mitigation actions and progress and enhance early stage adaptation measures. This draft climate change adaptation strategy will assist in the development of future City Development and Local Area Plans. It is proposed to set up appropriate oversight structures involving the elected representatives of Cork City Council, the Council's management team and project teams to implement specific initiatives as appropriate. Key performance indicators will be established and used to monitor progress and evaluate the effectiveness of the adaptation actions, with the realisation that climate change is a dynamic process. Cork City Council will use all available communication platforms to build awareness of the challenges faced from climate disruption, and involve all relevant stakeholders in encouraging greater participation and behavioural change to tackle what has been described as one of the greatest environmental and societal challenges to our current way of life on planet Earth.

1. INTRODUCTION

INTRODUCTION

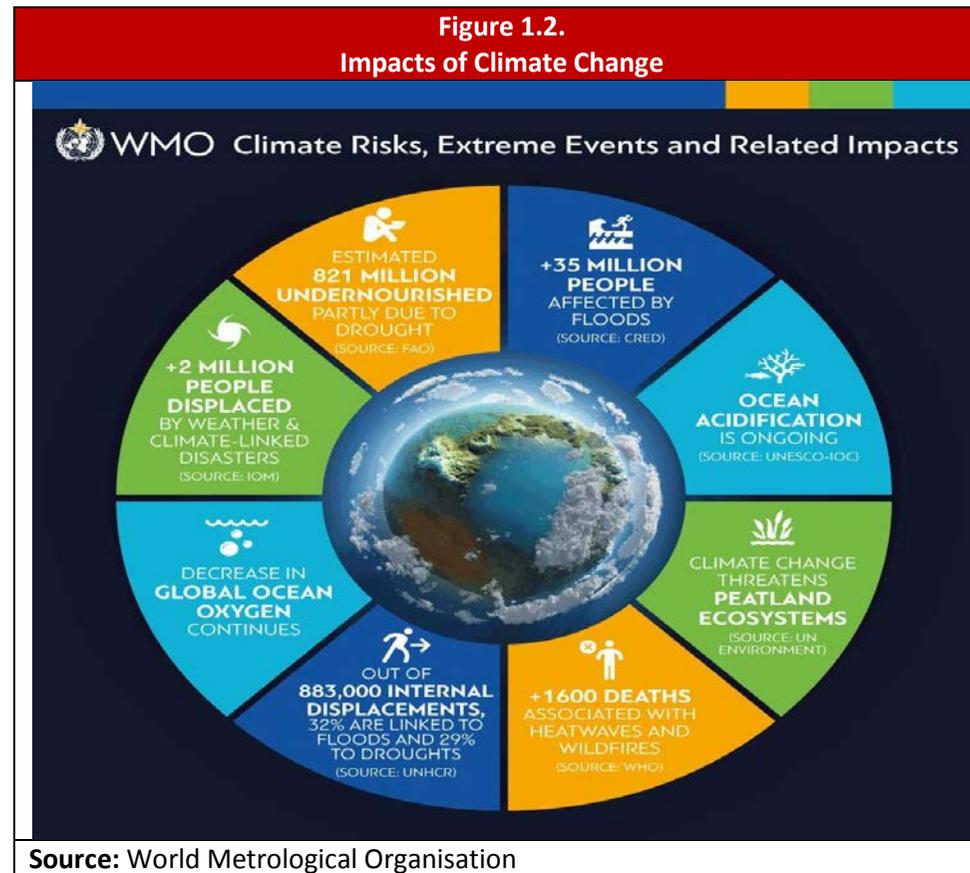
- 1.1. This draft Climate Change Adaptation Strategy 2019 – 2024 represents the first such strategy prepared for Cork City. That stated, as presented later, it builds on significant work conducted by Cork City Council in both adapting and mitigating for climate change. The strategy sets out the risks that climate change will pose to Cork City along with key goals, and actions that the City Council seeks to implement for Cork City to adapt to climate change. **As presented later, this climate change adaptation strategy will inform a *separate* climate change mitigation strategy which will be prepared by Cork City Council in due course.** Adaptation seeks to address the resilience of the city against the impacts of climate change, while the mitigation strategy will seek to reduce Cork City's impact on the climate.



- 1.2. Cork City should be agile in its response to climate change. To that extent, this is a ***dynamic Climate Change Adaptation Strategy and will be subject to constant review and updating as conditions change.***
- 1.3. This adaptation strategy has been prepared through a public consultation process, over a 6-week period. All submissions were evaluated before the final strategy document was finalised, in advance of the Elected Members of Cork City Council meeting to consider its adoption by 30th September 2019.

BACKGROUND

- 1.4. Climate change refers to changes in climate patterns that have been apparent from the mid to late 20th century onwards. This is largely attributed to the increased levels of atmospheric carbon dioxide (CO₂) produced by the use of fossil fuels, resulting in numerous global climatic shifts. There is broad scientific consensus that human activities, notably the burning of fossil fuels for energy, has led to the rapid build-up in atmospheric greenhouse gases, causing average global temperatures to rise.
- 1.5. Impacts from this warming have already been observed and include increases in global average air and ocean temperatures, accelerated melting of snow and sea ice, widespread retreat of glaciers, rising global average sea level, and extensive changes in weather patterns, including changes in precipitation levels and increased storm intensity. Climate change is one of the greatest environmental and societal threats confronting the world and is impacting on the lives of hundreds of millions of people globally as illustrated in Figure 1.2.



1.6. Observations show that Ireland's climate is also changing and projected physical climate changes include:

- increase in average temperature (surface air temperature, sea surface temperature);
- increased frequency of heatwaves;
- changes in precipitation patterns;
- ongoing mean sea level rise; and
- changes in the character of weather extremes such as storms, flooding, sea surges and flash floods.

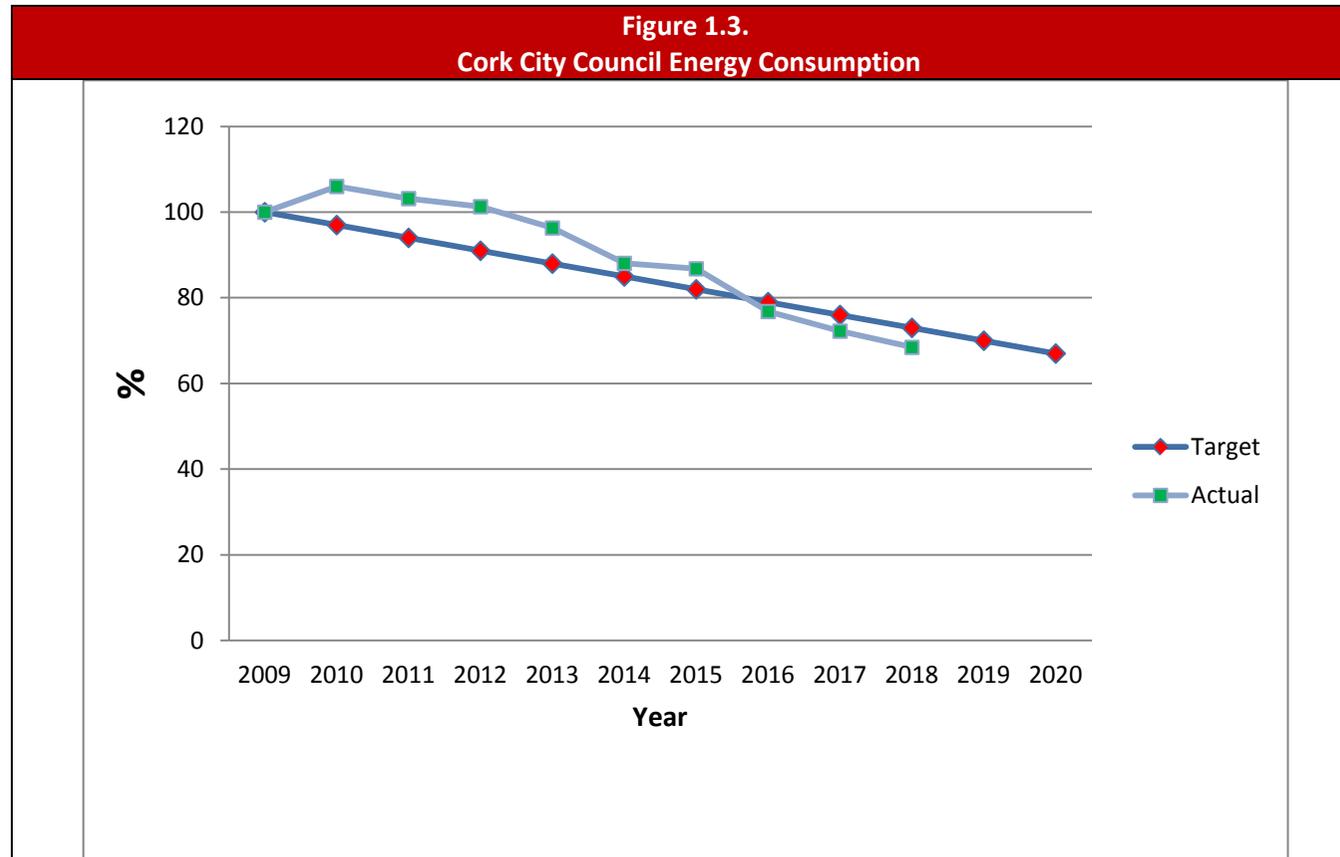
1.7. As illustrated later, these impacts are evident in Cork City.

EXISTING CORK CITY COUNCIL CLIMATE ACTIONS

1.8. This draft strategy was not prepared on a blank canvass. Cork City Council has put in place a number of actions aimed at adapting to and mitigating climate change.

1.9. Cork City Council signed up to the **Covenant of Mayors for Climate and Energy** in 2016, joining the mainstream European movement by local & regional authorities in addressing climate change. As the vast majority of energy is consumed in city territories, Cork city has a key burden-sharing role to play in meeting the voluntary commitment of signatories to reduce CO₂ emissions within their territories by at least 40% by 2030. As part of the Covenant of Mayors (COM) commitment, Cork City Council prepared and submitted the Sustainable Energy and Climate Action Plan (SECAP) in 2018 and has also committed to reporting every 2 years on the implementation of the mitigation and adaptation actions in the plan. The Covenant of Mayors commitment will play a key enabling role towards the long-term commitment of Cork City Council to transition to a low carbon society and economy.

1.10. In 2009, Ireland developed The National Energy Efficiency Action Plan 2009-2020 (NEEAP). This NEEAP set an overall national goal of 20% improvement in energy efficiency by 2020, within which the public sector is committed to a 33% improvement in energy efficiency by 2020. By the end of 2018 Cork City Council achieved a 31.5% energy reduction and is on target to reach this 2020 target. Figure 1.3. shows the City Council’s progress towards reaching this target. Much of this success is a result of Cork City Council’s directorates carrying out energy efficient mitigation projects.



1.11. The Cork City Energy Agency (CCEA), with the Cork City Energy Team (CCET), is committed to achieving ISO 50001 (the international standard for establishing, implementing, maintaining and improving an energy management system) accreditation for Cork City Council by 2020.

1.12. Adaptation measures that have been already implemented by Cork City Council are presented in Table 1.1.

Table 1.1. Climate Change Adaptation Measures Put In Place by Cork City Council	
Category	Measures
Support existing initiatives.	<p>Major Emergency Plan and Severe Weather Plans in place.</p> <p>A number of early warning systems are in place, for example:</p> <ul style="list-style-type: none"> • a new electronic river Lee level gauge provided at Parnell Bridge; • a Flood Early Warning System (FEWS) is currently being progressed for the Lee and it's major tributaries; • existing river Lee levels and flow data available from the Lee Road water treatment plant; • OPW Coastal Surge warning protocol for Cork and Bantry Harbours; • ESB protocol for water discharge from Lee Valley dams; and • IceCast Road Weather Information System for National Roads. <p>Cork City Council continues to work with the OPW in relation to the flood defences throughout the City.</p>
Investigate, review and prepare guidance.	<p>Sustainable Drainage Systems (SuDS) being reviewed to determine its suitability for Cork city.</p> <p>CODEMA to publish guidance on CO₂ Inventory compilation.</p>

Table 1.1. (Continued) Climate Change Adaptation Measures Put In Place by Cork City Council	
Category	Measures
Prepare inventories and undertake vulnerability assessments of assets.	<p>Property Interest Register has details of Council-owned properties.</p> <p>Roads database holds records of road classifications and condition.</p> <p>Eirspan bridge data base has records of Regional and Local road bridges, including rated condition and damage type.</p>
Identify opportunities.	The Cork City Council Local Enterprise Office (LEO) has expertise in project/product development with business and industry.
Raise awareness.	Cork City Council has built up experience of climate change. Existing mainstream and social media channels widely used by Communications Unit.
Further develop relationships.	<p>Important relationships include:</p> <ul style="list-style-type: none"> • stakeholders such as Irish Water, SEAI, EPA, ESB; and • 3rd level institutions with research specialisations in climate change.

PURPOSE OF THIS STRATEGY

1.13. This adaptation strategy forms part of the National Adaptation Framework (NAF), published in response to the provisions of the Climate Action and Low Carbon Development Act 2015. As the level of Government closest to local communities and enterprise, and as first responders in many emergencies, Cork City Council is uniquely placed to effect real positive change with respect to delivery of the national objective to transition to a low carbon and a climate resilient future. This adaptation strategy takes on the role as the primary instrument at local level to:

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

ADAPTATION POLICY CONTEXT

1.14. This strategy is set within a policy framework at international and national levels, as illustrated below.

International Context and the United Nations (UN) Sustainable Development Goals (SDGs)

1.15. Climate change has been on the international political and policy agenda for a number of decades. In 1992 the United Nations agreed a framework on climate change. The Kyoto Protocol, which was agreed in 1997, is based on the principle of common responsibilities to address climate change. By 2013 the EU published a white paper on a climate change adaptation strategy which seeks to contribute to a more climate resilient Europe. Specific targets were set in the 2015 Paris Agreement to limit global temperature rise to well below 2 degrees Celsius above pre-industrial levels and strives to limit the temperature increase to below 1.5 degrees Celsius. In addition, 9000 cities and local governments, including Cork City Council, are signatories to the Global Covenant of Mayors for Climate Change.

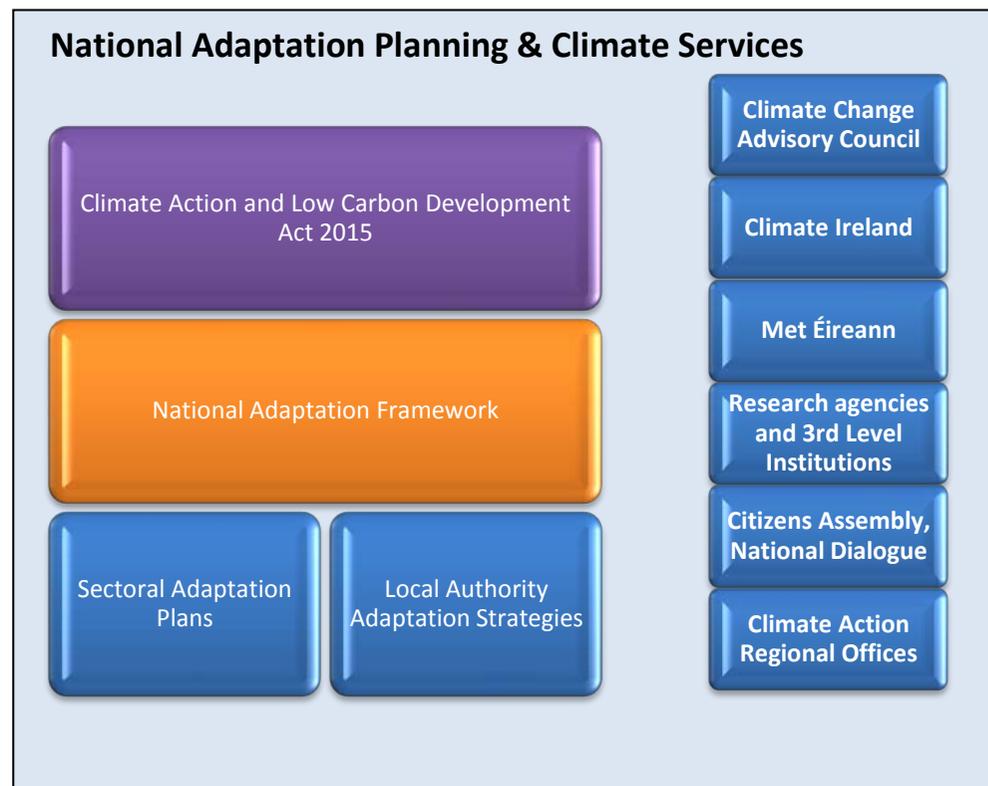
1.16. In 2015, countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). The SDGs are a blueprint to achieve a better and more sustainable future. They address global challenges related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The Goals interconnect and are interdependent. Goal No. 13 addresses Climate Action with an objective to: *Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy*. This recognises Climate Change as a global challenge that does not respect national borders and requires solutions that need to be coordinated at the international level to help developing countries move toward a low-carbon economy.

Irish Policy Context

1.17. The 2012 National Climate Change Adaptation Framework (NCCAF) was Ireland’s first step in developing a national policy on adaptation actions to combat the impacts of climate change. The 2014 National Policy Position on Climate Action and Low Carbon Development restated the policy position of the NCCAF. The Climate Action and Low Carbon Development Act 2015 provides the statutory basis for the national transition objective laid out in the National Policy Position. Further to this, it made provision for and gave statutory authority to both the National Mitigation Plan (NMP), published in 2017 and the National Adaptation Framework (NAF) published in 2018. The NAF has also identified twelve sectors across seven government departments/agencies which are required to develop specific climate adaptation strategies, which will include actions to be implemented at a local level. See **Appendix B** for a table of the sectors and their parent departments. As previously stated, this draft Climate Change Adaptation Strategy represents Cork City Council’s part of the National Adaptation Framework (NAF). In June, 2019 the Government published the **‘Climate Action Plan 2019 – to Tackle Climate Breakdown’** which presents a suite of actions designed to address climate change (see below).

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

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



Climate Action Plan 2019 – to Tackle Climate Breakdown

1.20. The all of government Climate Action Plan 2019 - *To Tackle Climate Breakdown* was published on Monday 17th June 2019. The plan sets out 183 individual actions over 12 sectors and charts an ambitious course towards decarbonisation. The Public Sector is identified as having a significant role in the '*Leading by Example*' section, to not only just reduce their own emissions but to inspire climate action across communities and society. Local Government in particular is recognized for its pivotal role in stimulating climate action at community level. The Plan speaks also to the role of the Climate Action Regional Offices (CARO) in assisting local authorities in building capacity to engage effectively with climate change. There are a range of actions that are specific to and/or relate to local authorities as well as the CAROs. Local authorities will be required to undertake an annual programme with measurable impact particularly with actions to focus on, *inter alia*;

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

The Climate Action Plan is notably focused on mitigation measures to achieve emission targets to 2030 and local authorities will need to expand their role to take on actions and measures from the Climate Action Plan to respond to and meet obligations set out.

The level of ambition within Cork City Council over-and-beyond adaptation measures is all- embracing of the mitigation measures prescribed by the Government of Ireland's 'Climate Action Plan' and this is reflected in the Councils resolution in its commitment to the Covenant of Mayors.

Regional Context

1.21. The Southern Regional Assembly is currently preparing a Regional Spatial and Economic Strategy (RSES) for the Southern Region, for the period 2019-2031. The RSES will provide a long-term regional level strategic planning and economic framework, which will support the implementation of the National Planning Framework for the future physical, economic and social developments for the Southern Region. The following key themes of the draft RSES are directly related to Cork City's Climate Change Adaptation Strategy:

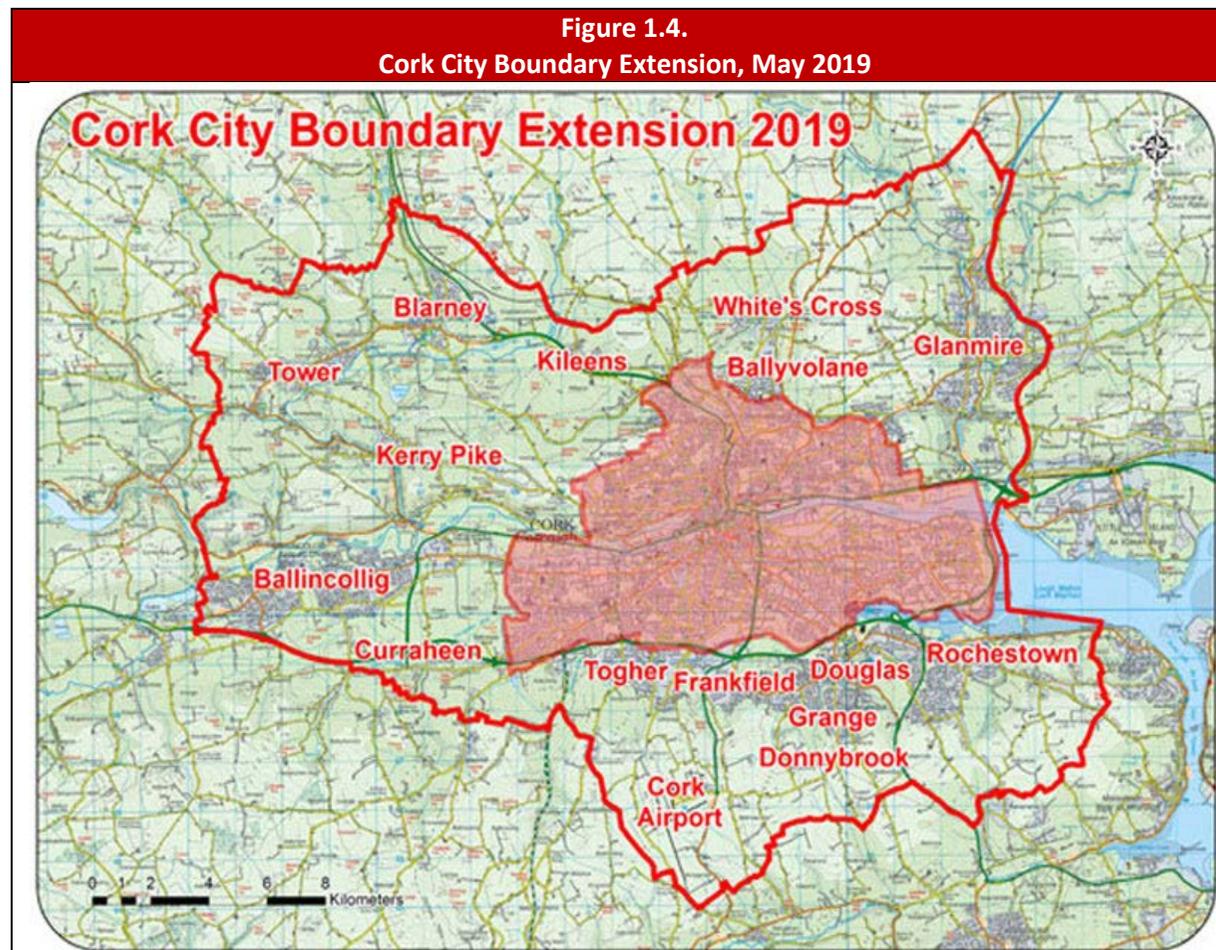
- Adaptation transition to a low carbon and climate resilient society; and
- Sustainable management of water and other environmental resources.

Climate Action Regional Offices (CAROs)

1.22. To assist local authorities prepare and implement climate change adaptation plans Climate Action Regional Offices (CAROs) have been established for four regional areas: Atlantic Seaboard North, Dublin Metropolitan, Eastern and Midlands, and Atlantic Seaboard South. Cork County Council was appointed as the lead local authority to manage the CARO for the Atlantic Seaboard South region and the five constituent local authorities in the Atlantic Seaboard South region are Cork City Council, Limerick City and County Council, Cork County Council, Kerry County Council and Clare County Council. The role of the CARO is to assist and coordinate the preparation of all local authority climate change adaptation strategies in its region.

Cork City Context

1.23. Cork City Council is responsible for developing, communicating and delivering this Cork City Council Climate Change Adaptation Strategy. Following the boundary extension that came into effect on 31st May 2019, the population of Cork is 211,000. The geographic area has expanded almost five-fold as illustrated in Figure 1.4. below. The red-hatched area in Figure 1.4 below shows Cork City Council's jurisdiction pre-31st May 2019. The Draft Regional Spatial Strategy population projections are forecasting a population increase to between 274,000 and 286,000 by 2031 and the National Planning Framework (NPF) sets a population target for Cork City in the region of 350,000 people by 2040.



Declaring a Climate and Biodiversity Emergency

- 1.24 During June 2019, the elected members of Cork City Council declared a 'climate and biodiversity emergency'. The members, in doing so, showed their commitment to taking action on climate change, including reducing the risks of climate change impacts on council operations and services, promoting and ensuring biodiversity throughout the county, as well as militating against the causes of climate change. This follows the decision by the Irish government and opposition parties to declare a climate and biodiversity emergency, becoming only the second country in the world to do so.

ENVIRONMENTAL ASSESSMENT

1.25 Cork City Council conducted the following screening of the draft Climate Change Adaptation Strategy:

- **Screening Strategic Environmental Assessment (SEA):** Under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011), all plans which are likely to have a significant effect on the environment must undergo screening to determine whether a Strategic Environmental Assessment (SEA) is required. This strategy has been screened for SEA and this screening determined that a full SEA is not required.
- **Screening for Appropriate Assessment (AA):** Screening of this strategy has been undertaken in accordance with the requirements of Article 6(3) of the EU Habitats Directive (directive 92/43/EEC) and the screening has determined that the Climate Change Adaptation Strategy is not likely to significantly affect Natura 2000 sites (i.e. Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) within or surrounding the plan area.

These are presented in detail in Appendix E and Appendix F respectively.

Co-benefits and Cumulative/in-combination environmental effects

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

Likewise, consideration of potential adverse cumulative and in-combination environmental effects must be accounted for in selecting and implementing specific actions. For example, consideration of environmental sensitivities under the Habitats Directive and Water Framework Directive are important in the context of potential adverse cumulative or in-combination effects. For the purposes of monitoring and reporting on progress, mal-adaptation will be identified and approaches to counter this will be explored thoroughly and put in place.

2. CLIMATE CHANGE IN CORK

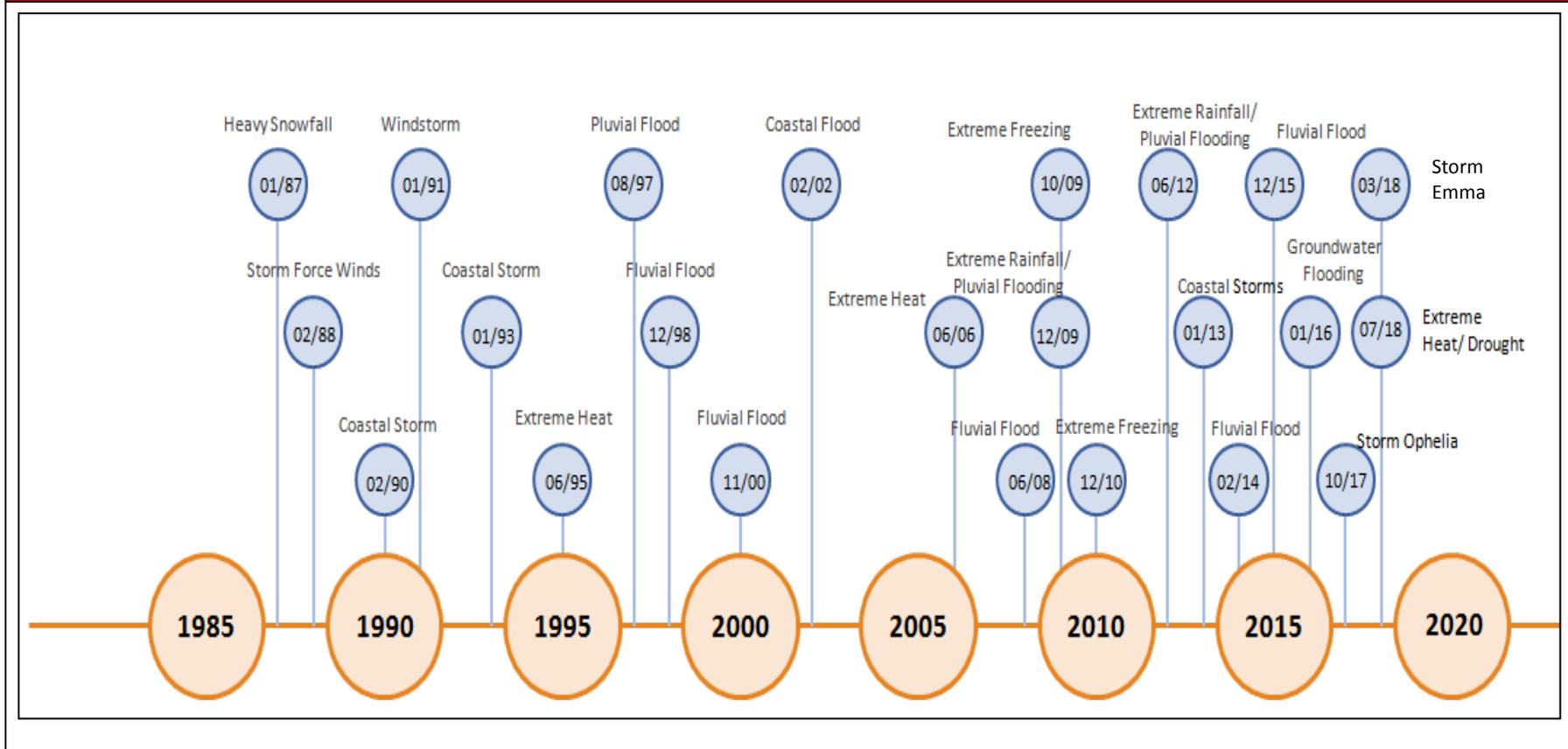
- 2.1. A review of extreme weather events in the strategy area over the period 1987 to 2018 has been undertaken using published Met Éireann data and has been categorised under the following headings for the Cork in Table 2.1 and shown graphically in Figure 2.1.

Table 2.1. Climate Change in Cork	
Extreme Weather Events	Description
Coastal flooding	<ul style="list-style-type: none"> February 2002: Cork city flooding
Coastal storms	<ul style="list-style-type: none"> January 1993: severe gusts and heavy rainfall February 1990: severe gusts and heavy rainfall
Extreme heat and drought	<ul style="list-style-type: none"> Summer 2018: warmest weather since 2006 Summer 2006: warmest weather since 1995 Summer 1995: warmest weather since 1955
Extreme rainfall	<ul style="list-style-type: none"> June 2012: 58mm 1-day total recorded in Bandon November 2009: 55mm 1-day total recorded in Ballyvourney
Fluvial flooding	<ul style="list-style-type: none"> December 2015: River Bandon February 2014: River Lee November 2009: River Lee; major flooding in Cork city August 2008: River Blackwater November 2000: River Lee
Freezing conditions	<ul style="list-style-type: none"> April 2019: Cork airport recorded - 8.6 degrees (coldest ground temperature on record) December 2010: Cork recorded -7.2 degrees

Table 2.1. Continued Climate Change in Cork	
Extreme Weather Events	Description
Groundwater flooding	<ul style="list-style-type: none"> January 2016: N25 flooded between Killeagh and Castlemartyr
Heavy snowfall	<ul style="list-style-type: none"> February/March 2018: Storm Emma January 1987: 12cm of snow at Roche's Point
Pluvial flooding	<ul style="list-style-type: none"> June 2012: Douglas August 1997: Freemount
Storm force winds/ windstorms	<ul style="list-style-type: none"> October 2017: Storm Ophelia, with gusts up to 84 knots recorded at Roche's point January 1991: gusts in excess of 68 knots recorded at Roche's point February 1988: gusts in excess of 84 knots recorded at Cork airport

- 2.2. It is evident that the main category of extreme weather events reported has been flooding (coastal, fluvial and pluvial). This is followed by windstorms and coastal storms and there is a general similarity in the numbers of the remaining event types. As illustrated in Figure 2.1. there is an acceleration of extreme weather events over recent years.
- 2.3. Cork City Council has a comprehensive Major Emergency Plan in place to ensure that staff at all levels are aware of their responsibilities and that appropriate actions are initiated in a timely and effective manner to deal with major emergencies. The Major Emergency Plan, which describes actions required in the event of severe weather events, has come into operation on a number of occasions, with the most recent activations being Storm Ophelia in October 2017 and Storm Emma in February / March 2018.

Figure 2.1.
Extreme Weather Events in Cork 1985 - 2019



3. CLIMATE RISK IDENTIFICATION

INTRODUCTION

3.1. This section presents the risks that climate change may have on Cork City based on trends of the climate variables that are changing.

CLIMATE VARIABLES

3.2. The tables below provide an overview of the seven climate variables that have been investigated in preparation of this strategy.

	Hydrology
Observed	<p>The analysis of river flows is complex and subject to large variability, so it is difficult to identify impacts of climate change. During the period 1954 to 2008, summer mean flows were dominated by decreasing flows while for winter there is a tendency for increases in mean flows. Annual and winter high flows are also dominated by increasing trends.</p> <p>Drier summers could have effects on summer base-flows of rivers in Cork and the recharge of underlying aquifers. This ultimately has implications for the provision of drinking water, as was evident in many areas during the prolonged drought period of summer 2018.</p>
Summary of Change	<p>Increasing seasonality in hydrological regimes can be expected with likely decreased summer and increased winter flows.</p> <p>Flood risk will increase due to a combination of higher river-flows and increases in extreme precipitation events. These events are likely to play a greater role in climatic events in the future. An example would be high tides coupled with fluvial and pluvial events, especially in the lower reaches of the River Lee and Cork Harbour.</p>
Climate risks for Cork city	<p>Groundwater flooding, which is the emergence of groundwater at the surface away from river channels and watercourses, under conditions where the 'normal' ranges of groundwater level and flow are exceeded.</p> <p>Pluvial, or surface-water flooding, which results from rainfall-generated overland flow that may occur during or immediately after intense rainfall events and before the runoff enters Cork city's watercourse or drainage system.</p> <p>Fluvial or river flooding, which occurs when excessive rainfall causes the River Lee to exceed its capacity.</p>

	Rainfall
Observed	Throughout Ireland, annual average rainfall amounts have increased by roughly 5% relative to the 1961-1990 baseline period, with this increase observed across all seasons. However, spatially, rainfall intensity and amounts vary with no clear direction of change yet apparent.
Summary of Change	Increasing seasonality in precipitation can be expected with drier summers likely. An increase in the occurrence and magnitude of extreme rainfall events is also likely.
Climate risks for Cork city	Groundwater flooding. Pluvial flooding. Fluvial flooding.

	Sea Level
Observed	Satellite observations indicate that sea level around Ireland has risen by approximately 0.04m to 0.06m since the early 1990s.
Summary of Change	Sea levels are expected to increase for all Irish coastal areas.
Climate risks for Cork city	Coastal flooding, which occurs when normally dry, low-lying land is flooded by seawater. Coastal erosion, which is the process of wearing away material from the coast line due to imbalance in the supply and export of material from a certain section.

	Sea Temperature
Observed	<p>The seas around Ireland have been warming at a rate 0.6^o C per decade since 1994, which is unprecedented in the 150 year observational record. The greatest warming has been observed over the Irish Sea.</p>
Summary of Change	<p>In line with global trends, the seas around Ireland are expected to continue warming. Warm seawater has a greater volume than cold seawater. As ocean temperatures increase, so will the total ocean volume. Any increased volume will cause the level of the water in the oceans to rise.</p>
Climate risks for Cork city	<p>Coastal flooding. Coastal erosion.</p>

	Surface Air Temperature
Observed	<p>Observations indicate an increase in the surface temperature for Ireland of 0.8°C since 1900. In addition, the number of warm days has increased while the number of frost days has decreased.</p>
Summary of Change	<p>Surface air temperatures are expected to increase everywhere compared to the present. An increase in the frequency, intensity and duration of heat waves is expected.</p>
Climate risks for Cork city	<p>Heat waves may lead to the urban heat island effect, severe drought and violent thunderstorms which impact upon human health, physical infrastructure, river water levels and fires. Fewer frost days and milder night-time temperatures are expected.</p>

	Waves and Surges
Observed	<p>Analysis of satellite data for the period 1988 to 2002 shows a general increase in wave height in the northeast Atlantic.</p>
Summary of Change	<p>The magnitude and intensity of storm wave heights are expected to increase for spring and winter.</p>
Climate risks for Cork city	<p>Coastal flooding.</p> <p>Coastal erosion.</p>

	Wind Speed and Storms
Observed	<p>For Ireland, observations indicate a high degree of yearly variability in wind speeds and, due to a lack of correlation in the available data, analysis of long term trends cannot yet be determined with confidence.</p>
Summary of change	<p>Projections indicate a decrease in wind speeds for summer and increases for winter.</p> <p>An increase in the intensity of extreme wind storms is expected.</p>
Climate risks for Cork city	<p>Wind storms or high winds, that are defined as a having a wind speed greater than 50 km/h which equates to a Force 7 (28–33 knots) on the Beaufort wind force scale.</p>

FLOODING RISKS IN CORK CITY

- 3.3. There is a long history of flooding in Cork city and the River Lee valley. There were some 292 floods reported over the period 1841–1988. A number of severe floods have affected the city, most recently in November 2009, February 2014 and Winter 2015/16. The November 2009 event was exceptionally severe, with major damage caused to commercial and residential buildings in Cork city. It has been estimated by the OPW that the damages caused in the 2009 river flood and 2014 tidal flood amounted to €90m and €40m respectively. The National Planning Framework identified that flood management must be addressed as part of any future growth strategy for Cork. Thus, the plans for the development of Cork City, including Cork Docklands, must consider the impact of flooding.
- 3.4. Climate Change is expected to increase flood risk. It could lead to more frequent flooding and increase the depth and extent of flooding. Due to the uncertainty surrounding the potential effects of climate change, a precautionary approach is always advised with respect to land use planning and development, building flood alleviation measures and ensuring longer term resilience of critical infrastructure. It is important to consider that the increase in the frequency and/or severity of flood events may impact the delivery of services of the council, and in particular may necessitate more frequent and resource intensive emergency responses.
- 3.5. The Lee Catchment Flood Risk Assessment and Management Study (Lee CFRAMS) was carried out by the OPW between 2006 and 2013. These studies have been developed to meet the requirements of the EU Directive on the assessment and management of flood risks (the Floods Directive). The CFRAM Studies have produced Flood Risk Management Plans (FRMP) to manage flood risk within river catchments. Flood maps are one of the main outputs of the studies. The maps indicate modelled flood extents for flood events of a range of annual exceedance probabilities (AEP). The flood event maps and future scenario maps are a crucially important mechanism that will support and assist in planning appropriate adaptation strategies and measures for local authorities.
- 3.6. In the case of the Lee catchment, these studies identified a preferred scheme to manage flood risk including a combination of a flood forecasting and warning system, revised ESB dam operating procedures and waterside defences. Following on from this, the Lower Lee Flood Relief Scheme (LLFRS) has been developed, which is a modified version of the measures proposed in the Lee CFRAMS together with a flow control structure on the south channel to rebalance flows between the north and south channels. This scheme is designed to protect over 2,100 properties, including 900 homes and 1,200 businesses against tidal and river flooding.
- 3.7. Cork City Council will work in conjunction with the OPW to deliver flood alleviation schemes that are deemed appropriate.

INFRASTRUCTURE

- 3.8. It will be necessary to conduct a detailed vulnerability assessment due to climate change of the 930km of roads and 190 bridges in Cork City.

RISKS TO BIODIVERSITY

- 3.9. In the case of the natural environment, the National Biodiversity Action Plan for 2017-2021 states that there is evidence that climate change is negatively impacting Irish habitats and is driving ocean acidification. Expected increases in temperature, changes in precipitation patterns, weather extremes (storms and flooding, sea surges, flash floods) and sea-level rise will affect the abundance and distribution of Irish species and possibly encourage the spread of alien invasive species.

Agriculture/Forestry/Soil Management

- 3.10. Tree planting/management, soil erosion, nutrient management, grazing management of sensitive soils, farming intensity within river catchments and many more issues will all influence adaptation/mitigation programmes within the local authority functional area, particularly having regard to the recently extended boundary. The Council is committed to working with relevant landowners in protecting natural and key cultural assets and developing a more sustainable green economy and resource management.
- 3.11. It is recognised that a well-planned and managed planting programme can help to improve water quality and to buffer and slow water flows. Cork City Council can benefit from tree planting supports for native woodland and amenity areas. The NeighbourWood scheme in the DAFM Forestry Programme is an example of a scheme which could provide localised climate benefits to Cork City.

REGIONAL AND NATIONAL CONSEQUENCES OF ADVERSE CLIMATE CHANGE IN CORK CITY

- 3.12. With a population of 211,000, Cork is Ireland's second largest city and a key driver of the regional and national economy. The negative impacts of climate change pose a significant risk to citizens, the economy, the environment and the delivery of local government services. This is especially relevant considering the risks from pluvial, fluvial and tidal flooding in Cork city and its environs. Cork City Council is directly responsible for over 10,000 public housing units. The Council also owns many municipal buildings and other facilities whose functions encompass the full range of local government activity and vary from area offices and libraries to civic amenity sites, parks, cemeteries and leisure centres. Cork City Council manages the major water treatment plant at the Lee Road on behalf of Irish Water.

3.13. The Cork metropolitan area has many natural and developed advantages, which make it an attractive area to live, to visit and to carry out business in. These include:

- One of the largest natural harbours in the world;
- A significant power generation station and an oil refinery;
- A Tier 1 seaport and an international airport, plus important rail and road links/hubs;
- Well developed digital infrastructure;
- A critical mass of excellent educational institutions;
- Major hospital and medical/health sector facilities;
- A vibrant cultural, sporting and recreational scene;
- A strong economic sector (over 150 Foreign Direct Investment (FDI) companies); and
- Significant commercial and retail facilities.

3.14 However, when viewed through the lens of risk assessment, climate change could make a significant impact on the economy and society of Cork and the Southern region. For example, the likelihood of a major flood event multiplied by the consequences of such an event in terms of danger and damage to citizens and infrastructure is greater in Cork city than many other cities. Having such a critical mass of infrastructure in the second largest city in Ireland means that when current and future climate change-related conditions and events become either the norm or occur at greater frequency and severity, many people, businesses and organisations will be negatively affected unless measures are put in place to adapt to climate change.

4 ADAPTATION AND IMPLEMENTATION

INTRODUCTION – GUIDING PRINCIPLES

4.1 A total of 66 actions under 7 high level themes have been identified to support Cork city’s adaption to climate change and address the risks presented in Section 3. The 7 high level themes, together with their objectives and actions, have been developed with the following four guiding principles, to ensure an understanding of the role of adaptation and that a coherent approach to the impacts of climate change is considered in the service delivery of Cork City Council.

- **Mainstream Adaptation:** That climate change adaptation is a core consideration and is mainstreamed in all Cork City Council services and activities. Additionally, it aims to ensure that Cork City Council is well positioned to benefit from economic development opportunities that may emerge due to a commitment to a proactive climate change adaptation and community resilience.
- **Informed Decision Making:** That effective and informed decision making within Cork City Council is based on reliable and robust information having regard to key impacts, risks and vulnerabilities of the county. This will support long term financial planning, effective management of risks and help to prioritise actions.
- **Building Resilience:** That improved awareness and appreciation of climate change will encourage communities to adapt to the anticipated impacts and promote a sustainable and robust action response and that the needs of vulnerable communities are prioritised and addressed.
- **Capitalising on Opportunities:** Predicted climate change can sometimes result in additional opportunities for the local authority. A register of opportunities will enable Cork City Council to encourage communities, stakeholders and interested parties to collaborate on the potential opportunities arising from climate change.

THEMES & ACTIONS

4.2 The 7 high level themes, which are of equal priority, are listed below.

- 1) **Local Adaptation Governance and Business Operations:** To support implementations of adaptation planning in all Council activities and operations and to build resilience within Cork City Council to support service delivery.
- 2) **Infrastructure and Built Environment:** To increase resilience of roads and transport infrastructure and of Council owed assets, including municipal buildings, depots and the public housing stock.
- 3) **Land Use and Development:** To integrate climate action considerations into land-use planning.
- 4) **Drainage, Water and Flood Management:** To adapt to the increased risk and impact of flooding and to liaise and work with other bodies responsible for management of water resources.
- 5) **Nature, Natural Resources and Cultural Infrastructure:** To develop approaches to protect the natural and key cultural assets in Cork City Council.
- 6) **Citizen Safety, Health and Wellbeing:** To build capacity & resilience within communities in regard to climate adaptation.
- 7) **Partnerships with other Sectors and Agencies:** To collaborate with other Sectors and Agencies in programs relating to climate action and adaptation planning.

4.3 The seven high level themes are presented in detail in the next section of the document, with proposed adaptation objectives and corresponding adaptation actions for the five year duration of this strategy.

4.4 The adaptation actions included in this strategy involve a mixture of “grey” engineered measures to reduce climate hazards, “green” ecosystem or nature-based adaption measures or “soft” adaptations that aim to alter the behaviour of the public. Actions have been identified for all the functional/operational areas of the council which have a role in their implementation and delivery. These response approaches can be adopted in isolation or can be co-ordinated to complement each other, depending on circumstances.

- 4.5 The action framework as set out over the 7 high level themes provides for the implementation of actions within the timeframes of short, medium and long. For clarity, these timeframes have been determined as:

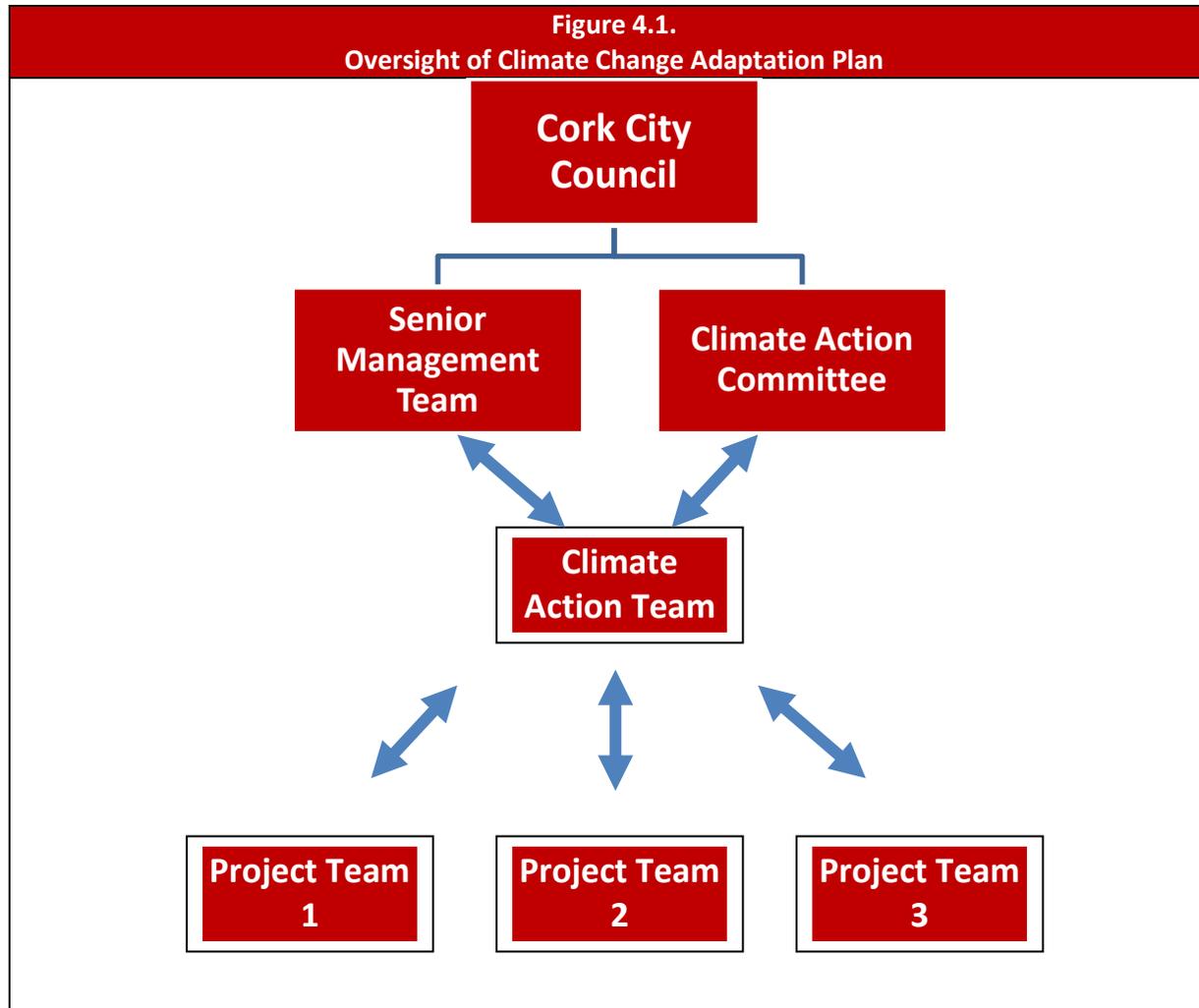
Timeframe	Categorisation
Short	1 st Half of Strategy
Medium	2 nd Half of Strategy
Long	During & After Lifetime of Strategy

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

- 4.6 The actions proposed in the published draft Cork City Council Climate Change Adaptation Strategy were amended following submissions during the public consultation process. While some actions can be implemented as proposed, others will need further preparatory work prior to implementation. The proposed actions may also be modified to take account of actions proposed in other sectoral adaptation strategies and from other recent and future key publications such as the 'All of Government' Climate Action Plan 2019 – *to tackle climate breakdown*.

IMPLEMENTATION

- 4.7 Cork City Council will establish suitable structures to oversee the implementation of this Climate Change Adaptation Strategy as illustrated in Figure 4.1. below. This governance is proposed until such time as the Strategic Policy Committees of Cork City Council are established, at which stage it is recommended that the members of Cork City Council review the governance structure for this strategy.
- **Cork City Council:** The elected members of Cork City Council are responsible for adoption of the Climate Change Adaptation Strategy. The City Council will approve any amendments to the strategy.
 - **Climate Action Committee:** One of the first actions of the newly elected City Council was to establish a Climate Action Committee. This committee will have oversight of the implementation of this strategy and make recommendations to Cork City Council in relation to any amendments to the plan.
 - **Senior Management Team:** The Senior Management Team will be responsible for the day –to-day delivery of the Climate Change Adaptation Strategy.
 - **Climate Action Team:** This internal, multi-disciplinary, cross-directorate team will be responsible for the establishment, resourcing and management of specific Project Teams to implement the adaptation actions. The secretariat will be provided by the Strategic and Economic Development Directorate.
 - **Project Teams:** Project Teams will be established, where appropriate to implement the actions of the strategy. These teams may include members from directorates and other stakeholder organisations as outlined in the actions below.



MONITORING

4.8 This adaptation strategy will be monitored by the elected members and senior management of Cork City Council to keep a record of progress made in implementing specific adaptation actions. Monitoring will be undertaken using key performance indicators (KPIs), which may evolve over time as the adaptation process matures and is mainstreamed. These indicators will be used to:

- Monitor the implementation of adaptation policies, measures and actions;
- Target, justify and monitor funding for adaptation programmes;
- Mainstream adaptation through links between sectors and related indicators;
- Communicate adaptation to policy and decision-makers and other stakeholders;
- Update climate change legislation, policy and research information;
- Compare adaptation achievements across sectors, regions and countries; and
- Inform and report climate change adaptation progress to Government.

The requirements of the SEA and habitats directives, where relevant and appropriate, will be considered during the implementation of the actions contained in this climate change adaptation strategy.

EVALUATION

4.9 Evaluation of the adaptation strategy will be a systematic and objective process to determine the effectiveness of adaptation actions. Given the complexity and long-term nature of climate change, it is essential that adaptation is designed as a continuous and flexible process, and subjected to periodic review, both in terms of the validity of the underlying scientific assumptions and the appropriateness of projects, policies and programmes. Lessons learned and good practices identified during the monitoring and evaluation of ongoing and completed projects, policies and programmes should inform future actions, creating an iterative and evolutionary adaptation process. This means that adaptation actions will be informed by latest climate change data and projections. As a result, monitoring, and evaluation can help improve the efficiency and effectiveness of adaptation efforts within Cork City Council. Part of the monitoring will also involve documenting climate events themselves, which will inform future adaptation and mitigation policies.

COMMUNICATION

- 4.10 Public communication and outreach are essential to inform and educate residents of Cork to climate change mitigation and adaptation measures. Cork City Council will build awareness on the challenges of climate change, keep the public informed on the implementation of this strategy and improve information flows during extreme weather events. A specific Communications Plan to support the implementation of the climate adaptation strategy will be developed to disseminate outcomes and updates to the various stakeholders. This will assist in the development of community forums to engage with the public so as to encourage greater participation and behavioural change in all aspects of climate adaptation and mitigation.

CORK CITY COUNCIL ADAPTATION ACTIONS

Local Adaptation Governance and Business Operations

Objective 1: To support the successful and practical implementation of climate adaptation planning.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
1.1	Establish a Climate Action Team with representatives from all the key functions of Cork City Council, to oversee the implementation of the actions of this climate change adaptation strategy. This Team will implement actions, report and review the progress of the strategy and will encourage local innovation.	Strategic and Economic Development	Climate Action Team	CARO	Short	In Progress
1.2	Integrate climate action into Cork City Council Service Delivery Programmes and provide for its translation into Team Development Plans and Personal Development Plans, to enable actions to be directly pursued by all relevant business units.	Senior Management Team	All Directorates Climate Action Team		Short	Yes
1.3	Ensure that climate action is a regular standing item on the agenda of Senior Management Team (SMT) meetings and relevant Strategic Policy Committees (SPCs), with bi-annual progress reports submitted to the Climate Action Team, as required.	Senior Management Team	All Directorates Climate Action Committee Strategic Policy Committees		Short	Yes
1.4	Liaise with the Climate Action Regional Office (CARO) and provide appropriate progress reports. Assist the local CARO in its development as a 'Centre of Excellence' for the region.	Strategic and Economic Development	Climate Action Team	CARO	Short - Medium	Yes

1.5	Ensure that climate action is a key consideration in the assessment of all planning applications and provide guidance on climate action to developers in Cork City.	Strategic and Economic Development	Climate Action Team Community, Culture and Placemaking	Southern Regional Assembly	Short	In Progress
1.6	Ensure that climate action is referenced to and aligned with the UN Sustainable Development Goals (SDGs), especially SDG 13: Climate Action.	Strategic and Economic Development	Climate Action Team Community, Culture and Placemaking	CARO Southern Regional Assembly	Short	In Progress
1.7	Building on adaptation planning actions set out in this strategy, support and compliment the practical implementation of actions arising from the National Climate Action Plan – to Tackle Climate Breakdown (as revised and updated annually), across the broad range of functions of the local authority to achieve the national climate ambition i.e. decarbonisation targets to 2030 and objectives to 2050.	Strategic and Economic Development	Climate Action Team Community, Culture and Placemaking	CARO	Short	In Progress
1.8	Explore with the relevant Government Department(s) the necessity of appointing a Climate Action Officer and strengthening other staff resources within the existing Climate Action Unit. This Officer and Unit will have responsibility for co-ordinating and delivering climate action-related activity within Cork City Council’s Administrative area.	Strategic and Economic Development	Climate Action Team Community, Culture and Placemaking	CARO	Short	In Progress

Objective 2: To ensure that climate adaptation is mainstreamed into all relevant activities and operations of Cork City Council.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
2.1	<p>The Climate Action Team will be tasked with managing and overseeing the effective mainstreaming of climate adaptation measures into all plans, projects, programmes, strategies and policies of Cork City Council:</p> <p>(a) build and strengthen partnerships and promote inter-departmental communications and co-operation;</p> <p>(b) compile a list of all plans, projects, strategies and policies, including expected review/update timelines and ensure that climate action considerations are integrated into all reviews.</p> <p>(c) provide a framework for climate action projects to be included into future service delivery programmes;</p> <p>(d) report to SMT on progress; and</p> <p>(e) include climate adaptation within the following:</p> <ul style="list-style-type: none"> • City Development Plan and Corporate Plan • Biodiversity Plan • Heritage Plan • Severe Weather Plan • Winter Maintenance Plan • Roads Programme • Housing Strategy • Local Economic and Community Plan • Tourism Strategy • Health & Safety Plan • Energy Management Plan and Sustainable Energy and Climate Action Plan (SECAP). • Cork Metropolitan Area Draft Transport Strategy 2040 – CMATS • Cork City Cycling Strategy and Cork Cycle Network Plan 	<p>Strategic and Economic Development</p> <p>Climate Action Team</p>	<p>Senior Management Team</p> <p>All Directorates</p>	CARO	Short - Medium	In Progress
2.2	<p>Ensure through the delivery of all services, functions and activities that there is more effective implementation of relevant regulations, policies, plans and strategies with a role in climate adaptation and environmental protection.</p>	Climate Action Team	Senior Management Team	CARO	Short - Medium	In Progress

Objective 3: To develop and maintain a resource and risk model for Cork City Council.						
No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
3.1	<p>Evaluate Cork City Council’s activities that may be affected by climate change. The risk assessments will include:</p> <ul style="list-style-type: none"> • collection and collation of historic weather event data for the Cork City Council region; • collection and evaluation of international and national data on projected climate patterns and the potential risks to Cork city; and • compile a list of Cork City Council’s assets that are vulnerable to climate change. Examine the current Sustainable Energy and Climate Action Plan (SECAP) for existing data. 	Strategic and Economic Development	All Directorates Climate Action Team	CARO UCC (ERI)	Short - Medium	In Progress
3.2	<p>Develop a system to document, monitor and analyse data on the impact of extreme weather events on Cork City Council. This will identify the actions required to adapt quickly and effectively to extreme weather events and to restore public services, taking into account the following baselines:</p> <ul style="list-style-type: none"> • nature and extent of extreme weather events and its impact on public service delivery; • impact of extreme weather events on Cork City Council’s assets; • staff resources required (and any deficits identified) to deal in a resilient way with all aspects of the impact of extreme weather events; • financial implications of extreme weather events; • number of days of closure of Cork City Council buildings and facilities; • staff working-days lost, including lost activities due to reassignment or loss of resources; • number of activations of Severe Weather Assessment Team; • number of emergency road closures; • number of emergency call-outs, plus representations and calls for assistance from elected representatives, customers, other sectors and members of the public; • number (and dates) of call-outs to deal with wild fires; • number of Health and Safety incidents; • number of kilometres of road treated in freezing and high temperature conditions; • the nature, extent and cost of service provided to or obtained from other sectors; and • the proportion of the impacts that is deemed to derive from climate change. 	Roads and Environmental Operations	Climate Action Team Customer Services Unit Flood and Severe Weather Assessment Teams Major Emergency Management Team	CARO UCC (ERI)	Short	In Progress

Objective 4: To build resilience within Cork City Council to support service delivery.						
No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
4.1	<p>Develop Business Continuity Plans to identify and address specifically the impacts associated with extreme weather events on all functions/services of Cork City Council and to explore potential opportunities to increase resilience. This will involve:</p> <ul style="list-style-type: none"> • preparation for and minimisation of the impacts of service disruption; • assessment of Cork City Council’s back-up systems infrastructure (including power outage back-up procedures) to ensure resilience; • assessment of the impact of climate events on outdoor working/ site visits and any impacts on deadlines and levels of service provision; • assessment of staff working environments during extreme weather events, and a review of potential ways to maintain safe working conditions and the provision of alternative working locations; and • development of plans for staff deployment and availability due to travel restrictions. 	Roads and Environmental Operations	Plant and Machinery ICT Services Severe Weather Assessment Team Corporate Affairs and International Relations	CARO	Short - Medium	Not yet Identified
4.2	<p>Develop a Communications Contingency Plan to identify essential key staff to be able to access all essential council systems remotely, so as to reduce or eliminate impacts on statutory deadlines and backlog. This will include:</p> <ul style="list-style-type: none"> • maintaining the internal communication protocol for extreme weather events to increase staff awareness of potential risk to safety, and to ensure all staff travel only in safe conditions; • development of internal back-up communication systems to ensure communication for emergency responders is maintained in the event of disruption to the main communication system(s); and • development of external back-up communication systems to ensure effective communication with external partners during severe weather events. 	ICT Services	Severe Weather Assessment Team Fire Services Corporate Affairs and International Relations	Gardaí Defence Forces Port of Cork OPW Irish Water Health Services Executive	Short - Medium	Not yet Identified

Objective 5: To build capacity within Cork City Council to respond effectively to extreme weather events.						
No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
5.1	Develop a climate change training programme to educate staff and elected members on the implications of climate change and how to effectively address the effects of climate change on Council operations and services and to build capacity within Cork City Council.	Training Department	All Directorates	CARO	Short - Medium	In Progress
5.2	<p>(a) Assist in building resilience and capacity within local businesses and communities to enhance the overall response to extreme weather events taking into consideration climate equality and justice.</p> <p>(b) Develop an education/awareness programme for business and community organisations to equip them with understanding of risks and how to build longer term resilience.</p>	Community, Culture and Placemaking	Climate Action Team	<p>CARO</p> <p>Cork Chamber</p> <p>Cork Business Association</p>	Short - Long	Not yet Identified
5.3	Support existing extreme weather event response arrangements and investigate further deployment of early warning systems (e.g. Flood Early Warning System (FEWS)), along with reviewing and collating information on existing early warning systems.	Roads and Environmental Operations	<p>ICT Services</p> <p>Severe Weather Assessment Team</p>	<p>Met Éireann</p> <p>Office of Public Works</p> <p>ESB</p> <p>Transport Infrastructure Ireland</p>	Short - Long	In Progress
5.4	Investigate the potential for technology-based solutions for the coordination of responses to climate events in the areas of ICT and GIS.	ICT Services	<p>Fire Service</p> <p>Severe Weather Assessment Team</p>	CARO	Short	Not yet Identified

Objective 6: To identify and support opportunities that may arise from pursuing adaptation efforts through the functions of Cork City Council						
No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
6.1	Identify, source and leverage funding streams for the implementation of climate change actions (including both adaptation and mitigation).	Strategic and Economic Development	All Directorates Climate Action Team	CARO Southern Regional Assembly Energy Cork	Short - Long	In Progress
6.2.	Support, encourage and develop the move to digital services and exploit new ideas which seek to capture opportunities associated with the environmental and technological advances that support climate actions. An example would be leveraging the progress achieved during the Smart Cities project.	Strategic and Economic Development	All Directorates ICT Services Cork City Energy Agency	CARO Public Participation Network Cork Environment Forum	Short - Long	In Progress

6.3	Collaborate and work with businesses in seeking new ideas to reduce the impact of climate change on Cork city.	Strategic and Economic Development	Climate Action Team Cork City Energy Agency	CARO Local Community Development Committee Public Participation Network Cork Environment Forum Energy Cork Tidy Towns Environment Protection Agency Local Enterprise Office Cork Chamber Cork Business Association Cork Healthy Cities	Short - Long	To be Assessed
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Infrastructure and Built Environment

Objective 7: To increase the resilience of roads and transport infrastructure.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
7.1	<p>Develop a system to document, monitor and analyse roads and transport infrastructure vulnerable to the impacts of climate change / extreme weather events including roads, bridges, walking and cycling facilities, rail and bus networks, the airport and the seaport, by the following actions:</p> <ul style="list-style-type: none"> • review information available from past events and existing asset management systems; • compile a vulnerable infrastructure inventory to aid works prioritisation and inform route prioritisation plans; • establish a procedure for structural integrity assessments of infrastructure after extreme weather events; • communicate with external stakeholders on assets that would be required during an extreme weather event e.g. snow ploughs, grit and salt, mobile emergency signage and lighting, back-up electricity generators, mobile flood barriers, pumps etc. ; • integrate climate considerations into the design, planning and construction of all transport infrastructures; • develop a transport plan for a severe weather event and distribute to relevant external stakeholders; and • integrate climate change adaptation (and mitigation) measures into the design, planning and construction of all roads and transport infrastructure, with a priority given to nature-based solutions e.g. Sustainable Drainage Systems (SuDS). • Home or hub or remote working should be promoted and instituted by relevant organisations and firms. This will help to reduce congestion and carbon emissions associate with using commuting to work, as well as a reduction in particulate matter impacting negatively on air quality. • Better promotion of the ‘Public Transport Tax Initiative’ scheme. • Support the increased take-up of school children and students using public transport. 	Roads and Environment Operations	<p>Major Emergency Management Team</p> <p>Flood Assessment Team</p> <p>Planning Policy Team</p> <p>Local Enterprise Office</p> <p>Smart Cities</p> <p>Healthy Cities</p> <p>Learning Cities</p>	<p>Cork County Council,</p> <p>Civil Defence, Cork Airport, Port of Cork, Bus Éireann, Irish Rail, National Transport Authority, Transport Ireland,</p> <p>Cork Chamber, Cork Business Association, Public Participation Network, Irish Water, Eirgrid, Gas Networks Ireland. UCC (ERI)</p>	Short	To be Assessed

Objective 8: To increase the resilience of Cork City Council buildings, housing stock, parks and cemeteries and other capital assets.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
8.1	<p>Develop a system, in the context of climate vulnerabilities, for the management of capital assets, including buildings, housing stock, fleet, recreation areas and public amenities:</p> <ul style="list-style-type: none"> • review information available from existing asset management systems; • analyse information from past events and the impacts of climate change for future events; • compile a vulnerable infrastructure inventory to aid works prioritisation; • establish a procedure for structural integrity assessments of assets after extreme weather events; • integrate climate change (adaptation and mitigation) measures into the design, planning and construction of all capital projects, with priority given to nature-based solutions; and • analyse the suitability of the Council’s fleet to operate during extreme weather events. 	Roads and Environment Operations	<p>Infrastructure Development (Capital Delivery Office)</p> <p>Climate Action Team</p> <p>Plant and Machinery</p>	<p>CARO</p> <p>UCC (ERI)</p>	Short - Medium	To be Assessed
8.2	Identify, resource and install new technologies (or update existing) in council buildings/housing assets to reduce the impacts of climate change on staff, customers, the general public and residents.	<p>Housing</p> <p>Corporate Affairs and International Relations</p>	<p>Roads and Environment Operations</p> <p>Building Control</p> <p>City Architect</p>	CARO	Long	To be Assessed
8.3	Review the Social Housing Tenant’s Handbook to increase awareness of extreme weather events and provide climate change resilience information to the tenants.	Housing	Community, Culture and Placemaking	CARO	Short	To be Assessed

8.4	Support the rollout of electric vehicles and electric vehicle-charging infrastructure and the rollout of compressed natural gas (GNG) usage and corresponding infrastructure in Cork City, beginning with Cork City Council’s fleet.	Roads and Environment Operations	Plant and Machinery Energy Team	SEAI Energy Cork Transport Infrastructure Ireland Gas Networks Ireland	Short	To be Assessed
8.5	Examine ways to reduce/avoid unnecessary staff travel and promote initiatives to promote more sustainable forms of transport for all Cork City Council staff. Examine the findings of the ‘Smarter Travel Workplace’ 2019 Staff Travel Survey (currently on-going) to deliver positive action amongst staff.	Community, Culture and Placemaking	Climate Action Team	SEAI Energy Cork Transport Infrastructure Ireland	Short - Long	In Progress
8.6	Promote cycling and walking to support a greater uptake of active travel in Cork city, thus reducing carbon emissions and improving air quality. Promote the modal shift away from private cars through landuse planning policy, development management and local initiatives and promotions. Continue to support Mobility Management Initiatives and other initiatives which support greater use of walking, cycling and public transport including Bike Week, European Mobility Week and other related promotions. Use the ‘Cork City Cycling Strategy’ and the ‘Cork Cycle Network Plan’ to help deliver this action.	Community, Culture and Placemaking	Climate Action Team	SEAI Energy Cork Transport Infrastructure Ireland	Short - Long	In Progress

Land Use and Development

Objective 9: To integrate climate action considerations into land use planning policy and influence positive behaviour.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
9.1	<p>Identify, integrate and implement climate change actions into the Development Plan and Local Area Plans.</p> <p>Integrate climate action as a guiding principle and strategic objective, thus tailoring planning policies to reduce the vulnerability of Cork city to the impacts of climate change, by:</p> <ul style="list-style-type: none"> enhancing the role of the natural environment to promote climate adaptation by promoting nature-based solutions e.g. green infrastructure; continuing to take a minimised risk-based approach to development in areas at risk of flooding (coastal, tidal, fluvial, pluvial and groundwater); promoting climate resilient designs and materials; and promoting energy efficiency and renewable energy solutions and water conservation measures in new developments and promote green roofs, walls and courtyards. 	Strategic and Economic Development	All Directorates Climate Action Team	CARO	Short	In Progress
9.2	Engage with energy and service providers to ensure that energy infrastructure and services are resilient to the impacts of climate change.	Roads and Environment Operations	Climate Action Team	Eirgrid, ESB, Bord Gais, Gas Networks Ireland	Short	To be Assessed
9.3	<p>(a) Ensure that climate change is a key consideration in selecting locations for future developments and that this is reflected in land use zoning policy.</p> <p>(b) In the development of policy and the planning and provision of green infrastructure, ensure appropriate buffer zones are maintained and protected to avoid potential impacts on designated habitats or protected species and habitats, and to protect and enhance wider biodiversity.</p>	Strategic and Economic Development	Community, Culture and Placemaking	CARO	Short - Medium	Yes

Drainage, Water and Flood Management

Objective 10: To adapt to the increased risk and impact of flooding due to climate change.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
10.1	Develop a flood risk management system for council assets and services: <ul style="list-style-type: none"> • analyse information from past events and the impacts of flooding for future events; • compile an inventory of vulnerable assets and services; and • review current flood maps of areas vulnerable to flooding and indicate flooding levels for a range of future scenarios. 	Roads and Environment Operations	Climate Action Team Flood Assessment Team	CARO OPW ESB Port of Cork	Short - Medium	To be Assessed
10.2	Work with the Office of Public Works (OPW) and other organisations to share information in relation to flood risk and in the development of major and minor flood protection and flood proofing schemes throughout Cork city.	Roads and Environment Operations	Climate Action Team Flood Assessment Team	OPW Flood Early Warning System (FEWS) ESB Port of Cork	Short	Yes
10.3	Ensure that flood event emergency response plans are reviewed on a regular basis to reflect the degree of flood risk.	Roads and Environment Operations	Flood Assessment Team Fire Service	OPW Flood Early Warning System (FEWS) ESB	Short	Yes

10.4	(a) Identify natural floodplains in Cork city and incorporate nature-based solutions in any enhancement works where possible. (b) Consider and explore the use of natural water retention measures in certain suitable areas as a method of managing flood risk, improve water quality, enhance biodiversity, management of soil and sediment and to provide for the creation of new or additional amenity areas. Liaise and collaborate with the OPW and other stakeholders engaged in research and pilot projects to develop knowledge and capacity on such measures.	Roads and Environment Operations	Flood Assessment Team	OPW Flood Early Warning System (FEWS)	Medium – Long	To be Assessed
10.5	Identify areas susceptible to isolation as a consequence of flooding and establish measures to address this issue. Use future scenario flood maps to assist in the identification of potentially vulnerable communities and assets.	Infrastructure Development (Capital Delivery Office)	Flood Assessment Team Roads and Environment Operations Fire Service	OPW Flood Early Warning System (FEWS) Civil Defence Defence Forces HSE	Short	To be Assessed
10.6	Review the current drainage systems for which Cork City Council is responsible for, by: <ul style="list-style-type: none"> • compiling an inventory of existing drainage districts; • identify areas that are susceptible to surface water flooding; and • adapting existing maintenance plans, taking into account impacts from climate change such as increased siltation and plant growth, and increased rainfall. 	Roads and Environment Operations	Infrastructure Development (Capital Delivery Office)	Irish Water	Short	In Progress
10.7	Develop a system for the upgrade of drainage networks, including the separation of sewer and surface water to increase resilience capacity.	Infrastructure Development (Capital Delivery Office)	Flood Assessment Team	Irish Water	Medium	In Progress
10.8	Investigate the use of smart monitoring in the management of the drainage systems for which Cork City Council is responsible for.	Roads and Environment Operations	ICT Services	Irish Water	Short	To be Assessed
10.9	Continually review flood risk data and take into account increased flood extents and depths in the design, planning and build/delivery of new infrastructure by the council to avoid potential/future flood prone areas and ensure that new infrastructure is resilient to climate change risks.	Infrastructure Development (Capital Delivery Office) Roads and Environment Operations	Flood Assessment Team	Irish Water OPW	Short	In Progress

Objective 11: To provide adequate drinking water supply and waste water treatment during extreme weather events.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
11.1	Support Irish Water in the provision of treated water from major water treatment plants during extreme weather events.	Roads and Environment Operations	Major Emergency Management Team	Irish Water	Short - Long	To be Assessed
11.2	Ensure the emergency services have access to water during extreme weather events (snow, frost, ice and drought).	Roads and Environment Operations	Major Emergency Management Team, Fire Service	Irish Water	Short - Long	In Progress
11.3	Pilot a public drinking water fountain at an appropriate location in a public park area and/or public realm area to provide quality water supply and contribute to a reduction in plastic waste. Explore the feasibility of expanding to a network if successful and liaise and collaborate with Irish Water as appropriate.	Roads and Environment Operations	Community, Culture and Placemaking	Irish Water	Short - Long	To be Assessed

Objective 12: To liaise and work with other bodies and agencies responsible for the management of water sources.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
12.1	Support Irish Water where possible in identifying public drinking water sources vulnerable to climate change. Support the implementation of source protection and or the identification of alternative sources, in order to maintain water quantity and quality levels.	Roads and Environment Operations	Climate Action Team	Irish Water UCC (ERI)	Short - Long	To be Assessed

12.2	Support Irish Water where possible to identify the impacts of power outages of varying durations on specific water and wastewater scheme operations. Support the identification of critical and vulnerable receptors.	Roads and Environment Operations	Climate Action Team	Irish Water UCC (ERI)	Short	To be Assessed
12.3	Liaise, support and work with Irish Water in the development, conservation and upgrade of the water supply systems so as to ensure Cork city has an adequate supply of water to address climate change demands.	Roads and Environment Operations	Climate Action Team	Irish Water UCC (ERI)	Short	To be Assessed
12.4	Liaise, collaborate and support agencies responsible for the management of watercourses in their employment of River Restoration Techniques and Floodplain Restoration Techniques aimed at improving ecological status of waterbodies.	Roads and Environment Operations	Climate Action Team	OPW River Basin Management LAWPRO Waterways Ireland Irish Water Irish Farmers Association Inland Fisheries Ireland	Short - Long	In Progress
12.5	Further develop collaboration with State bodies, and other relevant Bodies responsible for the management of water courses including (but not limited to): <ul style="list-style-type: none"> • OPW; • River Basin Management LAWPRO; • Waterways Ireland; • Irish Water; • Irish Farmers Association; • Inland Fisheries Ireland; • ESB; and • Others as appropriate. 	Roads and Environment Operations	Climate Action Team	OPW River Basin Management LAWPRO Waterways Ireland Irish Water Irish Farmers Association Inland Fisheries Ireland ESB	Short - Long	In Progress

Nature, Natural Resources and Cultural Infrastructure

Objective 13: To protect, enhance and restore the natural environment and promote biodiversity.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
13.1	Support and enhance a native shrub and tree planting programme for Cork City in conjunction with an awareness campaign in the context of climate adaptation. The tree planting programme will include the protection of existing trees, increasing tree cover, identifying new sites for additional tree planting for the enhancement of the natural environment and biodiversity and the protection of trees on private land. Support the planting of native species.	Roads and Environment Operations	Community, Culture and Placemaking	Cork Environment Forum Coillte	Short – Medium	In Progress
13.2	Review roadside hedge maintenance programmes in conjunction with landowners with cognisance of the need to maintain ecological corridors and linkages forming part of the green infrastructure within the city.	Roads and Environment Operations	Community, Culture and Placemaking	Landowners	Short - Long	To be Assessed
13.3	Support and enhance a programme for monitoring and controlling the spread of alien invasive species. Alien invasives may become more of a problem due to climate change, thus increasing threats to native species, in addition to causing structural damage to infrastructure.	Roads and Environment Operations	Community, Culture and Placemaking	Landowners National Parks and Wildlife Service	Short - Long	To be Assessed
13.4	(a) Support and promote areas that contribute positively towards enhanced biodiversity and implement the National Pollinator Plan, paying attention to the threats from climate change e.g. seasonal disruption, increased severe weather events. (b) Explore ways to increase the range of plant species with the aim of increasing food sources and habitats for pollinators. Examine ways to reduce the impact of a longer growing season on lifecycles of bees and other pollinators in terms of food availability and life cycles mismatch.	Roads and Environment Operations	Community, Culture and Placemaking	Landowners National Parks and Wildlife Service Cork Environment Forum	Short - Long	To be Assessed

(c) In collaboration with communities, and as part of the Green Schools campaign and in conjunction with Lifetime Lab, identify suitable new sites for the implementation of the Pollinator Plan and to ensure continued maintenance and upkeep.

13.5	<p>Identify potential ecological corridors and connectivity issues between areas. Identify the potential to open up culverted rivers and incorporate softer engineering solutions.</p> <p>Identify locations to create new habitats for native flora and fauna e.g. urban orchards, allotments, green roofs and walls, which will assist in negating the ‘heat island effect’.</p> <p>Protect existing wetlands and identify new ones which may arise as a result of climate change.</p> <p>With the inventory of Cork City Council-owned lands, identify the capacity to contribute to quality green infrastructure and enhance biodiversity.</p>	Strategic and Economic Development	Community, Culture and Placemaking Roads and Environment Operations	Landowners National Parks and Wildlife Service Cork Environment Forum	Short - Long	To be Assessed
13.6	<p>Protect natural resources through waste prevention and recycling. Support national and regional initiatives e.g. the policy actions of the Regional Waste Management Plan, the EPA’s Local Authority Prevention Network and Local Agenda 21.</p> <p>Promote behavioural change in relation to the use of natural resources through initiatives as the ‘Waste prevention grant scheme’.</p> <p>Work with communities to enable them to develop an appreciation of natural resource protection, thus highlighting the link with climate change e.g. Green Spaces for Health and Community Gardens.</p> <p>CCC will seek Department/Government support to employ one permanent full-time biodiversity officer in each LA, with additional biodiversity staff support being provided to LAs depending on their population/jurisdictional area.</p>	Roads and Environment Operations	Community, Culture and Placemaking	Waste Enforcement Regional Lead Authorities (WERLA) OPW Cork Healthy Cities Cork Environment Forum	Short - Long	In Progress
13.7	<p>Adopt ‘Green Public Procurement’, moving from ‘most economically advantageous’ to a ‘life-cycle costing model.’</p>	Finance	Climate Action Team	CARO Office of Government Procurement	Short - Long	To be Assessed

Objective 14: To review, manage and protect biodiversity and natural heritage within the natural environment.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
14.1	<p>Collaborate with the National Parks and Wildlife Service (NPWS) and research organisations (UCC, CIT, Marine Institute) in the review of biodiversity plans and habitat conservation strategies, and projects to identify risks from adverse climate change impacts.</p> <p>Work with communities and schools to create and implement local Biodiversity Action Plans.</p>	Strategic and Economic Development	Roads and Environment Operations	National Parks and Wildlife Service UCC CIT Marine Institute	Short - Long	To be Assessed
14.2	<p>Given the wider environmental benefits of green infrastructure, such as microclimate benefits including providing shade to alleviate heat stress, supporting for urban biodiversity, water retention, and flood alleviation etc, develop a green infrastructure strategy and associated action plan, including:</p> <ul style="list-style-type: none"> the research and mapping of areas considered beneficial for use as local carbon offsets through carbon sequestration in conjunction with the relevant agencies; and the integration of nature-based solutions in all City Council development / works (roads, housing, architecture, parks and water infrastructure). 	Strategic and Economic Development	Roads and Environment Operations Architects	Landowners National Parks and Wildlife Service Coillte Tidy Towns Cork Environment Forum Cork Food Policy Council	Short - Long	To be Assessed

Objective 15: To support and enhance built heritage and cultural infrastructure.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
15.1	<p>Develop a system to document, monitor and deliver actions on reducing the impacts of climate change on Cork City Council’s natural and built heritage and cultural assets, including the following:</p> <ul style="list-style-type: none"> • gather baseline data in order to monitor change e.g. map existing green areas, carry out habitat surveys; • create a risk register for the natural and built heritage and cultural assets; and • introduce ‘natural capital accounting’ which gives natural heritage a monetary value due to its association with tourism and overall health and wellbeing. 	Strategic and Economic Development	Climate Action Team	CARO	Short - Long	To be Assessed
15.2	<p>Raise awareness and support positive behavioural change among staff, schools, community, homeowners and developers. Actions to include:</p> <ul style="list-style-type: none"> • training and workshops; • information materials (brochures, educational packs, information boards); and • increased use of social media and attendance at events and festivals. 	Strategic and Economic Development	Climate Action Team	CARO	Short - Long	To be Assessed

Citizen Safety, Health and Wellbeing

Objective 16: To consult, identify actions and build capacity and resilience within local communities.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
16.1	<p>Develop public awareness campaigns to increase knowledge of and encourage behavioural change around climate change and extreme weather events. Activities to include:</p> <ul style="list-style-type: none"> • training and workshops; • information materials (brochures, educational packs, information boards); • increased use of social media; and • attendance at events and festivals. 	Strategic and Economic Development	<p>Corporate Affairs and International Relations</p> <p>Community, Culture and Placemaking</p> <p>Climate Action Team</p>	<p>CARO</p> <p>MET Éireann</p>	Short	To be Assessed
16.2	<p>Develop and implement a programme to enhance the capacity of citizens, businesses and communities to respond to and recover from extreme weather events with specific aims to:</p> <ul style="list-style-type: none"> • provide assistance where possible to vulnerable communities to develop a stronger facilitating role for mitigating risks; • provide advice on the risk of extreme events affecting their locality; • devise adaptation actions to enhance preparedness and reduce dependency on local authority emergency responses; • provide support to develop appropriate resilience arrangements to enable response and recovery; and • integrate key considerations around climate equality and justice. 	Roads and Environment Operations	<p>Corporate Affairs and International Relations</p> <p>Climate Action Team</p> <p>Fire Services</p> <p>Local Enterprise Office</p>	<p>Civil Defence</p> <p>Gardaí</p> <p>HSE</p> <p>Health and Safety Authority</p>	Short - Medium	To be Assessed

16.3	<p>Raise awareness of the impacts of climate change and the ways for citizens, businesses and communities to respond appropriately and to increase resilience to these impacts. This should include:</p> <ul style="list-style-type: none"> • develop and implement a behavioural change plan for citizens, businesses and communities to change behaviours, understand and better deal with climate change and extreme weather events; • provide and promote information on extreme weather event preparedness, including property security and safety; • highlight health issues related to extreme weather events; • raise public safety awareness; • raise water safety awareness for unsupervised watercourses in local areas; • promote local resources to adapt to extreme weather events e.g. road salting; • use of flood mapping outputs, National Catchment Flood Risk Assessment and Management (CFRAM) programmes and other such climate related programmes in any public awareness campaigns; and • work to provide for climate change adaptation co-benefits (opportunities) that provide benefits for the environment through decreasing greenhouse gas emissions or reducing pressures on resources, and promote benefits for communities. 	Community, Culture and Placemaking	Fire Service Climate Action Team	Public Participation Network	Short	To be Assessed
			Healthy Cities	Civil Defence, Gardaí, HSE, Health and Safety Authority		
			Local Enterprise Office	OPW		
				Irish Water		
				Port of Cork		
				Cork Airport		
				Irish Rail		
				Waterways Ireland, Transport Infrastructure Ireland		
				Cork Chamber		
16.4	<p>Explore ways Cork City Council can help older, vulnerable and isolated people/communities to become more climate resilient.</p>	Community, Culture and Placemaking	Strategic and Economic Development Climate Action Team	Public Participation Network, Age Action, Local Community Groups	Short - Medium	To be Assessed
			Healthy Cities			
16.5	<p>Collaborate with third level and other research facilities to investigate the potential of climate action technologies and their application in Cork city, in conjunction with innovation and research funding at national and EU level.</p>	Strategic and Economic Development	Climate Action Team	UCC / CIT National and International Research Centres.	Medium - Long	To be Assessed
				Cork Chamber		

Partnerships with other Sectors and Agencies

Objective 17: To collaborate with other sectors and agencies in programs relating to climate change.

No.	Action	Responsible Lead Council Directorate / Team	Council Teams	External Partners	Action Timeframe	Resourced
17.1	Liaise, collaborate and work in relevant partnership with the sectors in the delivery of the sectoral adaptation actions, as approved by Government, where they are relevant to the functions and activities of Cork City Council.	Strategic and Economic Development	All Directorates Climate Action Team	CARO <u>Departments of:</u> Agriculture, Food and the Marine, Culture, Heritage and the Gaeltacht, Transport, Tourism and Sport Communications, Climate Action and Environment Housing, Planning and Local Government Health	Short - Long	To be Assessed
17.2	Liaise, collaborate and support local organisations and agencies in the pursuit of initiatives and efforts to reduce carbon emissions, build social cohesion and community resilience against the local impacts of climate change and in working towards climate justice	Strategic and Economic Development	Climate Action Team	CARO Relevant Others	Short - Long	To be Assessed

Appendix A: The Science behind Climate Change

An Intergovernmental Panel on Climate Change (IPCC) Special Report in 2018 states that human activities are estimated to have caused approximately 1.0 degree Celsius of global warming with a *likely* range of 0.8 degrees Celsius to 1.2 degrees Celsius. Global warming is *likely* to reach 1.5 degree Celsius between 2030 and 2052 if it continues to increase at the current rate (high confidence).

This coincided with an increase in the average global temperature of 0.74°Celsius between 1906 and 2005. In 2013, the U.S. National Oceanic and Atmospheric Administration announced that CO₂ levels had reached 400ppm. The World Meteorological Organization (WMO) Greenhouse Gas Bulletin (No.14/22 Nov 2018) showed that globally averaged concentrations of carbon dioxide (CO₂) reached 405.5 parts per million (ppm) in 2017, up from 403.3 ppm in 2016 and 400.1 ppm in 2015.

As far back as 2013, the IPCC concluded that *"human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes... it is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century"*. The IPCC Climate Change 2014 Synthesis Report summed up observed changes in the climate system as follows: 'Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished and sea level has risen. In 2019, a research paper in the journal 'Advances in Atmospheric Sciences' states that 2018 has set a new record of ocean heating, surpassing 2017, which was the previous warmest year ever recorded. The vast majority of global warming heat ends up deposited in the world's oceans, and ocean heat content change is one of the best – if not the best – metric for climate change. While the World Meteorological Organization (WMO) released its analysis in 2013 that shows that the decade spanning 2001-2010 was the warmest ever recorded in all continents of the globe, a February 2019 newsletter from the Climate Central organisation uses NASA and NOAA data to declare that 2018 was the fourth-hottest year on record globally, with the five warmest years on record happening during the past five years – and the 20 warmest occurring over the past 22 years.

Appendix B: Adaptation Policy Contexts

International Context

The Paris Agreement 2015 (set within the context of the United Nations Framework Convention on Climate Change (UNFCCC)), was ratified by Ireland on 4th Nov 2016, and it is aimed at:

- limiting global warming to less than 2.0 degrees Celsius above pre-industrial level and pursue efforts to limit the temperature increase to 1.5 degrees Celsius; and
- building resilience and increasing the ability to mitigate the impacts of climate change.

The agreement requires all the parties to formulate and implement National Adaptation Plans (NAPs).

One of the 17 United Nations Sustainable Development Goals (SDG No. 13) calls on countries to *'take urgent actions to combat climate change and its impacts' and to integrate effective Climate Action measures into national policies'*.

European Context

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

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

Sectoral Context

Twelve sectors across seven government departments/agencies which will be developing individual climate adaptation strategies.

Sector	Parent Department
Seafood	Department of Agriculture, Food and the Marine
Agriculture	Department of Agriculture, Food and the Marine
Forestry	Department of Agriculture, Food and the Marine
Biodiversity	Department of Culture, Heritage and the Gaeltacht
Built and archaeological heritage	Department of Culture, Heritage and the Gaeltacht
Transport infrastructure	Department of Transport, Tourism and Sport
Electricity and gas networks	Department of Communications, Climate Action and Environment
Communications networks	Department of Communications, Climate Action and Environment
Flood risk management	Office of Public Works
Water quality	Department of Housing, Planning and Local Government
Water services infrastructure	Department of Housing, Planning and Local Government
Health	Department of Health

Under the non-statutory 2012 Framework, four Government departments prepared draft sectoral plans covering 5 sectors. These plans are:

- Sectoral Adaptation Plan for Flood Risk Management (OPW, 2015);
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Agriculture and Forest Sector (DAFM, 2017);
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Transport Sector (DTTAS, 2017); and
- Adaptation Plan for the Electricity and Gas Networks Sector (DCCAIE, 2017).

Government departments must develop statutory sectoral adaptation plans in accordance with the National Adaptation Framework (NAF) and the six-step adaptation planning process described in the May 2018 [Sectoral Planning Guidelines for Climate Change Adaptation](#). These guidelines aim to ensure that a coherent and consistent approach to adaptation planning will be adopted by the key sectors in Ireland.

Actions in completed plans could include those actions that:

- mainstream (integrate) adaptation into key sectoral plans and policies;
- identify and understand the key vulnerabilities, risks and opportunities facing their sectors. This should include major cross cutting risks;
- ensure that plans related to emergencies assigned to a sectoral department as lead Government department under the Strategic Emergency Planning Guidelines are climate-proofed;
- identify and collect information on the costs and benefits of adaptation within their sectors;
- build capacity within their sectors to cope with climate change;
- identify and address key research gaps within their sectors;
- improve co-ordination with the local government sector; and
- develop appropriate monitoring and verification systems within their sectors.

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