



**KILKENNY**  
COUNTY COUNCIL

# Kilkenny County Council

## Climate Change Adaptation Strategy

### 2019-2024

Kilkenny County Council

Partner Authority with

The Eastern & Midlands Climate Action Regional Office



# Acknowledgements

**This Strategy was developed through collaboration with and contributions from:**

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Environmental Protection, Water Strategic and Energy Policy Committee

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Kilkenny County Council Environment Section

With assistance from

The Eastern & Midlands Climate Action Regional Office

# Foreword – Chief Executive and Cathaoirleach



Ireland is at the beginning of a long and challenging process of transitioning to a low-carbon, climate resilient and environmentally sustainable economy. Irish people have experienced first-hand the potential impacts of climate change including increased temperatures, changes in precipitation, sea level rise, changes in the variability and extremes of storms, flooding and flash floods, all of which have resulting impacts on our environment, society and economy. Events like these are expected to increase in frequency highlighting the need for adaptation measures to help the country cope with the effects of climate change.

The National Adaptation Framework (NAF) sets out a clear pathway for Ireland to become a more resilient economy and society, capable of dealing with the enormous complexities and challenges climate change is likely to present. This statutory NAF sets out the national adaptation strategy which aims to reduce Ireland's vulnerability to these impacts. It also identifies the role of key sectors including local government in developing climate resilience while also recognising the need to ensure coordination of adaptation actions across sectors and Government Departments and Agencies.

This requirement for a comprehensive response to climate change at local and regional level makes local government critical to the delivery of national and international policies. The establishment of the four Climate Action Regional Offices (CAROs), as Centres of Excellence, based on distinct geographic/ topographic characteristics are key to enabling local authorities develop and roll out climate action strategies in a coordinated response to national and regional policy at a local level.

Kilkenny County Council is committed to being a frontrunner in effecting change in terms of mitigation and adaptation. This desire has been demonstrated by the commitment of the Senior Staff and Elected Members over the past decade in terms of staff and budget resources to deliver on environmental and climate change initiatives and inputs across the organisation. This strategy is a further demonstration of our commitment.

**Colette Byrne**  
Chief Executive

**Cllr Peter Cleere**  
Cathaoirleach

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# **Chapter 1**

## **Introduction**

# 1.1 Executive Summary

The impacts of climate change are already visible today and are expected to intensify over the coming decades. This inaugural Climate Adaptation Strategy for Kilkenny developed by Kilkenny County Council (KCC) is a response to the impact that climate change is having and will continue to have on the City and County of Kilkenny and its citizens. The most immediate risks to Kilkenny which are influenced by climate change are predominantly those affected with changes in extremes such as floods, precipitation and storms. Many commentators have concluded that 2018's heatwave was most likely as a result of climate change and there has also been unprecedented flooding in many parts of the county due to intense rainfall.

KCC will, through its commitment to facing up to the challenge of climate change, lead by example in tackling this global issue.

Indeed, local authorities are already leading the way for example in the shift towards energy efficiency measures. Under the National Energy Efficiency Action Plan (NEEAP) and the Public Sector Energy Efficiency Strategy, every local authority is required to achieve:

- A 33% improvement in the councils' energy efficiency by 2020;
- A 40% reduction in the councils' greenhouse gas emissions by 2030.

This Climate Adaptation Strategy features a range of actions across the following sectors *Energy and Buildings, Flood Resilience, Transport, Resource Management and Nature-Based Solutions and Communities* that collectively address the main targets of this plan, namely:

- To make Kilkenny a climate resilient county by reducing impacts of future climate change related events;
- To actively engage with and inform citizens and communities in Kilkenny about the impacts of climate change. Public awareness is key to developing effective climate adaptation and mitigation measures.

In order to achieve these targets, this Climate Adaptation Strategy sets out the current climate change impacts and greenhouse gas emission levels in the county through the development of adaptation and mitigation baselines. This strategy examines the future impacts that climate change may have on Kilkenny and then sets out a first iteration of actions that will be used to reduce the source and effects of these impacts.

The adaptation baseline has identified that the effects of climate change are already impacting on Kilkenny at a significant rate and are very likely to increase in their frequency and intensity.

The number of days with heavy rainfall has increased and the amount of flooding events in the county of Kilkenny has risen in the last 10 years. Kilkenny has also experienced extreme temperatures over the same period as witnessed most recently in 2018, with Met Éireann issuing a red warning for snow in February followed by one of the hottest summers on record later in the same year. All of these extreme weather events clearly highlight the need to reduce the impacts that climate change is having on the environment, the economy and the citizens of Kilkenny.

The mitigation baseline calculates the greenhouse gas emissions for the Council own activities and also for the entire county. It found that Kilkenny County Council produced 5,117 tonnes of CO<sub>2</sub> in 2017<sup>[1]</sup>.

This strategy has been developed to close the gap between the current baselines and the stated targets. The strategy has many co-benefits such as improved health through cleaner air and active

travel, a better environment through habitat protection and a stronger economy from new markets and job opportunities. While Kilkenny County Council acknowledges the key role it has to play through its own activities, this strategy also highlights the need to tackle emissions produced county wide. Kilkenny County Council will work with key stakeholders and community groups to influence and support carbon reduction initiatives across the transport, commercial and residential sectors.

In addition, as public awareness is key to developing effective climate adaptation and mitigation, Kilkenny County Council will, through this strategy, commit to address the current knowledge gap and will work with community groups and citizens to act on climate change through a range of awareness and behavioural change actions. Working with affected communities is vital as the costs of maintaining a managed approach to the impacts of climate change will continue to increase as extreme weather events become more severe and gaps between events shorten. This will also likely reduce the economic, physical and psychological capacity of affected communities to recover between events.

This strategy has been developed following an extensive process of research, policy analysis and workshops with staff, SPC and regional working groups. It follows on from the publication of Local Authority Adaptation Strategy Development Guidelines published in December 2018.

This strategy will be complemented and updated each year by means of an annual action plan that will set out the specific measures to be implemented. These actions in turn will be continuously monitored, reviewed and updated by a dedicated climate action team within KCC. They will be assisted by the Eastern & Midlands Climate Action Regional Office (CARO), which will ensure that the overall strategy is fully updated every 5 years to reflect latest policy, technology and climate related impacts.

Four Climate Action Regional Offices (CARO) have been established to deliver on the local government sector's obligations under the Climate Act 2015 and the National Adaptation Framework published by the Department of Communications, Climate Action and Environment (DCCAE) in January 2018. Kildare is the lead authority for the Eastern & Midlands CARO. In January 2019, Kildare invited the 17 local authorities within the region to submit a bid to become a Partner County, to assist in the roll out of the CARO works program over the next five years. Kilkenny was one of four counties to submit a bid application. Kilkenny County Council was successful in our application. As a Partner County, Kilkenny will host a fully funded executive cognate staff member of the Eastern & Midlands CARO, which will be based in Kilkenny. This puts Kilkenny in a good position to face the challenges of Climate Change and afford us the opportunity to be national front-runner in effecting change in terms of mitigation and adaptation

As a local authority, KCC has a key role to play in addressing and leading in its response to climate change. This strategy sets out a comprehensive picture of where we need to focus our efforts in order to effect a transition towards a more climate resilient future. As a local authority we are uniquely placed to effect real positive change on the ground. While we must be ambitious and challenge ourselves, we must equally ensure that the strategy is carefully managed and paced. We hope that through the actions outlined in this strategy, we will contribute to the delivery of the national objective of transitioning to a low carbon climate resilient economy in the long term and also improving our ability to plan for, and respond to, severe weather events in the shorter term.



# 1.2 Introduction & Background

## 1.2.1 Introduction:

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

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

This Kilkenny County Council Climate Change Adaptation Strategy is the start of the process of adaptation planning in Kilkenny and is the first step in increasing knowledge and understanding of our changing climate, growing resilience, and enabling effective responses to the threats posed by climate change.

## 1.2.2 Purpose of this Strategy:

This Kilkenny County Council Adaptation Strategy forms part of the National Adaptation Framework (NAF) which was published in response to the provisions of the Climate Action and Low Carbon Development Act 2015.

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

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

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

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

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

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

### 1.2.3 The Challenge of Climate Change

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

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

- Burning of fossil fuels such as oil, gas, peat, and coal resulting in carbon dioxide emissions,
- Agricultural activities that lead to methane and nitrous oxide emissions,
- Emissions from changes in land use such as urbanisation, deforestation and desertification.

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

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

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

### 1.2.4 The Challenge for Ireland

There is evidence that Ireland's climate is changing in line with global trends of climate change. Over the last few decades our climate has warmed, sea-levels have risen, rainfall patterns have changed and we have been impacted by frequent, intense and more extreme weather events. Temperatures have increased by 0.8°C since 1900 and sea level rises of about 35mm per decade<sup>[10]</sup> have been observed since 1990. Climate change has diverse and wide ranging impacts on Ireland's economic and natural resources including:

- More intense storms and rainfall events giving rise to disruption to society;
- Increased river and coastal flooding;
- Water shortages in summer;
- Increased risk of new pests and diseases;
- Adverse impacts on water quality;
- Changes in the distribution and phenology of plant and animal species on land and in the oceans<sup>[2]</sup>.

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

Nationally, climate projections<sup>[3]</sup> for the next century indicate that the climate trends observed over the last century will continue and will intensify over the coming decades as follows;

- Increase in average temperatures across all seasons. Heat waves are expected to occur more frequently;
- Significant reductions are expected in average levels of spring and summer rainfall with a substantial increase in the frequency of heavy precipitation events in Winter and Autumn;
- Decrease in wind speed and an increase in extreme wind speeds. The number of very intense storms is projected to increase over the North Atlantic region;
- Sea levels will continue to rise for all coastal areas. The south of Ireland will likely feel the impacts of these rises first. Sea surface temperatures are projected to continue warming for the coming decade.

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

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

### 1.2.5 What is Climate Adaptation?

Climate Adaptation can be best described as planning proactively to take action and make adjustments to minimise or avoid the existing and anticipated impacts from climate change. The Intergovernmental Panel on Climate Change (IPCC) in 2014 defined climate adaptation as:

***“The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.”***<sup>[4]</sup>

Climate adaptation aims to build climate resilient communities, to protect people, ecosystems, businesses, infrastructure and buildings from the negative impacts of climate change. As a Local Authority we play a pivotal role in planning for, and responding to, emergency situations. We are best placed to react faster and more effectively to local climate events given our close relationship with communities and extensive knowledge of the local, natural and built environment. This is demonstrated by our prompt and unrelenting emergency responses to varying and more frequent extreme weather events.

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

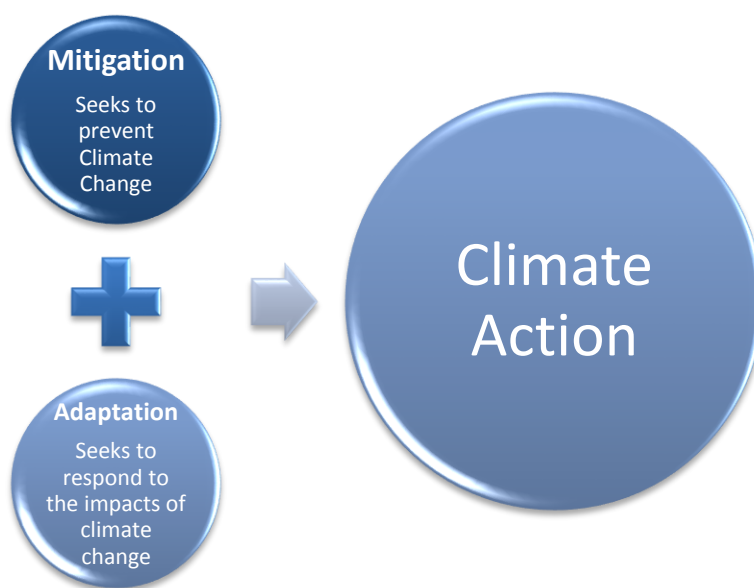
## 1.2.6 Adaptation and Mitigation

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

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

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

It is tasked with mainstreaming climate change adaptation over time into all functions, operations and services of the local authority. It seeks to inform or ‘climate proof’ existing plans and policies produced and implemented by the local authority. This ensures a considered, consistent and coherent approach, to allow us to face head-on the challenges of a changing climate and to build resilience within the local authority organisation itself as well as across all communities.

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

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

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

### 1.2.7 Adaptation Policy Context

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

### 1.2.8 International Context

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted in May 1992. The framework's objective is "to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"<sup>[5]</sup>. It is noted this framework sets non-binding limits on greenhouse gas emissions and contained no enforcement mechanisms. However, the framework outlined how specific international treaties may negotiate further action towards its key objective.

**The Paris Agreement 2015** is a protocol set within the context of the UNFCCC (ratified by Ireland on 4<sup>th</sup> November 2016) and it is aimed at:

- Limiting global warming to less than 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C;
- Increasing the ability to combat the impact of climate change and foster climate resilience.

This agreement states the need for parties to formulate and implement National Adaptation Plans.

### 1.2.9 EU Context

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

**The Global Covenant of Mayors (COM) 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. Kilkenny County Council is a party to the Covenant of Mayors.

### 1.2.10 National Context

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

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

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

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

### 1.2.11 Methodology

The methodology deployed to develop this local adaptation strategy includes:

- internal adaptation team meetings;
- facilitated workshops with staff and elected members and the Strategic Policy Committee for Environment;
- Use of resources including the City & Environs and County Development Plans, Engineer reports, web based tools such as Climateireland.ie etc.

The draft plan was placed on public display in line with the provisions of the public consultation and stakeholder communication plan. In addition to the consultation process of the draft strategy, environmental screening reports are to be undertaken with Environmental Authorities.

The Strategic Environmental Assessment (SEA) process was undertaken in accordance with the provisions of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011).

### 1.2.12 Environmental Assessment:

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

Under the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. 435 of 2004 as amended by S.I. 200 of 2011), all plans which are likely to have a significant effect on the environment must undergo screening to determine whether SEA is required. "Screening" is the process for making a determination as to whether a particular plan, would be likely to have significant environmental effects, and would thus warrant SEA. This strategy has been screened for SEA and it is determined that full SEA is not required. The screening report accompanies this strategy.

#### **Screening overview for 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) to determine if the Climate Change Adaptation Strategy is likely to significantly affect Natura 2000 sites (*i.e.* Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) within or surrounding the strategy area. The Screening Report accompanies this strategy.

**Chapter 2**  
**Regional & Local Context**

# 2.1 Overview of County Kilkenny

## 2.1.1 Topography

County Kilkenny is located in the south-east of Ireland and is bordered by counties Carlow, Laois, Tipperary, Waterford and Wexford. Topographically the county is characterised by the lowland areas of the river valleys of the Barrow, Nore and Suir, with the central area of the county and the south-west characterised as lowland areas. Outside of these areas the land rises to the upland areas of the Castlecomer Plateau to the north and the Slieveardagh Hills to the north-west, with the southern area of the county being largely characterised as an Upland area. The highest concentrations of urban populations are in Kilkenny City and the Environs of Waterford City in Kilkenny (Ferrybank) are located within the lowland river valleys.

The area of County Kilkenny is 2,072 km<sup>2</sup>. The county is drained by the rivers Barrow, Nore and Suir that are collectively known as The Three Sisters. The smaller rivers of the Kings, Dinin, Duiske, Goul, Glory and the Blackwater form part of the catchment of the Three Sisters Rivers.

The River Nore bisects the county on a north-south axis; it passes through Kilkenny City and is joined by the Kings River south of Bennettsbridge. The River Barrow flows along the eastern boundary of the county and joins the River Nore north of New Ross. The River Suir flows along the southern boundary of the county and is joined by the Nore and the Barrow south of Belview Port. The combined catchment area of the Three Sisters is 9,207 km<sup>2</sup>, made up of the Suir's 3,610 km<sup>2</sup>, the Barrow's 3,067 km<sup>2</sup> and the Nore's 2,530 km<sup>2</sup>.

The Three Sisters Rivers and associated rivers join up to create one of the largest estuarine systems in Ireland. The tidal limits extend to Carrick-on-Suir on the Suir River, Saint Mullins on the Barrow, and Inistioge on the Nore. The main channels of the Suir and the Barrow-Nore system converge at Cheekpoint east of Waterford City and continue out into the Celtic sea. County Kilkenny has direct access to the Irish Sea, through Belview Port on the River Suir and through New Ross on the River Barrow.

## 2.1.2 Demographics

The census of population in 2016 recorded a population of 99,118 for County Kilkenny which was an increase of 4% from 2011. A total of 39,226 housing units were recorded within the county. Within the same census period Kilkenny City had increased by 8.5% to 26,512. Kilkenny City is the predominant urban centre within the county. The Ferrybank neighbourhood which is comprised of the Environs of Waterford City within County Kilkenny is the second largest centre of population within the county, with a recorded population in the last census of 5,246.

Within the urban centres of Kilkenny City, Ferrybank, Callan, Thomastown, Castlecomer and Graiguenamanagh is a combined population of 39,467 which equates to 40% of the population of the county. These centres are also supported by a number of smaller settlements. At present the majority of the population of County Kilkenny reside in the rural areas, with an overall approximation of 60% of the county's population.

The *Draft Regional Spatial and Economic Strategy (RSES) for the Southern Region* <sup>[6]</sup> projects that the population of County Kilkenny will grow to 110,000 by 2026 and 114,500 by 2031. A significant proportion of this growth is anticipated to take place within the urban areas, and in particular in Kilkenny City.

Both nationally and locally, a rise in population is projected to increase the impacts of climate change, which will include additional pressure on drainage systems that are already working near



capacity. The associated demand for more homes will lead to a decrease in pervious or green surfaces, exacerbating flooding due to enhanced run-off. Having regard to the dominance of the Three Sisters River Basin catchment, and the location of a number of settlements within the river valleys, together with the tidal nature of these rivers in the southern and eastern areas of the county, a significant area of Kilkenny is susceptible to the climate change risks with particular regard to fluvial and tidal flooding.

### 2.1.3 Employment

Key drivers of the growth of the Green Economy globally include emissions reduction targets, increasing fossil fuel prices, diminishing natural resources, the impact of climate change, environmental legislation and consumer preferences. Development of the Green Economy provides an opportunity for businesses to reduce costs, improve their environmental performance and engage in the shift to a new economic paradigm. Local Government is part of the network for assistance to business and industry in supporting the development of the Green Economy.

The 2016 census found that the labour force in County Kilkenny was 47,407 persons; of these people 5,533 are employed in the areas of human health and social work activities, 5,423 in the area of wholesale and retail trade and repair of motor vehicles. Manufacturing accounts for 4,348 of the labour force and education 3,767.

The 2011 census of population identified that a total of 7.3% of the county's labour force was classified into broad industrial group A - agriculture, forestry and fishing, compared with 4.1% nationally. In the 2016 census, the number of people working within this class was 3,488 or 7.3%.

Kilkenny has strong indigenous industry in sectors such as food and drink as well as the craft sector. The city has a high profile nationally and internationally as a centre for tourism, festivals, heritage and the arts. Tourism is a major revenue generator for County Kilkenny, estimated by Fáilte Ireland to be worth approximately €94 million to the county in 2016, and visitor numbers to Kilkenny at 579,000 with 51% of these visitors coming from overseas.

Kilkenny has developed a strong profile as a services centre with companies such as State Street, VHI, Banking 365, Carne, CipherTechs and Taxback.com. The city itself also acts as an administration centre for a number of state and semi-state agencies including the national headquarters of the Heritage Council and the Design & Crafts Council of Ireland, and the regional headquarters of the Health and Safety Authority and the Health Services Executive.

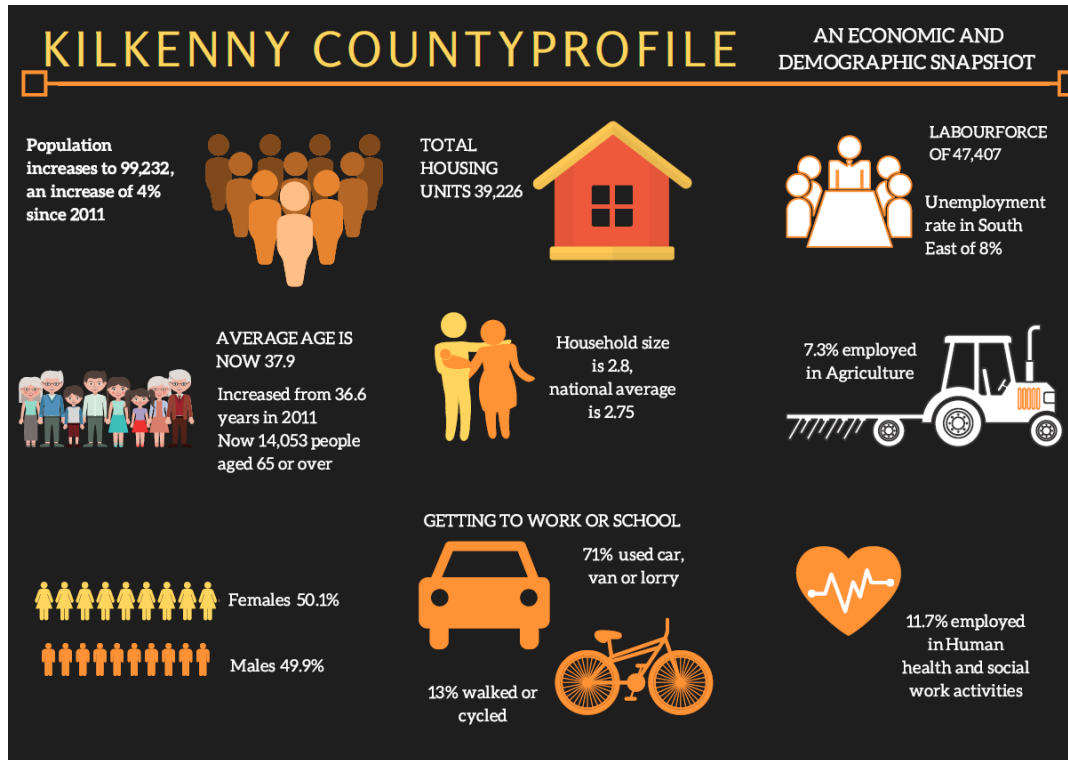
The Belview Port area is located circa. 5 km downstream of Waterford City on the River Suir estuary. The port is a strategic national, regional and county asset with good road and rail links. Significant investment has taken place in the infrastructural capacity of the lands zoned at Belview for industrial and port related activities, with this area identified as an area suitable for strategic development and foreign direct investment.

The Census of Population 2016 identified the following statistics in relation to the labour force travel patterns relating to County Kilkenny:

- The total number of persons living and working in Kilkenny is 41,363;
- The total number of persons commuting into Kilkenny to work is 7,828;
- The total number of persons commuting outside of Kilkenny to work is 10,092.

The 2011 Census of Population identified that the majority of the county's population use the private car as a means of transport, with 64.5% of the total numbers travelling using the car either as a passenger or as a driver. Of the population aged 15 years and over at work in the 2011 census, travel times were report of less than 15 minutes for approx. 31% of this category. A further 33% took between 15-30 minutes to travel to work, with the remainder taking longer or not stated.

As stated previously, agriculture in Kilkenny supports thousands of jobs in the rural economy, both directly in food and drink processing and also in the wider agri-industry, including input suppliers, agricultural contractors, jobs in auctioneering, transport, engineering, accountancy, legal, veterinary and other services.



### 2.1.4 Infrastructure

Since January 2014, water and wastewater has been the responsibility of Irish Water while Kilkenny County Council provides water services in accordance with a service level agreement with Irish Water. Water distribution input in the county has amounted to 27,166 m<sup>3</sup> per day over 365 days, amounting to 9,915,500 m<sup>3</sup> of potable water per year. Given the losses on the network, a far greater production is however required to meet the future demand. Wastewater in similar quantities is disposed of back to the environment. Kilkenny County Council has significantly reduced water distribution input from 33,000m<sup>3</sup>/day in 2010 to the current figure of 27,166m<sup>3</sup>/day which is a reduction of 18%. This has been achieved through active leakage detection, demand management, pressure management and water-mains rehabilitation. All new development must account for how the surface water runoff will be managed on development sites. As such, the County Council aims to control runoff from such sites through Sustainable Urban Drainage Systems (SuDS).

The electricity transmission network of Kilkenny comprises mostly 110kV (kilovolt) circuits and one 220kV circuit in the south of the County. A gas pipeline runs from Paulstown through the County past Kilkenny City and on towards Callan to the West and Ballyragget to the North. A spur from the main gas pipeline extends down to Great Island in County Wexford and into Belview Port.

In April 2016, 22,739 dwellings in Kilkenny had broadband access. Currently there is poor broadband and mobile provision in the rural areas of Kilkenny. Renewable energy comes in many forms,

including wind energy, solar energy or biomass. As of January 2019, permissions have been granted by the Council and on appeal to An Bord Pleanála for 39 wind turbines in 8 locations, together with 12 solar farms covering an area of approximately 160Ha.

The Council's natural heritage provides significant economic benefits for the county. It underpins important economic sectors such as agriculture, tourism and recreation, and is a core component of the county's green infrastructure. Protection of the county's natural resources is regarded as necessary to sustain economic growth. The multi-functional role of green infrastructure enhances opportunities for recreation and tourism, encourages new business to invest in the county and has a role in climate change adaptation. County Kilkenny's green infrastructure is a key strategic asset for the county.

Improvements such as the completion of the telecoms Metropolitan Area Network (MAN) around Kilkenny City and the opening of the M8 and M9 motorways have increased opportunities for inward investment, and increased accessibility throughout the county and adjoining counties. Kilkenny is linked via the M9 motorway to Waterford and Dublin, with the M8 linking the county with Cork and Dublin. There are motorway connections to Dublin, Waterford and Belview Port. The completion of the N25 Waterford City bypass the south of the county and the second River Suir Bridge increases accessibility for the county, which is a significant benefit to Belview Port and associated enterprises.



There are two passenger railway lines in use in the county. A spur from Kilkenny City at Lavistown connects to the Dublin-Waterford main passenger line. The Waterford-Limerick passenger line runs in the south of the county, serving Waterford and Carrick-on-Suir stations. Belview Port is served by rail, connecting to the Waterford line, which facilitates the movement of freight. There is potential for more innovative and additional carriage of freight via the rail network at Belview and east of Kilkenny City to divert heavy commercial traffic for the public road network, which would offer environmental benefits.

**Chapter 3**  
**Adaptation & Mitigation Baseline**

## 3.1 Public Awareness

One of the biggest challenges to tackling climate change is public acceptance of the risks and the associated demand for solutions to reduce these risks through policy and services. There are two types of solutions - top-down, such as governmental policy and regulations, and bottom-up, led by citizen demand for change. For a successful route to reduce climate risk, both levels of solution need to be addressed.

A recent special Eurobarometer report<sup>[7]</sup> surveyed each member state across differing social and demographic groups and recorded public attitudes to climate change. The survey found that 68% of Irish respondents considered climate change to be a very serious problem, with 49% stating that it is the national government's responsibility to tackle it (local government only scored 30% in this area). Fifty per cent of Irish respondents also claimed that they had personally taken action against climate change. Interestingly, when these actions were described, a much higher rate of positives was recorded; for example, 79% said they regularly reduce waste and recycle. This shows that there is a disconnect between what people think are climate change actions and what actions are actually being carried out. The survey also highlighted a lower importance attached to some actions; low fuel consumption in a new car was only a priority for 12% of respondents, while just 7% had installed equipment in their homes to reduce energy consumption.

It may be no coincidence that higher-scoring actions such as recycling and the energy ratings of electrical appliances are also influenced by top-down regulations. With 88% of Irish respondents agreeing that tackling climate change can present opportunities for jobs and boost the economy, it shows that there is an appetite for change, but it is not being regulated, communicated or incentivised adequately.

Over the course of two weekends at the end of 2017, the Citizens' Assembly discussed how the state could make Ireland a leader in tackling climate change. The assembly heard presentations from a range of experts in areas such as the science of climate change and international policy. Over 1,200 submissions were received from the general public, advocacy groups, professionals and academics. At the end of the process, the assembly voted on 13 recommendations, all of which were overwhelmingly agreed. The recommendations demand top-down action from the government, in order to encourage and facilitate bottom-up actions from Irish citizens. By prioritising public transport over road networks, higher carbon taxes, provisions for community owned energy developments and feed-in tariffs for domestic energy production, the conditions would be in place to allow the growth of bottom-up solutions.

The Assembly also underlined the need for public bodies to take a leadership role by climate-proofing their own facilities, reducing energy use and applying low-carbon solutions to their services. In addition, risk assessments of critical infrastructure were seen as essential to increase the state's resilience to adverse climate impacts. This Climate Adaptation Strategy is cognisant of the role that KCC must play in increasing citizen awareness and participation in climate solutions and the unique position that local government holds in interacting with its citizens. The protection of critical infrastructure, facilitating bottom-up solutions and applying regulations, where possible, are at the centre of this plan and will be strengthened in future iterations.

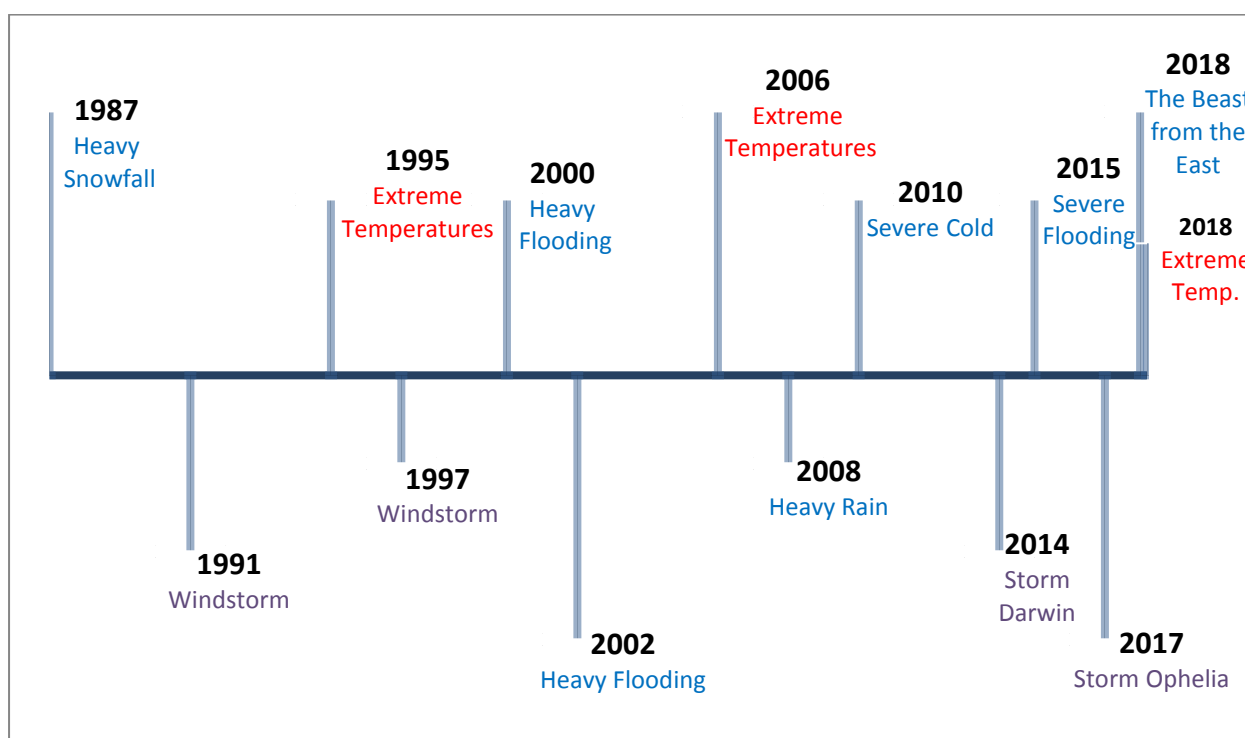
## 3.2 Adaptation Baseline

Kilkenny County Councils Environmental Department has produced this adaptation baseline in line with the guidelines contained in the *Local Authority Adaptation Strategy Development Guideline* and the *National Adaptation Framework*. This Climate Adaptation Strategy has been reviewed to the requirements of the *Local Authority Adaptation Strategy Development Guideline*. The objective of this baseline is to document the occurrence of past climatic events, their frequency, the specific areas of county Kilkenny that are most vulnerable and the risks associated with such events. This adaptation baseline also highlights the need for emergency planning to be continually updated in line with extreme weather events. From the adaptation baseline, we can assess the current and future risks that will affect county Kilkenny. These risks are assessed and addressed by putting actions in place to build a more resilient city and county that is robust, resourceful and is able to adapt in response to changes in climate and in times of crisis. A list of all actions, including adaptation actions, may be found in each of the action areas contained in this Climate Adaptation Strategy. This Climate Adaptation Strategy will be complemented by an annual action plan.

### 3.2.1 Baseline

Table 3.1 and table 3.2 below summarises the climatic events recorded by Met Éireann<sup>[8]</sup> that have occurred in Kilkenny over the last 31 years. These events were recorded due to their unique intensity and abnormal weather patterns. The effects of these major events are not purely economic; they also highlight social and environmental impacts and vulnerabilities, as further described in the following sections.

**Table 3.1 Major Climatic Events in Kilkenny Timeline**



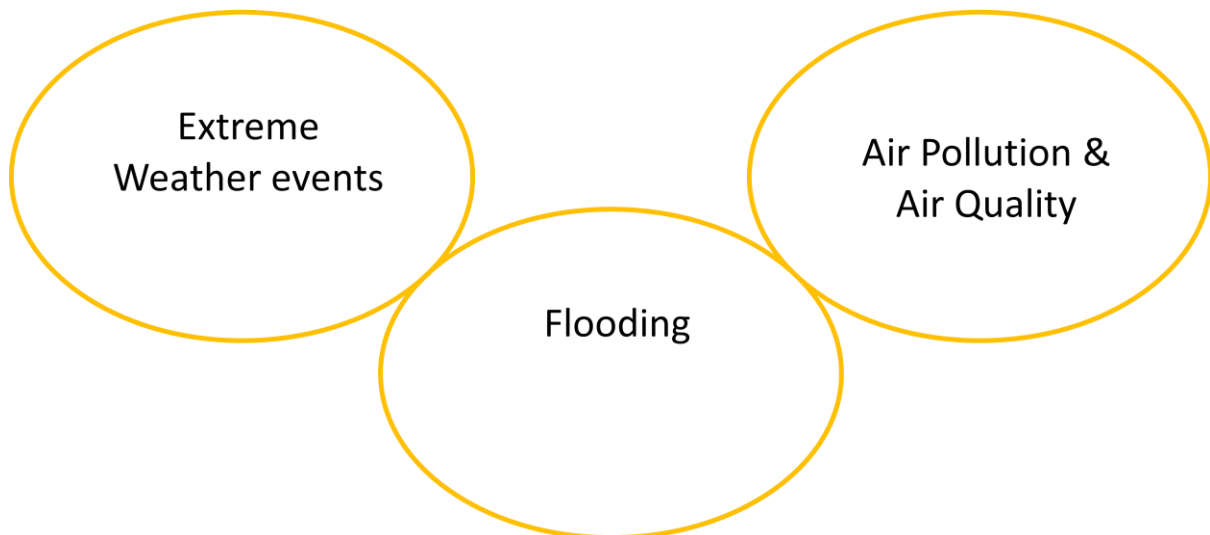
**Table 3.2: Major Climatic Events in Kilkenny**

| Event  | Timeline              | Description   |
|--|-----------------------|---|
| Extreme Temperatures                           | May – August 2018     | Warmest Kilkenny summer since 1975. Kilkenny experienced 58 days with temperatures above 20°C between May-July. Peak temperature of 30.3°C          |
| Snow/Extreme Cold<br>'The Beast from the East' | February – March 2018 | Status Yellow weather warning for Kilkenny. Low temperatures of -5.5°C recorded, coldest March in Kilkenny since 2010.                              |
| Storm Ophelia                                  | October 2017          | Gusts of 111km/h recorded. Status Red weather warning for Kilkenny, schools closed throughout the county.   |
| Severe Flooding                                | December 2015         | Severe flooding in towns and villages in Kilkenny with Graiguenamanagh one of the worst affected. Rainfall of 60.0mm recorded.                      |
| Storm Darwin                                   | February 2014         | Gusts of 126km/h recorded. Status Yellow warning for Kilkenny. Trees fallen along with structural damage to buildings.                              |
| Severe Cold                                    | Winter 2010           | Second lowest temp in the country recorded in Kilkenny at -16.4°C. Coldest winter on record since 1962/1963.  |
| Heavy Rain                                     | August 2008           | High rainfall throughout Kilkenny. Precipitation level highs of 42mm experienced in one day. Roads blocked due to flooding throughout the county.   |
| Extreme Temperatures                           | Summer 2006           | Warmest summer on record since 1995 in Kilkenny. Average July temperature of 23°C in Kilkenny.  |
| Heavy Flooding                                 | November 2002         | Severe flooding in towns throughout Kilkenny due to heavy rainfall in the days preceding the event.   |
| Heavy Flooding                                 | November 2000         | Heavy flooding experienced, particularly in South Kilkenny causing mudslides. Precipitation levels of 80.1mm recorded in one day.                   |
| Windstorm                                      | December 1997         | Gusts of 87km/h recorded in Kilkenny, highest wind speeds in 40 years for the county.   |
| Extensive Flooding                             | November 1997         | Heavy rainfall caused countywide flooding which claimed the life of a woman outside Freshford.  |
| Extreme Temperatures                           | Summer 1995           | Warmest summer on record with temperatures of greater than 25°C experienced for 27 days. Highest temp of the summer recorded in Kilkenny at 30.8°C. |
| Windstorm                                      | January 1991          | High winds of 118km/h recorded in Kilkenny  |
| Heavy Snowfall                                 | January 1987          | Snow depths of 100mm noted in Kilkenny. The county experienced 11 days without sunshine.  |

**Risks may be categorised as:**

1. Economic loss, which includes damage to infrastructure and the disruption of daily activities.
2. Social loss, including damage to human life, health, community and social facilities
3. Environmental and heritage loss, which takes into consideration the sensitivity of the environment (the natural, cultural and historical environment), habitats and species. Risks in areas adjacent to major rivers are exacerbated, which means we need to assess the impacts of not only extreme weather and climatic events, but also climatic trends, such as sea level rise and increasing temperatures. These events and trends should not be considered as independent, as they influence each other. The slow, gradual increase in temperatures and sea level rise will contribute to the increased frequency and intensity of extreme weather events and flooding. Table 3.3 on the following page shows a 30-year overview of different climate variables (cold snaps, heat waves, storm surges, coastal erosion, etc.), which are grouped into three types of events and trends (extreme weather events, sea level rise and flooding). This table summarises the current effects of climate change variables and their projected changes.

Climate Events and Trends Kilkenny  
Council are Facing





**Table 3.3: Climate Variables Projection – 30 Year Overview**

| Climatic Events & Trends | Parameter        | Observed   | Confidence | Projected Changes   |
|--------------------------|------------------|--|------------|---|
| Extreme Weather Events   | Cold Snaps       | Increasing average air temperatures may result in a decrease in the frequency of cold snaps.   | Medium     | Projections for 2050 indicate an increase in mean annual temperature, in the range of 1-1.6°C. This will result in milder temperatures and a decrease in the frequency of cold snaps.   |
|                          | Heat Waves       | Average air temperatures are increasing and may result in an increase in the frequency and intensity of heat waves.                    | High       | Eight heat waves have been recorded in Ireland over the last 30 years (more than 5 days exceeding 25°C). Projected mean annual temperature increases for 2050 predict temperature and heat wave duration intensification.             |
|                          | Dry Spells       | Precipitation is becoming more seasonal and is likely to cause drier periods in summertime.  | High       | Ireland as a whole will experience drier summers, with a decrease of up to 20% in summer precipitation under a high emission scenario. This will result in longer periods without rainfall which will affect water-sensitive regions. |
|                          | Extreme Rainfall | The number of days with rainfall greater than 0.2mm and 10mm has been gradually increasing   | Medium     | The frequency of extreme rainfall is expected to keep on increasing over the years, especially in the autumn and winter seasons.  |
|                          | Wind Speeds      | Wind speeds are increasing slightly in the winter periods and decreasing over the summertime.  | Low        | Long term trends cannot be determined accurately; although it is anticipated that wind speed will change in a minor way, the frequency of wind storms is expected to increase in the winter periods and decrease in summer.           |
| Flooding                 | Fluvial          | Increased rainfall intensity, high river flows and high tides contribute to an increase in fluvial flooding.                           | High       | Projections show both high tides and the intensity of rainfall days are increasing which, in turn, will result in an increase in fluvial flooding.  |
|                          | Pluvial          | Increased rainfall intensity will likely lead to an increase in pluvial flooding.  | Medium     | It is predicted that the probability of flood events occurring will increase and the number of heavy rainfall days per year is also projected to increase, resulting in a greater risk of pluvial flooding.                           |
|                          | Ground water     | High tides and the increase in intensity of rainfall are causing groundwater levels in tidal and inland areas to flood more frequently | Medium     | It has been projected that high tides will increase as sea levels rise, as will the intensity of rainfall. Both factors will lead to an increase in groundwater flooding.   |

# CASE STUDY

## **Flooding in Graiguenamanagh December 2015**



- Water 3ft high in areas
- SuperValu closed first day in 30 years
- 4" of rain in 6 days
- Up to 88 local businesses affected

## **Storm Ophelia October 2017**



- Clean-up cost Council €317,000
- Two cows electrocuted in Aghlish
- Power outage for 32,000 premises
- 500 homes without water after 2 days
- Rare trees felled in Woodstock Gardens

## **Extreme High Temperatures Summer 2018**



- Driest Kilkenny summer since 1995
- Temperature of 30.3°C recorded
- County hosepipe ban for 4 months
- Hospitalisation high for sunstroke
- Fodder crisis experienced by farmers

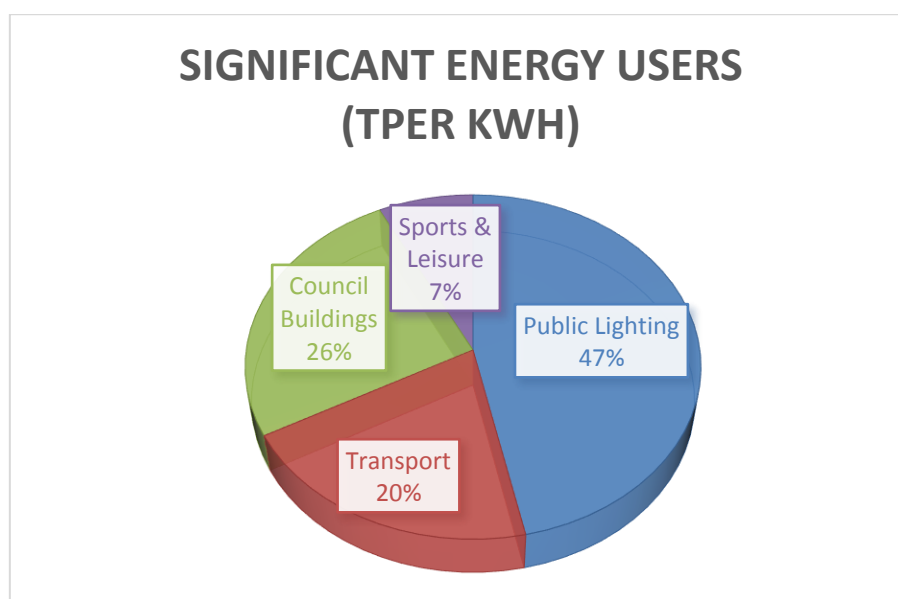
# 3.3 Mitigation Baseline

## 3.3.1 Kilkenny County Council's Energy Use & Emissions

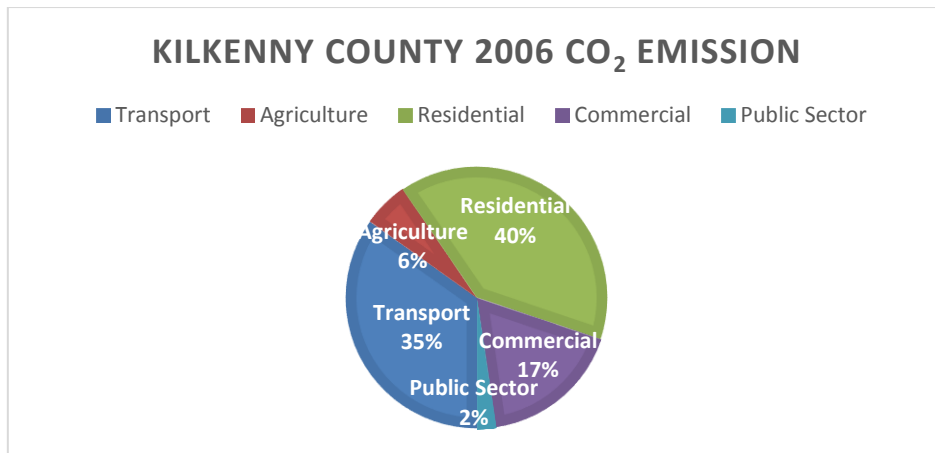
Kilkenny County Council is responsible for the energy use and emissions from its buildings and facilities, its public lighting, and also from its vehicle fleet. The information from the Sustainable Energy Authority of Ireland's (SEAI) Monitoring and Reporting (M&R) database<sup>[1]</sup> shows that KCC consumed a total of 24 gigawatt hours (GWh) of primary energy in 2017. The energy database also shows that KCC improved its energy performance by 27% between the baseline year 2009 and 2017 which represented a cumulative absolute saving of 6 GWh of primary energy during the same period.

This highlights a gap-to-target of 6%, meaning that KCC must improve its energy performance by a further 6% between now and 2020 in order to meet its 33% energy reduction target.

The Council's public lighting is the highest energy consumer, accounting for 47% of the council's overall primary energy consumption. This is mainly due to the large number of public lights owned and operated by the council. The council's buildings and facilities are the second highest energy consumer, accounting for 33% of the total energy consumption, while the municipal fleet accounts for 20% of the total energy use, the total primary energy requirement (TPER) for all of which can be seen in the graph below.



The most accurate information for total emissions in Kilkenny County is based on Census 2006<sup>[9]</sup> data. Using this data, KCC was able to calculate that the total emissions for the Kilkenny area amounted to 565,730 tonnes of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) in 2006. The sectors that produced the most emissions were the residential, commercial and transport sectors, accounting for 40%, 17%, and 35% of the total emissions, respectively. The public sector accounted for 2% of the county's total CO<sub>2</sub> emissions. This highlights the need for collaboration and action from all stakeholders to tackle the remaining 98% of emissions in the county that are accounted for the private sector.



To calculate County Kilkenny’s total final consumption and CO<sub>2</sub> emissions for the Covenant of Mayors Sustainable Energy Action Plan (SEAP), 2006 was chosen as the baseline year. This year was selected due to the availability of reliable CSO Census of Population data. Data was collated under various headings as follows; residential, public sector, transport, commercial and industry. This SEAP has been developed using the data from the 2006 CSO Census of Population, together with energy data produced by the Sustainable Energy Authority of Ireland 2006 and Environmental Protection Agency (EPA).

#### **Residential**

The methodology used for residential dwellings was to measure the Building Energy Ratings (BERs) published on the SEAI portal<sup>[1]</sup>. County Kilkenny had a total of 10,451 BERs publishable for use in this SEAP. The energy performance is expressed as: (a) Primary energy use per unit floor area per year (kWh/m<sup>2</sup>/yr) represented on an A to G scale; and (b) Associated CO<sub>2</sub> emissions in kgCO<sub>2</sub>/m<sup>2</sup>/yr. The BER data was then presented in the rating per dwelling under the category of Detached, Semi-Detached, Terraced and Apartment dwellings.

#### **Public Sector**

The methodology used for the calculation of Public Sector - Total Primary Energy Consumption and CO<sub>2</sub> Emissions, was measured from 2009-2013 SEAI Energy MAP reporting of Kilkenny’s public sector and was compared to the national public sector obtained from SEAI.

#### **Transport**

The national primary energy and CO<sub>2</sub> emissions in the transport sector were obtained from SEAI. From the data, revised results are calculated by omitting the aviation industry and fuel tourism, as well as rail and public passenger services (which are included in the public sector). Calculation for Kilkenny’s primary energy consumption and CO<sub>2</sub> emission was based on the average percentage of vehicles of different categories in Kilkenny and the State, obtained from the CSO Census 2006.

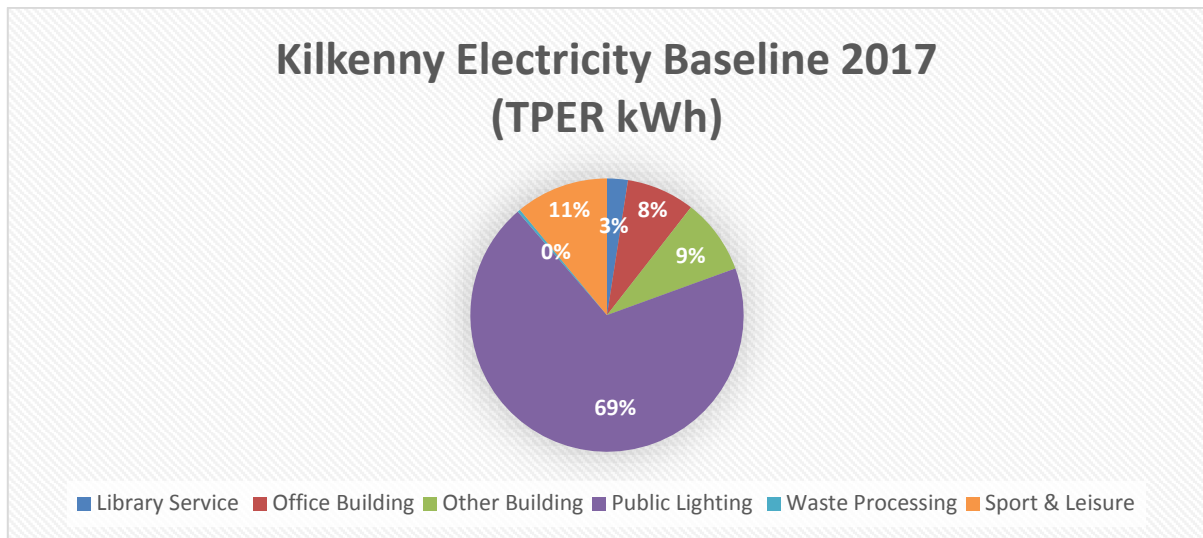
#### **Commercial and Industrial**

The methodology used in calculating the baseline energy and corresponding CO<sub>2</sub> data for the Commercial and Industrial Sector was consistent with that used for the previous sectors, i.e. the national figures (obtained from SEAI) were apportioned based on the population of the County.

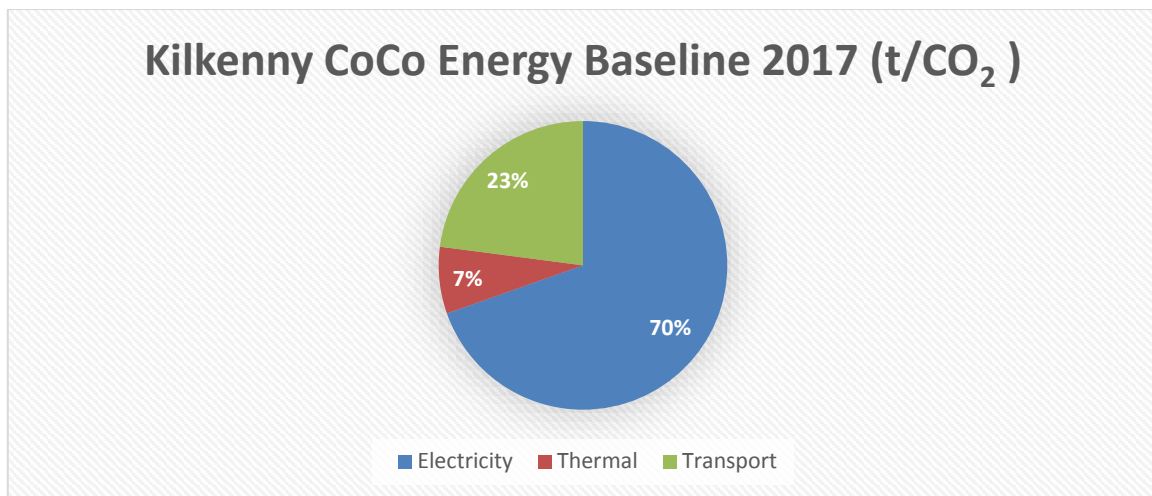
#### **Agriculture**

The methodology used for the agriculture sector, was based on the estimation of total primary energy consumption and the corresponding CO<sub>2</sub> emissions. The area of farmland in Kilkenny was measured against the national farmland area and was expressed as a percentage, based on the data provided by CSO Census 2011. This same percentage figure was used to calculate Kilkenny’s primary energy consumption in the agriculture sector, by multiplying it by the national primary energy consumption figure for agriculture, obtained from the SEAI.

In 2017 public lighting consumed 69% of the council’s total electricity usage. The remaining 31% of total primary electricity use is made up of the other council operations such as Library Service, Fire Service, Corporate Buildings, Roads and Transport Depots, Environment and Sports and Leisure.



In 2017 Kilkenny County Council produced 5,117 tonnes of CO<sub>2</sub>. The majority of the CO<sub>2</sub> emissions for the council’s operations were associated with electricity usage at 70%, while the councils transport section was the second highest at 23% with the remaining thermal use associated with the heating of council buildings.



| KCCs Emissions Overview  | KCC’s Emissions by Category   |   |  |  |
|--|---|---|--|--|
| <p>Total emissions produced by KCC in 2017:</p> <p style="font-size: 24pt; font-weight: bold; color: #0070c0;">5,117</p> <p>tonnes of CO<sub>2</sub></p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center; vertical-align: top;"> <p><b>Buildings &amp; Facilities</b></p> <p>33%</p> </td> <td style="width: 33%; text-align: center; vertical-align: top;"> <p><b>Public Lighting</b></p> <p>47%</p> </td> <td style="width: 33%; text-align: center; vertical-align: top;"> <p><b>Municipal Fleet</b></p> <p>20%</p> </td> </tr> </table> | <p><b>Buildings &amp; Facilities</b></p> <p>33%</p> | <p><b>Public Lighting</b></p> <p>47%</p> | <p><b>Municipal Fleet</b></p> <p>20%</p> |
| <p><b>Buildings &amp; Facilities</b></p> <p>33%</p>  | <p><b>Public Lighting</b></p> <p>47%</p>  | <p><b>Municipal Fleet</b></p> <p>20%</p>            |  |  |

**Chapter 4**  
**Climate Risk Identification**



## 4.1 Climate Risk Identification

Severe weather events impact infrastructure, homes, communities and the delivery of services to the detriment of County Kilkenny. Recently, Kilkenny has experienced an increase in extreme weather events, and this is evident from the Timeline of Major Climatic Events (Table 3.1). While we cannot attribute climate change to all these events, they are the most evident consequence of climate change. Their effects are in the form of prolonged periods of extreme cold or heat, which cause snow and heatwaves, hurricane gusts due to violent winds, and heavy rainfall resulting in flooding. Globally, temperatures are increasing and are expected to continue increasing during summer with extreme cold spells in the winter months. Meanwhile, average precipitation is expected to decrease during the summer and autumn period, with extreme rainfalls becoming more common in the winter time. The frequency of extreme wind conditions, particularly during the winter, is also expected to increase.



### 4.1.1 Sea Level Rise

There has been a large rise in sea levels around Ireland in recent decades, and the trend is going to accelerate over the next century. This will test the state's ability to withstand "almost perfect storms", according to climate change expert Dr. Margaret Desmond<sup>[10]</sup>. Since the early 1990s, sea level rises of about 35mm per decade have been observed around the Irish coast which is attributable to climate change, concludes an EPA report<sup>[2]</sup> co-ordinated by Dr. Desmond, who is based at UCC environmental research institute. Whilst Kilkenny is an inland county, it is not free from the effects from the sea levels rising. The tidal limits extend to Carrick-on-Suir on the Suir River, Saint Mullins on the Barrow, and Inistioge on the Nore. It is also important to understand the other elements which, when combined with rising sea levels can contribute to flooding.



Photo Source: Newstalk

### 4.1.2 Heatwave

A heatwave is defined as a period of 5 consecutive days with temperatures exceeding the average maximum by 5°C. With the average summer temperature in Ireland being 19.6°C, a heatwave on the island is therefore 5 consecutive days above 24.6°C. Heatwaves are natural occurrences around the globe; however, they are rarely experienced in Ireland due to its location so far north of the equator. In the previous five years, Ireland has experienced two heatwaves, July-August 2013 and June-August 2018. The 2018 heatwave resulted in extreme drought conditions countrywide and was the hottest Irish summer since 1975, 43 years previous. It is predicted through climate models that global warming will result in heatwaves becoming more common in Ireland and throughout the northern hemisphere as global temperatures steadily rise and summertime precipitation decreases.



Photo Source: Agriland.ie

### 4.1.3 Flooding

Flooding can have multiple causes, including sea level rise, run-off water, heavy rainfall, extreme events, storms and tidal surges. Kilkenny County experiences several types of flooding, including:

- **Fluvial flooding** is caused by rainfall (extended or extreme), resulting in rivers exceeding their capacity;
- **Tidal flooding** resulting from storm surges and extreme weather events that cause sea levels to rise above the norm and force sea water and tidal rivers to flood onto land;
- **Network flooding** resulting from urban drainage systems being inundated with water and exceeding their capacity;
- **Pluvial flooding** from intense and sudden rainfall running over-ground and exceeding capacity of local drainage systems is a key risk across the whole city;



- **Groundwater flooding** results when groundwater rises up from an underlying water table and can flood surface and subsurface infrastructure; occurs during sustained rainfall events and affects low lying areas of the city.

The extent of flood damage due to rivers may also be seen below, which depicts the potential risk from the River Barrow and River Nore on the towns of Graiguenamanagh and Thomastown respectively. This shows even just one river flooding would impact on a large population and would cause significant damage to the surrounding area.



Figure 1: River Flood Extents for Graiguenamanagh & Thomastown (Source: Floodinfo.ie)

#### 4.1.4 Future Risks

Met Éireann predicts that Ireland as a whole will experience wetter and milder winters, with a 10-15% increase in rainfall, and drier summers.

**“Projections suggest average temperatures will continue to increase, with warming across all seasons. A warming climate may cause stresses to vulnerable populations, such as children and the elderly. This can also affect water quality and may cause pollutant contamination to surface water that may be attributed to a decrease in water flows during the warming summer and autumn months. Areas to the east are expected to see the strongest increase over the coming decades.” – Met Éireann**

Precipitation projections indicate an increase of up to 20% in heavy rainfalls during the winter and autumn seasons<sup>[3]</sup>. Although no long-term wind speed trend can be accurately determined, it has been projected that extreme wind speeds will increase during the winter periods. This would greatly affect critical infrastructure such as communication and transportation, which may be disrupted by the violent winds. Also, this increase in extreme wind events, coupled with sea level rise and coastal storms, may lead to increased wave heights and could result in habitat loss and damage, due to coastal and soil erosion.

### 4.1.5 Extreme Weather

The aim of compiling extreme weather adaptation actions is to reduce the effects of these events. Some of the actions that have been adopted by Kilkenny Council include:

- Communication at national and local level with the general public, promoting appropriate behaviour and actions to be taken to limit impacts during extreme weather event;
- Emergency planning strategies, continually aligned with extreme weather events;
- Monitoring and forecasting of extreme weather events, which include accurate and timely weather-related alerts, real-time time surveillance, evaluating and monitoring.



#### Future Risk = Consequence x Likelihood

The consequence of the future risk (the level of damage caused by a climatic event or trend) range from critical to negligible consequences.

The likelihood is the probability of these future risks occurring. Probability can range from almost certain to rare.

Both the consequence and likelihood are given ratings from one to five which can be multiplied to get their future risk, high, medium or low.

| Consequence |   |
|-------------|---|
| Critical    | 5 |
| Major       | 4 |
| Moderate    | 3 |
| Minor       | 2 |
| Negligible  | 1 |

x

| Likelihood     |   |
|----------------|---|
| Almost Certain | 5 |
| Likely         | 4 |
| Possible       | 3 |
| Unlikely       | 2 |
| Rare           | 1 |

=

| Future Risk |         |
|-------------|---------|
| High Risk   | [15-25] |
| Medium Risk | [7-14]  |
| Low Risk    | [1-6]   |

**Table 4.1: Extreme Weather Events Risk Matrix**

| Impact Areas                                    | Description  | Parameter        | Consequence | Likelihood | Future Risk |
|---|--|------------------|-------------|------------|-------------|
| Critical Infrastructure & the Built Environment | Projected increase in temperature, wind speeds, cold snaps and rainfall will put stress on the built environment, particularly on critical infrastructure (e.g. electricity and communication networks) and residential developments (with the most vulnerable populations being particularly at risk) | Cold snaps       | 4           | 3          | 12          |
|   |  | Heat waves       | 2           | 4          | 8           |
|   |  | Dry Spells       | 3           | 5          | 15          |
|   |  | Extreme Rainfall | 4           | 3          | 12          |
|   |  | Wind Speeds      | 5           | 2          | 10          |
| Water Resources                                 | Projected increases in temperature, cold snaps and rainfall will affect flows and quality of water resources. Temperature increases and dry spells will result in a reduction of water resource availability, whilst cold snaps can cause disruption of water services                                 | Cold snaps       | 5           | 3          | 15          |
|   |  | Heat waves       | 4           | 4          | 16          |
|   |  | Dry Spells       | 5           | 5          | 25          |
|   |  | Extreme Rainfall | 5           | 3          | 15          |
|   |  | Wind Speeds      | 1           | 2          | 2           |
| Waste Management                                | Projected increases in temperature, heat waves and droughts may increase the risk of fires and can increase the prevalence of vermin and odour   | Cold snaps       | 2           | 3          | 6           |
|   |  | Heat waves       | 4           | 4          | 16          |
|   |  | Dry Spells       | 4           | 5          | 20          |
|   |  | Extreme Rainfall | 5           | 3          | 15          |
|   |  | Wind Speeds      | 1           | 2          | 2           |
| Transport                                       | Increase in wind speeds, cold snaps and rainfall will put stress on transport networks which may lead to disruption of transport services during extreme events  | Cold snaps       | 5           | 3          | 15          |
|   |  | Heat waves       | 2           | 4          | 8           |
|   |  | Dry Spells       | 2           | 5          | 10          |
|   |  | Extreme Rainfall | 3           | 3          | 9           |
|   |  | Wind Speeds      | 4           | 2          | 8           |
| Biodiversity                                    | Projected increases in temperature, wind speeds, cold snaps and rainfall will put an increased stress on biodiversity, by causing damage, habitat loss and increasing the prevalence of invasive species   | Cold snaps       | 5           | 3          | 15          |
|   |  | Heat waves       | 4           | 4          | 16          |
|   |  | Dry Spells       | 4           | 5          | 20          |
|   |  | Extreme Rainfall | 3           | 3          | 9           |
|   |  | Wind Speeds      | 3           | 2          | 6           |

**Table 4.2: Flooding Risk Matrix**

| Impact Areas                                    | Description   | Parameter   | Consequence | Likelihood | Future Risk |
|---|---|-------------|-------------|------------|-------------|
| Critical Infrastructure & the Built Environment | Coastal, fluvial, pluvial and groundwater flooding will put stress and risk on the built environment. This additional risk will cause all areas in the built environment to suffer (businesses, residential etc.) | Tidal       | 5           | 5          | 15          |
|   |   | Fluvial     | 5           | 5          | 25          |
|   |   | Pluvial     | 4           | 4          | 16          |
|   |   | Groundwater | 4           | 3          | 12          |
| Water Resources                                 | Increases in flooding incidents put more pressure on water systems which are typically located at the lowest elevation possible and are therefore at a greater risk of flooding                                   | Tidal       | 5           | 5          | 8           |
|   |   | Fluvial     | 4           | 5          | 20          |
|   |   | Pluvial     | 4           | 4          | 16          |
|   |   | Groundwater | 5           | 3          | 15          |
| Waste Management                                | Flooding of sites increases the risk of surface and groundwater contamination   | Tidal       | 4           | 5          | 4           |
|   |   | Fluvial     | 3           | 5          | 15          |
|   |   | Pluvial     | 4           | 4          | 16          |
|   |   | Groundwater | 5           | 3          | 15          |
| Transport                                       | Increases in coastal, fluvial and pluvial flooding will cause road damage which can lead to transport service disruption  | Tidal       | 5           | 5          | 4           |
|   |   | Fluvial     | 5           | 5          | 25          |
|   |   | Pluvial     | 4           | 4          | 16          |
|   |   | Groundwater | 4           | 3          | 12          |
| Biodiversity                                    | Flood events can cause loss of habitats and damage to ecosystems  | Tidal       | 4           | 5          | 4           |
|   |   | Fluvial     | 3           | 5          | 15          |
|   |   | Pluvial     | 2           | 4          | 8           |
|   |   | Groundwater | 2           | 3          | 6           |

**Chapter 5**  
**Adaptation Goals, Objectives &**  
**Actions**

# Energy & Buildings

## Overview

## Target

25 GWh

Consumed in 2017

=

5,117

Tonnes of CO<sub>2</sub>



50%

Improvement  
in energy  
efficiency by  
2030

40%

Reduction in  
Council's  
Greenhouse Gas  
emissions by 2030

## Examples of main action types

Energy Master Plan for the Kilkenny  
Region



Public lighting upgrades

Energy upgrades in Council  
buildings



Social housing retrofits

Home Energy Saving Kits in all KCC  
libraries



Research and innovation

## Stakeholders to work in partnership and co-create solutions

Agricultural/Private Businesses



SEAI/DCCA

Private Citizens/Communities

Energy Suppliers

Government Departments  
(DCCA)

Developers

# 5.1 Energy & Buildings

In 2017, Kilkenny County Council's buildings and public lighting consumed 25GWh of primary energy, which amounted to 5,117 tonnes of CO<sub>2</sub>. The actions outlined in this section show how, through better energy planning using energy mapping, improvements in building energy efficiency, the use of renewables, and increased innovation, KCC will reduce the emissions from its operations and service delivery. As KCC is not responsible for the upgrading of private buildings in Kilkenny, it will provide information on how KCC has retrofitted social housing and council-owned building stock, and how it has deployed renewable energy systems, in an effort to encourage the private sector to follow suit.

KCC is also helping citizens to become more aware of their energy use by making Home Energy Saving Kits available through all of its public libraries.

A number of key objectives have been identified that will frame the compilation of the adaptation actions:

- To reduce energy related CO<sub>2</sub> emissions of Kilkenny County Council
- To explore improvements in energy efficiency and help identify value for money in energy spending across the council
- To support the increase of renewable energy produced in council operations
- To support the reduction of energy imported by the County
- To progress Kilkenny County Council's own energy efficiency and renewable energy projects/programmes and continue to communicate these experiences to inform best practice across all sectors
- To support the improvement of quality of life and thermal comfort for residents in social houses to help reduce the risk of fuel poverty
- To increase the awareness and understanding amongst stakeholders and the general public of the objectives of Kilkenny County Council's Adaptation Plan

## 5.1.1 Kilkenny County Council Monitoring & Reporting

Under S.I. No. 426 of 2014, Kilkenny County Council has an obligation to report annually on their energy performance. The Public Sector in Ireland is tasked with reducing their energy consumption by 50% by 2030 from their baseline year. The 50% target was set against the then estimated baseline energy usage (c. 10,000 GWh) and spend (€600m) in 2009. A public body can select its preferred baseline from a choice of three periods (2001-2005 or 2006-2008 or 2009). The 50% savings target is applied to whichever baseline period is selected by the public body. Kilkenny County Council choose the 2009 baseline as the energy information available from 2009 was deemed the most robust for reporting purposes from the three time periods available.

Kilkenny County Council reports their energy usage annually to the SEAI which manages the reporting process on behalf of the Department of Communications, Climate Action and Environment (DCCAE). This annual reporting entails compiling full data of their previous year's energy consumption and the SEAI prepare a report on energy efficiency in the public sector to DCCAE annually. This report entitled "Annual Report 2018 on Public Sector Energy Efficiency Performance" details the entire energy performance of the public sector. Based on the 2018 report<sup>[11]</sup>, Kilkenny County Council is currently at 27%. As a result of this, the council is currently more efficient than the baseline year and is on track to reach the 2020 targets.

The energy consumption across the local authority and water services sectors accounts for 23% of all public Sector energy use. The local authorities and water services sector as a group is currently at

28% of its target and it is envisaged that further developments towards energy efficient street lighting projects, such as the pilot project developed in Kilkenny will help the group to achieve their targets.

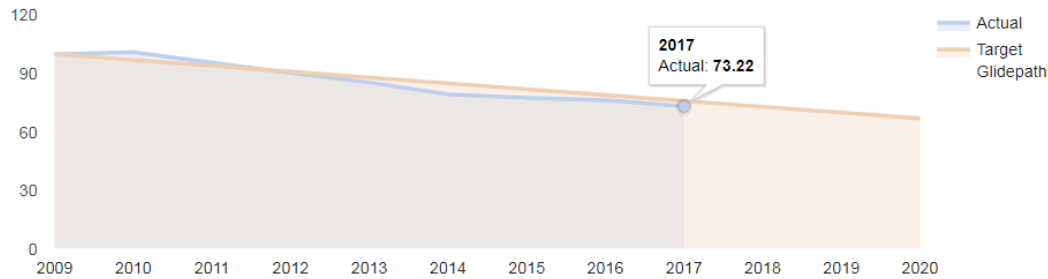


Figure 2: Kilkenny County Council's 2017 Monitoring & Reporting Results

In order for Kilkenny County Council to achieve their 33% energy reduction obligation, the Council has identified a number of energy efficiency areas to meet the target by 2020. The Gap-to-Target tool identifies five key areas where Kilkenny County Council can reduce their energy consumption and meet the 2020 target. These areas are public lighting, electricity efficiency in buildings, thermal efficiency, transport and renewable energy. Kilkenny County Council will revise the energy efficiency investment strategy in 2019 to develop these projects further.

### Case Study – Kilkenny Streetlight BEC pilot project 2017

Kilkenny County Council undertook a street lighting project between June to October 2017 which saw 1,300 street lights around Kilkenny upgraded to LED lighting, one of the largest street lighting retrofit projects ever undertaken in Ireland.

The change to LED street lighting has multiple benefits, including reducing the number and severity of road accidents, reduces street crime, reduces carbon emissions and reduces maintenance costs as LEDs have a lifetime of 20 years.

The total cost of the project was €592,000 with grant assistance of €195,000 coming from the SEAI. Electricity savings for KCC are expected to be €100,000 per annum, resulting in a 5-year payback with 30% SEAI aid.



Dublin Road, Kilkenny



|                                   | Annual Energy (kWh)  | Annual Cost (€)       | Annual CO <sub>2</sub> (kg) |
|-----------------------------------|----------------------|-----------------------|-----------------------------|
| <b>Before project</b>             | 1,091,873            | €148,713              | 580,876                     |
| <b>After project</b>              | 346,300              | €47,166               | 184,232                     |
| <b>Savings (% in parentheses)</b> | 745,543 (68% saving) | €101,547 (68% saving) | 396,645 (68% saving)        |

In April 2014 Kilkenny County Council became city partners with 3 Counties Energy Agency (3cea), who acted as facilitator in the Intelligent Energy Europe Streetlight EPC project. The aim of the project was to create the demand and supply for Energy Performance Contracts (EPC) for street lighting in Ireland and across Europe. As part of this, real life EPC projects were identified and carried out. Kilkenny County Council and 3cea identified a large project consisting mainly of the declassified road network in Kilkenny and other areas of the city and county with inefficient lighting. There are in excess of 10,000 streetlights owned and operated by Kilkenny County Council. The pilot project identified the retrofit of 1,300 or 13% of the street lighting stock of Kilkenny County Council.



Clara, Co. Kilkenny

### Case Study – Living City Initiative 2015-2020

The Living City Initiative is a scheme of property tax incentives designed to regenerate buildings in the Special Regeneration Area (SRA) of Kilkenny City. It is concerned with conversion and refurbishment of residential and commercial buildings within the SRA of Kilkenny City. Tax relief is available to owner-occupiers of owned/rented residential and commercial properties within the SRA for the construction, reconstruction, repair or renewal of buildings constructed before 1915 in an effort to regenerate the city centre while simultaneously improving the energy efficiency of buildings through the deep retrofitting of heating and lighting facilities.

It is hoped this will recognise the embodied energy within historic buildings in Kilkenny, assess their potential carbon emissions and promote the use of low energy building materials.

## Case Study – Castlecomer Library Heating Upgrade

An LED lighting retrofit was carried out on Castlecomer Library through the BEC 2015 programme in an effort to reduce the large electricity demand for heating the building.

The project saw the installation of two 10kW cassette units for heating linked to outdoor and indoor temperature sensors on a 7-day schedule.

The total project cost €15,110 with grant aid from SEAI worth €4,533 assisting in the retrofit. Savings over a 25-year period are estimated to be €30,600, reducing the cost spent annually on electricity while resulting in a warmer and more comfortable library.



|                               | Annual Energy (kWh) | Annual Cost (€) | Annual CO <sub>2</sub> (tonnes) |
|-------------------------------|---------------------|-----------------|---------------------------------|
| <b>Imports before project</b> | 24,974              | €3,746.10       | 10.2                            |
| <b>Imports after project</b>  | 16,814              | €2,522.10       | 6.9                             |
| <b>Savings</b>                | 8,160               | €1,224.00       | 3.3                             |

## 5.1.2 Energy & Buildings Actions

**Timeframe** defined as Short term 1-3 years, Medium term 4-5 years, Long term 5+ years

|                          | Action  | Lead Dept(s)                    | Timeframe |
|--------------------------|---|---------------------------------|-----------|
| <b>Energy Planning</b>   |   |                                 |           |
| 1*                       | Create climate adaptation and energy master plan for Kilkenny   | 3cea & KCC                      | Medium    |
| 2                        | Integrate climate adaptation and energy actions in the new <i>Kilkenny City &amp; County Development Plan 2020-2026</i>   | Planning & 3cea                 | Short     |
| 3                        | Continued support and lead applicant for the SEAI Better Energy Communities   | 3cea & Multi-departmental       | Short     |
| 4*                       | Communicate and adhere to statutory requirements relating to the architectural interests of historic buildings and impacts of service upgrades, when assessing for suitable solutions to increasing energy performance of a building          | Energy, Conservation & Planning | Medium    |
| 5*                       | Undertake Energy Audit of Historic structures in the ownership of the Local Authority, providing a common template for audit or assessment of works   | 3cea                            | Long      |
| 6                        | Develop policy in the City & County Development Plan to promote local materials and use of sustainable, low carbon footprint materials instead of those that require intense high temperature and carbon emissions                            | Planning                        | Medium    |
| 7                        | Develop policy in the City & County Development Plan to promote and advise for the use of environmentally friendly material and appropriately designed new buildings, which utilise orientation, shelter, sun, light, etc. in design details. | Planning                        | Medium    |
| 8*                       | Encourage further research and pilot schemes for the deep retrofit of historic properties while assessing whole life durability of products and embodied energy of historic buildings.  | Planning                        | Long      |
| <b>Energy Management</b> |   |                                 |           |
| 9                        | Undertake feasibility study and gap analysis of development of ISO 50001 compliant energy management system   | 3cea & Transportation           | Short     |
| 10                       | Annual Monitoring & Reporting to SEAI on energy and carbon use.   | 3cea & Energy Office            | Short     |

|   |   |   |        |
|---|---|---|--------|
| <b>11</b>                                 | Publish Climate Action and Energy Review annually   | 3cea & Energy Office  | Short  |
| <b>Energy Efficiency &amp; Renewables</b> |   |   |        |
| <b>12</b>                                 | Reduce the need for "Grey adaptation" measures, for example, identifying sites for trialling renewable energy projects  | 3cea & Energy Team  | Short  |
| <b>13*</b>                                | Produce a Climate Adaptation and Energy efficiency plan for all council owned and operated buildings (e.g. Fire, Library, Sports, Roads and Transport and Corporate Buildings)                      | Energy Office & Facilities Office                             | Short  |
| <b>14</b>                                 | Develop a Public Lighting Upgrade Plan  | Roads & Transport   | Short  |
| <b>15*</b>                                | Complete feasibility study on district heating systems for Urban Regeneration projects  | Multi-departmental  | Medium |
| <b>16*</b>                                | Investigate rolling out the installation of PV panels on all Kilkenny County Council buildings  | 3cea & Energy Office  | Short  |
| <b>17</b>                                 | Investigate potential for BioEnergy projects in Dunmore Civic Amenity Site  | Environment   | Short  |
| <b>18*</b>                                | Establish a carbon saving register  | Energy & Environment  | Medium |
| <b>19*</b>                                | Encourage the development of anaerobic digestion and renewable gas infrastructure in County Kilkenny  | Multi-departmental  | Medium |
| <b>Research &amp; Innovation</b>          |   |   |        |
| <b>20</b>                                 | Work with CARO on research and project proposals for grant funding  | CARO  | Short  |
| <b>21</b>                                 | Work with third level institutes on climate adaptation research projects  | Multi-departmental  | Short  |
| <b>22</b>                                 | Develop research and funding opportunities for climate adaptation, renewable and energy efficiency projects   | Multi-departmental  | Short  |
| <b>Energy Awareness</b>                   |   |   |        |
| <b>23</b>                                 | Engage with students on climate change through CPD programme/ Engineers Week/Science Week   | Environment & Transportation                                  | Short  |
| <b>24</b>                                 | Provide citizens with energy awareness material in public buildings. Also providing the Home Energy Saving Kits in KCC's public libraries to help members improve energy efficiency in their homes. | Energy Office/<br>Library Service/<br>Environmental Awareness | Short  |
| <b>25*</b>                                | Provide County Council tenants with climate adaptation awareness materials at home, particularly at time of taking up new tenancy   | Housing   | Short  |

|            |   |          |        |
|------------|---|----------|--------|
| <b>26</b>  | Provide sufficient guidance to the Kilkenny City & County Development Plan (2020-2026) to ensure renewable energy projects, including projects for wind-, solar- and bio-energy can be progressed throughout the County without significant impacts on the landscape, amenity, heritage and the environment | Planning | Short  |
| <b>27*</b> | Organise Deep Retro fit training for staff in various sections of KCC   | Planning | Medium |
| <b>28</b>  | Noted objective under Climate Action Plan 2019 to establish a number of pilot 'climate action community engagement' offices in a number of Local Authorities  |          |        |

\* Action subject to funding approval

### **Relevant Plans/Legislation:**

- Building Regulations Part L;
- Climate Action and Low Carbon Act 2015;
- Kilkenny County Development Plan 2014-2020;
- Kilkenny City & Environs Development Plan 2014-2020;
- Kilkenny Sustainable Energy Action Plan 2016-2020;
- Energy Act 2016;
- Energy Efficiency Directive (Article 14);
- Irelands National Renewable Energy Action Plan;
- National Energy Efficiency Action Plan (NEEAP);
- S.I. No. 426/2014 – European Union (Energy Efficiency) Regulations;
- Support Scheme for Renewable Heat;
- S.I No. 46 of 2015 Climate Action and Low Carbon Development Act.

# Flood Resilience

## Overview

3 Main Rivers:  
Suir, Nore, Barrow

## Target



A climate-resilient Region

Reduction/Mitigation of flood risks in Kilkenny

4

Major flooding events in the last 20 years



## Examples of main action types

Liaise with OPW for building flood alleviation, defence or adaption schemes



Investigate sustainable urban drainage guidelines in council buildings

Coordinate emergency response plans



Flood awareness campaign with OPW

## Stakeholders to work in partnership and co-create solutions

Office of Public Works



Government Departments

General Public

Community Groups

Environmental Groups

LAWPRO

## 5.2 Flood resilience

**‘Kilkenny Local Authorities aim to provide a framework for the protection of the environment, including water quality, the avoidance of flood risk and the provision of a high quality telecommunications infrastructure’ – Kilkenny County Development Plan 2014-2020**

Flooding is a key climate change risk facing the Kilkenny region. Climate change increases the frequency and intensity of heavy rainfall events and storm surges, which increase the risk of pluvial and fluvial flooding in vulnerable areas across the city. Extreme rainfall and weather events can also place additional pressure on the urban drainage network and water supply, which can result in network flooding and water shortages. Together with the Office of Public Works (OPW) and neighbouring local authorities, KCC is actively working to implement projects and programmes that align with the EU Floods Directive and Water Framework Directive, which call for member states to undertake strategic flood risk assessments and to favour nature-based solutions such as integrated wetlands, green infrastructure, and Sustainable Urban Drainage Systems to be used for adaptation and mitigation responses to achieve flood resilience.

A number of key objectives have been identified that will frame the compilation of the adaptation actions:

- To mitigate the risk and impact of flooding;
- To provide and plan for effective drainage systems;
- To liaise and work with other bodies, agencies responsible for the management of water courses.

### 5.2.1 Flood Risk Management

In partnership with the OPW and neighbouring local authorities, KCC is working to adapt areas that are vulnerable to flooding by using comprehensive flood risk mapping. KCC is looking at measures that include natural and engineered solutions and has adopted a FAB Plus Strategy:

- **Flood** risk mitigation
- **Amenity** enhancement
- **Biodiversity** opportunity
- **Plus:** Carbon reduction/sequestration, waste reuse, potential for regeneration, recreational enhancement.

#### Case Study – Flood Relief Scheme

The OPW has announced a 10 year programme<sup>[12]</sup> to implement flood risk management measures in 118 towns across Ireland, 6 of which are in County Kilkenny. Ballyhale, Freshford, Graiguenamanagh, Inistioge, Piltown and Thomastown will see the implementation of flood relief schemes costing in the order of €1 billion to deliver nationally.

The Council is delighted that the above six schemes are proposed in the initial tranche of funding of this flood relief scheme. Kilkenny County Council will work closely with the OPW to ensure the remaining towns are featured early in this 10 year programme.

|                |                |
|----------------|----------------|
| Graigenamanagh | €9.06m         |
| Ballyhale      | €0.43m         |
| Freshford      | €3.8m          |
| Inistioge      | €1.49m         |
| Thomastown     | €12.67m        |
| Piltown        | €1.6.m         |
| <b>Total</b>   | <b>€29.05m</b> |

### 5.2.2 Flood Defence

While flood alleviation incorporating nature-based solutions is KCC’s preferred response, there are certain areas of the city and county that are not suited to soft solutions. Therefore, KCC is liaising with the OPW regarding building physical flood defences along the River Nore and Barrow to take into consideration increased risk from climate change. Additionally, KCC is actively researching alternatives to physical flood defences such as zoning policies to restrict further development in at-risk areas, along with the development of flood zones to accommodate flash floods.

#### Case Study – *The Nore Vision*

The Nore Vision is an initiative by Kilkenny LEADER Partnership (KLP) which aims to bring together organisations and members of the public with an interest in the River Nore and its catchment area to identify areas of interest and see how the River and hinterland could be developed<sup>[13]</sup>.

Flood management is a theme identified as a priority by almost all representatives and organisations who participated. It is hoped that sustainable flood mitigation measures could be developed by adopting a flood amelioration approach which would see anthropogenic defences and natural methods used to protect water meadows and floodplains. It is also hoped soft engineering can be used for flood management so the River is not a threat to those who live beside it.



Photo Source: Wikipedia.org



## Case Study – Callan Minor Works Flood Relief Scheme

The Callan Minor Works Flood Relief Scheme 2011-2012<sup>[14]</sup> comprises of flood defence walls, embankments and a pumping station for storm water that would otherwise accumulate behind defences at a total cost of €270,000.

The Scheme was devised in response to major flooding in the town in 2004 which saw the King's River to burst its banks and flood surrounding homes and businesses. The new defences protect 22 properties along the river.



The impacts of flooding can be devastating to communities, properties, business, infrastructure, cultural heritage and the natural environment. It is likely that climate change will have a considerable impact on flood risk in the future for Kilkenny, with projections indicating that the number of heavy rainfall days per year may increase, which could lead to an increase in flood risk across the city and county.

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

## 5.2.3 Flood Resilience Actions

**Timeframe** defined as Short term 1-3 years, Medium term 4-5 years, Long term 5+ years

| No.                          | Action  | Lead Dept(s)       | Timeframe |
|------------------------------|---|--------------------|-----------|
| <b>Flood Risk Management</b> |   |                    |           |
| 1                            | Continually update the Emergency Response Plan  | Multi-departmental | Short     |
| 2*                           | Explore the potential of working in partnership with OPW, with regard to Flood Awareness Campaigns  | Multi-departmental | Medium    |
| 3                            | Monitoring of flood forecasting and warning system  | Multi-departmental | Short     |
| 4*                           | Implement Sustainable Urban Drainage Guidelines in council buildings where feasible   | Multi-departmental | Medium    |
| 5                            | Liaise, collaborate and work in partnership with OPW, with regard to flood protection schemes   | Roads              | Medium    |
| 6*                           | Assess the potential of soft engineering methods in future flood defence schemes  | Multi-departmental | Medium    |
| 7*                           | Carry out yearly risk workshops to assess impacts on council services   | Multi-departmental | Short     |
| 8*                           | Investigate the feasibility of developing integrated constructed wetlands within Kilkenny   | Planning           | Short     |
| 9                            | Monitoring of flood, storm and climate change damage to historic structures in collaboration with National Monuments Services and other national & local agencies | Heritage           | Short     |

\* Action subject to funding approval

### **Relevant Plans/Legislation:**

- Catchment-Based Flood Risk Management Plans (CFRMP);
- Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study 2011-2016;
- Kilkenny County Development Plan 2014-2020;
- Kilkenny City & Environs Development Plan 2014-2020;
- EU Environmental Liability Directive 2004/35/EC;
- EU Floods Directive 2007/60/EC;
- National Landscape Strategy for Ireland 2015-2025;
- The 2<sup>nd</sup> Cycle River Basin Management Plan 2018-2021.

# Resource Management

## Overview

Reduce single use plastic  
in Council buildings

Reduce water waste  
from Council buildings



## Target



Increase recycling rate of  
managed waste by 2020

Reduce the direct disposal of  
unprocessed residual municipal  
waste to landfill

Reduction in waste generated by  
local authorities

## Examples of main action types

Running council staff recycling  
awareness campaign



Running anti-dumping and anti-litter  
campaigns for general public

Implementing water conservation  
campaign in civic buildings



Installation of solar compactor  
bins planned for the city

## Stakeholders to work in partnership and co-create solutions

General Public

Government  
Departments

Irish Water

Private Businesses & Service  
Providers



Southern Waste Region

Community Groups, Tidy Towns,  
IBAL

## 5.3 Resource Management

**‘The Waste Management Plan for the Southern Region is the framework for the prevention and management of wastes in a safe and sustainable manner. The scope of the waste plan is broad and ultimately it needs to provide policy direction, setting out what we want to achieve and a roadmap of actions to get us there’ – Southern Region Waste Management Plan (2015-2021)**

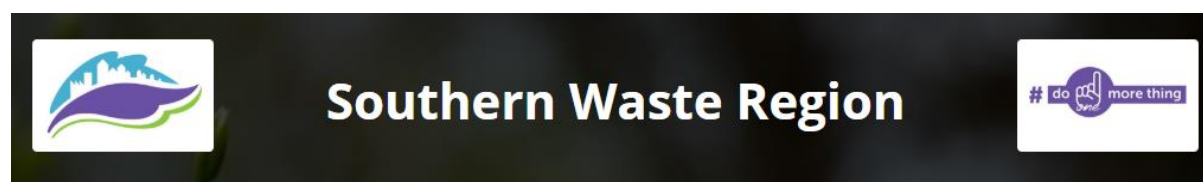
In partnership with the Southern Waste Region, Kilkenny County Council developed and implemented the policies and actions laid out in the region’s Waste Management Plan. KCC is working to reduce the production of waste and protect the environment from contamination by hazardous waste materials and general litter. KCC has run anti-dumping initiatives to target illegal dumping in cooperation with the Department of Communications, Climate Action and Environment.

A number of key objectives have been identified that will frame the compilation of the adaptation actions:

- To liaise and work with other bodies and agencies responsible for resource management
- To promote and maximise resource management initiatives
- To integrate climate action considerations into waste management policies
- To identify and support opportunities that may arise from pursuing adaptation efforts through the functions of Kilkenny County Council

### 5.3.1 Waste Management

**‘Plan Target – Reduce to 0% the direct disposal of unprocessed residual Municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices’ – Southern Region Waste Management Plan (2015-2021)**



KCC has a comprehensive waste prevention and recycling programme within the Council and strives to reduce consumption while minimising the waste produced in KCC’s buildings and operations. Central to preventing the production of waste is changing the procurement of products used in Council buildings and operations. A priority for KCC is to review procurement procedures and identify opportunities to source local, environmentally-friendly products for use in its operations. For example, KCC is committed to eliminating the use of disposable cups in its buildings and encouraging staff to use reusable cups.

## Case Study – Reduce Single Use Plastic

In January 2019, the Government decided that government departments and public bodies will lead the way in reducing the generation of single use plastics and waste<sup>[15]</sup>. With immediate effect, Government Departments will not supply, directly or indirectly, the following items for use within their offices:

- Single use plastic beverage cups
- Single use plastic cutlery
- Single use plastic straws



These items will not be purchased by public bodies, including state agencies and schools, from the 31<sup>st</sup> of March 2019. Government employees are encouraged to bring reusable cups to work in an effort to reduce plastic waste generation in these buildings.

### 5.3.2 Litter & Recycling in the Public Realm

**'Plan Target – Achieve a Recycling Rate of 50% of Managed Municipal Waste by 2020'**

-Southern Region Waste Management Plan (2015-2021)

## Case Study – Recycling Ambassador Programme

Officially launched in November 2017 and running until December 2018, the Recycling Ambassador Programme (RAP) is an initiative funded by the Department of Communications, Climate Action and Environment, and the Regional Waste Management Offices to improve Ireland's recycling rates and reduce levels of contamination in household recycling bins<sup>[16]</sup>.

Workshops were established to teach citizens about good recycling practice such as how to correctly use the green bin and how to avoid contamination in recycling bins while also discouraging the use of disposable items.



The programme aimed to directly reach 15,000 people nationwide; however, it is believed that the programme reached much further as those who attended the workshops spread the word within their communities, a large amount of whom are believed to be in County Kilkenny.

Part of reducing waste is encouraging people to recycle. KCC is planning to maintain and promote the availability of recycling infrastructure such as bring centres across the county. KCC is also actively working with the Southern Region Waste team to inform people about what they can and cannot recycle.

### Case Study - Savour Kilkenny

Savour Kilkenny in conjunction with Kilkenny County Council took steps in 2018 to minimise the festivals environmental impacts that come with the 40,000 plus attendees<sup>[17]</sup> each year.

Food waste bins were provided to cater for cooked or raw food, compostable packaging, cardboard and newspaper to divert the amount of waste going to landfill and instead compost and convert it into a usable product. Water points were provided to allow festival-goers to refill their reusable containers thus reducing single-use plastic waste. Stallholders were asked to sign up to a 'Going Green Charter' in which they pledged to reduce water and energy consumption, buy local produce and services and use compostable cutlery, among many others.



The Environment Section of Kilkenny County Council funded the greening of the festival through the Local Authority Prevention Network fund.



## 5.3.3 Resource Management

**Timeframe** defined as Short term 1-3 years, Medium term 4-5 years, Long term 5+ years

| No.                     | Action   | Lead Dept(s)       | Timeframe |
|-------------------------|--|--------------------|-----------|
| <b>Waste Management</b> |  |                    |           |
| 1                       | Encourage staff to reduce paper usage through an awareness campaign.   | IT                 | Medium    |
| 2*                      | Run an ongoing recycling awareness campaign for council staff  | Environment        | Medium    |
| 3*                      | Promote recycling to householders through a range of workshops, talks and programmes   | Environment        | Short     |
| 4                       | Develop a climate change awareness procedure code for all new staff  | Environment        | Short     |
| 5                       | Investigate waste prevention measures to decrease waste generation within the LA offices   | Environment        | Short     |
| 6                       | Promote recycling & waste prevention to householders through a range of workshops, talks and programmes  | Environment        | Short     |
| 7                       | Reduce litter pollution in watercourses throughout Kilkenny in association with the Local Authorities Water Programmes   | Environment        | Short     |
| 8*                      | Assess the practicality of introducing environmentally friendly waste containers in Kilkenny City  | Environment        | Medium    |
| 9*                      | Develop pilot recycling projects   | Environment        | Medium    |
| 10*                     | Develop guidelines for “sustainable, low carbon events” to inform and guide event organisers   | Environment        | Medium    |
| 11                      | Phase out single use food and beverage containers in KCC buildings and at KCC events   | Environment        | Medium    |
| 12*                     | Examine methods of conserving water in KCC buildings   | Environment        | Medium    |
| 13                      | Ensure newly implemented waste collection systems are utilised in high population areas around Kilkenny  | Environment        | Short     |
| 14                      | Liaise with LAWPRO to evaluate water quality issues around Kilkenny  | Environment        | Short     |
| 15*                     | Expand the use of Green Public Procurement and aim to seek to procure goods, services and works with a reduced environmental impact throughout their life cycle. | Multi-departmental | Medium    |

|            |   |                    |       |
|------------|---|--------------------|-------|
|            |   |                    |       |
| <b>16*</b> | Develop an environmental advertisement campaign to promote awareness among all age groups of ongoing and future waste reduction and recycling projects  | Multi-departmental | Short |
| <b>17*</b> | 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 | Multi-departmental | Short |
| <b>18</b>  | Continue to identify suitable locations to extend the existing bring centre recycling facilities  | Environment        | Short |

\* Action subject to funding approval

### **Relevant Plans/Legislation:**

- Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study 2011-2016;
- Kilkenny County Development Plan 2014-2020;
- Kilkenny City & Environs Development Plan 2014-2020;
- EU Environmental Liability Directive 2004/35/EC;
- EU Floods Directive 2007/60/EC;
- EU Habitats Directive 92/43/EEC;
- National Landscape Strategy for Ireland 2015-2025;
- The Ramsar Convention on Wetlands;
- The 2<sup>nd</sup> Cycle River Basin Management Plan 2018-2021;
- Water Framework Directive 2000/60/EC;
- Southern Region Waste Management Plan 2015-2021;
- County Kilkenny Waste Management Bye-Laws 2018;
- Kilkenny Litter Management Plan;
- Waste Management Acts, 1996-2016;
- Litter Pollution Acts, 1997-2009.

## Transport



Overview

25 GWh

Consumed in 2017 =  
5,117 tonnes of CO<sub>2</sub>

Target



50%

Improvement  
in energy  
efficiency by  
2030

40%

Reduction in  
Council's  
GHG  
emissions by  
2030

167

Vehicles in Council  
fleet



Examples of main action types

Form group to meet aspirations of  
National Renewable Energy Action Plan



Working with stakeholders to  
improve bus service

Implementing or supporting  
walking and cycling campaigns



Investigate segregated cycleways  
and footpaths

Stakeholders to work in partnership and co-create solutions

General Public

Community Groups

National Transport Authority,  
RSA



Environmental and interest  
groups

Irish Rail, Bus Éireann

Government Departments and  
Agencies

## 5.4 Transport

**“The Council will promote walking, cycling, public transport and other more sustainable forms of transport as an alternative to the private car, together with the development of the necessary infrastructure” – Kilkenny County Development Plan 2014-2020**

Transport is one of the main sources of greenhouse gas emissions in Kilkenny. A sustainable transport system is essential to reduce these greenhouse gas emissions. Vehicles that run on fossil fuels not only release CO<sub>2</sub> into the atmosphere, but also release other polluting materials that are harmful to the public’s health. The size of this challenge cannot be underestimated, given the high number of private car journeys in Kilkenny and the reliance on road freight transport for moving goods. In addition, the infrastructures that these transport systems are dependent on are also at risk from the current effects of climate change, such as flooding and extreme weather events. Adaptation solutions will be needed to ensure a safe and efficient transport network. A move towards sustainable transport will not only reduce greenhouse gas emissions, but will also lead to a cleaner and more connected region that provides a positive and healthy environment for its citizens.

KCC has been aware and fully committed to reducing the impact of transport on its environment over the last number of years. KCC adopted its first Mobility Management Plan for the City and Environs in 2009. The plan outlined a strategy for improved accessibility, resulting in reduced congestion, safer pedestrian and cycling environment, a reduction in emissions and a greater level of transport allied with physical activity leading to better health. Through the actions set out in the Mobility Management Plan 2009-2014, a number of suitable infrastructural improvements complementary to the existing network of narrow lanes and reduced street widths in the medieval core were carried out along with a range of improvement works to the main access roads to the city, schools and community facilities.

The mobility management plan followed various studies on the travel modes and recreational needs of the city and environs. It was also based on the Kilkenny Cycle Network Study 2002 and the Kilkenny Open Space, Sports and Recreation Study 2002. The Kilkenny City Local Area Plan 2005 adopted a strategy for the medieval core of the city and identified key routes for pedestrian/cyclist use in a traffic calmed environment with emphasis on shared space and reduced vehicle speeds.

KCC, through its own development plan strategy and policies, promotes the integration of land use and transportation, works with a range of stakeholders to improve transportation in the city and county, and encourages a modal shift away from private cars to more sustainable transport methods.

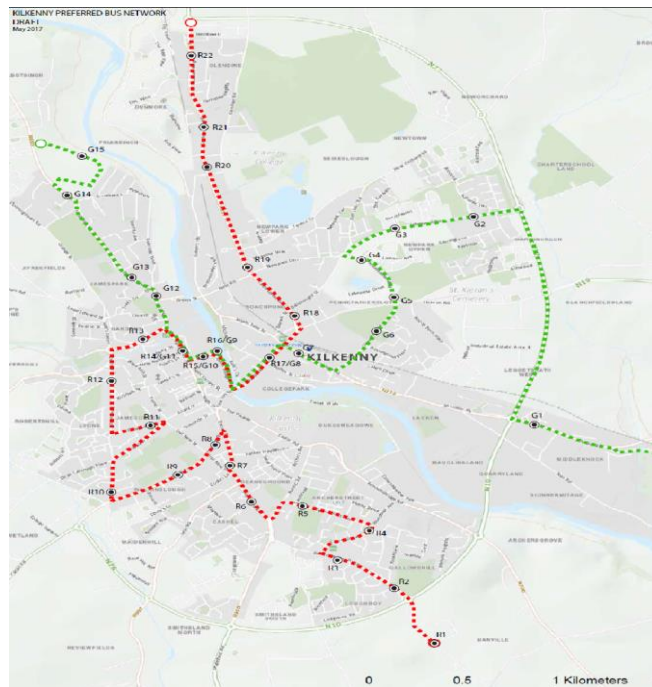
A number of key objectives have been identified that will frame the compilation of the adaptation actions:

- To increase the resilience of roads and transport infrastructure;
- To ensure that climate adaptation is mainstreamed into all transport activities and operations within Kilkenny County Council and the wider community;
- To build resilience within Kilkenny County Council to support a modal shift among council staff;
- To identify and support opportunities that may arise from pursuing modal shift efforts through the functions of Kilkenny County Council;
- To collaborate with other agencies and groups working with communities to enhance the awareness and effectiveness of community programmes related to modal shift.

### 5.4.1 Public Transport

KCC is working with the National Transport Authority (NTA) to develop a public city bus service.

The commencement of the bus services within the city & environs is a significant commitment to the provision of sustainable transport choices in Kilkenny. KCC will monitor these services in relation to the public service contract requirements and will actively pursue options for consolidating and improving these services.



### 5.4.2 Operations

The council has 167 vehicles in its fleet, which are broken down into different vehicle types, including cars, vans, lorries and road sweepers. As transport accounts for a large portion of KCC's overall energy use, the Council will investigate the viability of replacing the fleet with newer, more fuel efficient vehicles, including electric vehicles where practical. KCC has purchased an electric amenity vehicle in the city and will review this pilot with a few to expanding same.

### 5.4.3 Planning & the Public Realm

KCC is working to make the streets more inviting, user friendly and safer to encourage people to walk and cycle, thus improving the public realm. Development of the Medieval Mile and the Patrick Street Enhancement Scheme have provided for the upgrade of existing footpaths, the installation of pedestrian crossings and increased seating and bicycle parking. The end product greatly improves the attractiveness of the streetscape whilst also providing for better pedestrian connectivity.

The pedestrianisation of Kieran Street has been a particularly successful scheme that has prioritised pedestrian and cycle access while fundamentally contributing to the high level of retail and commercial activity. The provision of on street seating areas outside numerous businesses and the overall vibrancy of the street make it a desirable location to visit and congregate for local people and visitors to the city.

### 5.4.4 Traffic Calming Measures

Over the last decade, there has been a gradual lowering of speed limits throughout Kilkenny City and its suburbs in order to reduce pollution levels and make the city safer and more enjoyable for cyclists and pedestrians to get around. Kilkenny has been at the forefront of the adoption of 30kmh special speed limits within the city centre and residential areas which has been introduced in many urban areas around Ireland. This speed limit change defines the city centre boundary while also defining the transition between cycle lanes and tracks for cyclists outside the city to a shared carriageway with traffic inside the city centre.

#### Case Study – Kilkenny City Mobility Management Plan 2009-2014

The Kilkenny City Mobility Management Plan 2009-2014 was designed to introduce a series of measures which would improve the attractiveness of using public transport, cycling, walking and carpooling.

It outlined a range of methodologies towards achieving modal shift by raising awareness, monitoring and evaluating the effects of the interventions, engaging with the community, schools and workplaces, and through publicity and information with particular emphasis on local media and special events promoting the benefits of smarter travel.

The achievements under the Mobility Management Plan include:

- The introduction of a scheme on on-street parking charges in the core retail area to deter car use in the city centre;
- Construction of accessible bus stops to facilitate the local City Bus Service;
- Construction of the Kilkenny Orbital Cycleway, 10km off-road pedestrian and cycle paths along the margins of Kilkenny Ring Road;
- Construction of the Quaylink Pedestrian Bridge;
- Provision of bicycle parking in the city centre at numerous locations.



The aim of these actions was to promote and encourage the use of sustainable modes of transport, the effects of which have been a positive step towards combatting climate change by reducing the daily vehicular carbon dioxide emissions in Kilkenny.

### 5.4.5 Cycling

KCC will continue investigate the provision of a city bike scheme which will help to reduce emissions and provide more options for sustainable modes of transport. A feasibility report has been carried out along with site visits to similar sized cities where such schemes have been successful. Such a scheme would have potential benefits for people living in the city and visitors to Kilkenny alike.

Significant investment has been made in the provision of cycle tracks and cycle lanes along the radial roads and streets leading to the city centre. This investment has occurred over a timeframe extending back to the period prior to the publication of the National Cycle Manual. In this context, a review will be carried out of all existing cycle lane and cycle track provisions with the specific objective of setting Kilkenny as an exemplar cycling urban area in Ireland. KCC is also actively working to improve cycling infrastructure through the development of segregated cycle paths where possible.

#### 5.4.6 Travel & Behaviour Change

Less dependency on the private car for routine trips and replacement by public transport, walking and cycling will result in a reduction in the consumption of non-renewable resources and the production CO<sub>2</sub> emissions. This will help KCC meet national emission reduction targets while also providing health benefits.

As part of the Mobility Management Plan, in 2010 an implementation team called the Kilkenny Smarter Travel Group consisting of representatives of Kilkenny Local Authorities (Engineering, Community/Enterprise and Environment), Health Service Executive (Health Promotion Unit), Kilkenny Recreational Sports Partnership, and Waterford Institute of Technology (Department of Sport and Exercise Science) was established to oversee its implementation. Due to the abolition of the Borough Council, The Smarter Travel Committee ceased however as part of this plan it is an objective to reconvene this initiative.

#### Case Study - Schools Programme

As part of the Kilkenny Smarter Travel programme, a comprehensive cross-sectional survey of active transport and overall physical activity in adults, adolescents and children known as the Schools Programme<sup>[18]</sup> was undertaken in 2011 and 2013.

All 5th and 6th class primary students and 2nd and 5th year post-primary students across all Kilkenny city schools participated. For the baseline survey, 684 primary schoolchildren, 721 secondary schoolchildren, and 849 adults participated. The survey was supervised by the Sport and Exercise Science Department of Waterford Institute of Technology who analysed the results.

Between 2011 and 2013, community-wide interventions to promote active travel included awareness raising activities such as Smart Saturday, Bike Days, as well as the annual bike week. Bike training has taken place in some primary and secondary schools, and an adult bike training course was also initiated.



## 5.4.7 Transport Actions

Timeframe defined as Short term 1-3 years, Medium term 4-5 years, Long term 5+ years

| No.               | Action   | Lead Dept(s)                     | Timeframe |
|-------------------|--|----------------------------------|-----------|
| <b>Operations</b> |  |                                  |           |
| 1                 | Develop strategy to convert fleet to low emission vehicles   | Roads                            | Medium    |
| 2                 | Explore the potential for expanding the KCC fleet with energy efficient amenity vehicles   | City Engineering                 | Short     |
| 3*                | Investigate ways to carry out a modal shift of staff within Kilkenny County Council from private car to more sustainable modes of transport to reduce emissions from private car | Planning                         | Medium    |
| 4*                | Investigate the feasibility of a hot desk policy in Council offices to reduce travel to work by commuting staff  | Corporate                        | Short     |
| 5                 | Promote carbon friendly modes of transport to work   | Corporate                        | Short     |
| 6*                | Provide welfare facilities at KCC offices to encourage alternate modes of transport to work  | Corporate                        | Short     |
| 7                 | Identify gaps in the cycle route provision for the full extent of the cycle network up to the city centre gateways to make it safer and easier to cycle within the city          | Kilkenny City Municipal District | Short     |
| 8                 | Continue the upkeep of cycle/walkways around County Kilkenny   | Kilkenny City Municipal District | Short     |
| 9                 | Promote World Car Free Day and European Mobility Week to increase awareness of climate friendly modes of transport   | Corporate                        | Short     |
| 10                | Accommodate where possible the provision of additional EV charging points  | Environment                      | Short     |
| 11*               | Re-establish Smarter Travel Committee to ensure continued development of transport facilities in Kilkenny  | Kilkenny City Municipal District | Short     |
| 12                | Prepare mobility management plans for the district towns to encourage more climate friendly sustainable modes of transport   | Municipal District Offices       | Short     |
| 13*               | Develop mobility management plans with the schools in the city and environs  | Kilkenny City Municipal District | Long      |
| 14                | Investigate the feasibility to increase the number of public bike parking facilities in County Kilkenny  | Kilkenny City Municipal District | Medium    |
| 15                | Liaise, collaborate and work in partnership with NTA in the implementation of Kilkenny public transport schemes where feasible   | Kilkenny City Municipal District | Short     |

|           |   |                                  |       |
|-----------|---|----------------------------------|-------|
| <b>16</b> | Implement policy to increase modal shift to public transport                  | Environment & Planning           | Short |
| <b>17</b> | Promote pedestrian priority within the city centre                            | Kilkenny City Municipal District | Short |
| <b>18</b> | Investigate the feasibility of enhancing public bus facilities in rural areas | Roads                            | Short |

\* Action subject to funding approval

**Relevant Plans/Legislation:**

1. Climate Action and Low Carbon Development Act 2015;
2. Design Manual for Urban Roads and Streets;
3. Kilkenny County Development Plan 2014-2020;
4. Kilkenny City and Environs Development Plan 2014-2020;
5. Kilkenny Mobility Management Plan 2009-2014;
6. Electric Vehicle Grant Scheme and VRT Relief;
7. National Cycle Policy Framework 2009-2020;
8. National Transport Authority's Permeability Best Practice Guide;
9. Public Transport Act 2016;
10. Smarter Travel: A New Transport Policy for Ireland 2009-2020.



# Nature-Based Solutions & Communities

## Overview

9,207km<sup>2</sup>

Catchment area of Three Sisters Rivers

7.3%

Kilkenny's labour force engaged in agriculture, forestry & fishing

39

Nature conservation sites in county Kilkenny

## Target



Manage Green Space along rivers and watercourses

Protect native species, parks, open spaces and trees

Improve Water Quality in Prioritised Action Areas



## Examples of main action types

Work with community groups, businesses and schools



Manage the City and County's green infrastructure



Implement the All Ireland Pollinator Plan



Protecting, planting and maintaining trees across the city and county



## Stakeholders to work in partnership and co-create solutions

Government Departments

Community Groups

Environmental Groups

General Public

Local Authorities Water Programme

Schools and Third level institutions





# 5.5 Nature-Based Solutions & Communities

## 5.5.1 Communities

**“Social Capital may be defined as that which accrues to a person as a result of their activities participation in the life of their communities. For example, social capital is said to be gained from neighbourliness, local area networking or volunteering. Kilkenny Local Authorities are committed to the Agenda 21 process of building partnerships between local authorities and local development and other sectors to develop and implement local policies for the development of sustainable communities.”** - Kilkenny County Development Plan 2014-2020

Communities play a fundamental role in achieving the targets for adaption to climate change in Kilkenny City and County, throughout the all the key areas of Energy and Buildings, Transport, Flooding, Resources Management and Nature Based Solutions and Communities.

The Kilkenny Local Economic and Community Plan 2016-2021 is underpinned by the principle of sustainability – promoting a more resource-efficient, green and more inclusive economy. The plan recognises that the value gained from biodiversity is reliant on its ongoing sustainable protection and management and that green infrastructure is an integral part of sustainable development, alongside other infrastructure such as utilities and transport networks. It is an objective of the plan to encourage and support biodiversity and the protection and enhancement of local heritage and culture, while supporting energy efficiency and maximising the circular economy potential.

A number of key objectives have been identified that will frame the compilation of the adaptation actions:

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

Examples of Community Solutions to climate change currently taking place throughout Kilkenny City and County in partnership with Kilkenny County Council include:

- Participation of ninety-two schools in the An Taisce Green Schools Flag;
- Active Tidy Towns groups participating in the National Tidy Town Competition, with a special award for Tidy Towns helping our pollinators;
- Participation of over 100 groups annually in the National Spring Clean Promotions;
- Activities and events during National Heritage Week;
- Community improvements assisted by the Amenity Grants scheme;
- Increased tree planting during National Tree Week and Tree Day;
- Working to improve water quality with the Communities Office of the Local Authority Waters Programme.

## Case Study - Helping Our Pollinators

Kilkenny County Council supports our pollinators through many initiatives with the community, including through supporting schools with the Heritage Office schools' biodiversity booklet, a new award in the in the Tidy Towns competition for helping our pollinators, and raising awareness through pollinator friendly information on new signage at the forty-four bring banks throughout the city and county. As a sign of support and commitment, *Bombus hortorum* has recently been adopted as KCC's emblem. The 2019 Kilkenny St. Patrick's Day festival has biodiversity at its heart – with the theme 'Bring the Bees Back'.



Photo Source: irelandswildlife.com

On 4<sup>th</sup> March 2019, Kilkenny County Council signed a framework agreement with the All-Ireland Pollinator Plan to formalise KCC's long term commitment to support pollinators in County Kilkenny.

**“Climate change policy is a loop, not a line. The local Adaptation Strategy will help build a dynamic relationship between ‘how much’ in emission reduction policy and ‘how to’ in adaptation and mitigation policy. There is a need for a multi-level and inter-agency experimental approach to climate change and resource scarcity to ensure that meaningful ‘how to’ policies can be formulated and implemented.”** - Kilkenny Local Economic and Community Plan 2016-2021

## Case Study - Inistioge awarded Gold Medal in Entente Florale

Inistioge village was nominated by Ireland to represent the country in the Europe-wide Entente Florale competition. A huge amount of hard work was undertaken by local people, Inistioge Tidy Towns and the Community Water Officer in partnership with Kilkenny County Council.



Photo Source: kilkennyheritage.ie

Kilkenny County Council worked with the local community to undertake and support a number of valuable heritage surveys and projects in Inistioge which will have benefits long into the future. These included an Inistioge Green Infrastructure Map, a Biodiversity Action Plan for St. Columcille's National School, Inistioge Pollinator Planting list and Inistioge Heritage Trail Brochure. Inistioge were awarded a Gold Medal in 2018 in the Entente Florale Competition.

## 5.5.2 Nature-Based Solutions

**“Landscapes, rivers, woodlands, hedgerow, geology, plants and animals are all part of our natural heritage. Kilkenny’s heritage is that which makes the county unique, what gives it its special character and its ‘sense of place’. It is a valuable economic resource. It is the basis for Kilkenny’s tourism industry, and brings significant economic benefits to the county. Heritage is also vital for the health, well-being and quality of life of communities”.**

- Kilkenny County Development Plan 2014-2020

Nature-based solutions are defined by the International Union for Conservation of Nature as “actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits”.

Nature-based solutions are critical in climate change adaptation; they can play an important role not only for biodiversity and ecosystems, flood prevention and carbon sequestration, but also in temperature regulation, water quality, erosions prevention, and filtering pollutants from the air and water. Nature-based solutions are used in a smart, ‘engineered’ way to provide sustainable, cost-effective and adaptable measures that support climate resilience.

Examples of nature-based solutions currently deployed as ecosystem services within Kilkenny City and County include the protection of the Castle Park in Kilkenny City as a central green space and ecological corridor to the River Nore, a swale along the River Nore Linear Park as part of sustainable urban drainage systems (SuDS), restoration of Woodstock Gardens and estate, increased biodiversity, and tree planting to improve air quality and provide shade and corridors for movements of wildlife. The natural floodplains along the rivers serve as buffer areas and also as flood attenuation areas.

**“It is the aim of the Council to conserve, enhance and manage the counties natural heritage including its biodiversity, landscapes and geological heritage and to promote understanding of and sustainable access to it”** – Kilkenny County Development Plan 2014-2020

A number of key objectives have been identified that will frame the compilation of the adaptation actions:

- To protect and enhance the natural environment to work positively towards climate action;
- To support Bio-diversity for its intrinsic value within the natural environment;
- To integrate climate action considerations into land use planning policies;
- To promote and maximise the most efficient and sustainable use of land.

## Case Study - Woodstock Gardens and Arboretum

Woodstock Gardens and Arboretum are located adjacent to the village of Inistioge on the banks of the River Nore in County Kilkenny. Woodstock gardens were once considered one of the great gardens of Ireland dating to the Victorian Period from 1840-1900 and attracted many visitors. Since 1999 Kilkenny County Council has been undertaking an ambitious scheme of restoration to return to these gardens to their former glory.



Photo Source: woodstock.ie

Phase three of the restoration project is now complete. The Council is engaging with Coillte to make recommendation of the future development of the circa 1,000 acre estate. Kilkenny County Council is investigating the potential to develop the walkways from Inistioge village to Woodstock Gardens and to continue to build on links connecting the village community to Woodstock.

### 5.5.3 Green Infrastructure and Nature Conservation

**“The term ‘Green Infrastructure’ can be defined as strategically planned and interconnected networks of green space and water capable of delivering ecosystem services and quality of life benefits to people. The emergence of Green Infrastructure planning is a response to the growing recognition of the many benefits which green space provides to society and of the need to plan for its protection, provision and management in tandem with plans for growth and development. It has a significant role to play in assisting in the protection of Natura 2000 sites and biodiversity.” – Kilkenny Heritage**

Green Infrastructure is designed and managed to provide and facilitate the following:

- A high-quality environment which will provide economic benefits by attracting inward investment and new business;
- High quality open spaces which provide health and social benefits for people through the provision of play areas, safe and attractive localities and routes for meeting, walking and cycling;
- Space for contact and opportunities to interact with nature which is considered essential for good health and wellbeing;
- Adaptation to the impacts of climate change and flooding;
- Local food production in allotments, gardens and through agriculture;
- Space for biodiversity to flourish;
- A sense of place and local distinctiveness.

Kilkenny County Council's new Cultural Strategy for Arts, Heritage and Libraries 2018-2022 replaces the former Arts Plan, Biodiversity Plan, Heritage Plan and Library Plan. The plan includes the objectives to:

- Work with communities, agencies and other key partners to encourage participation and to identify, record and protect Kilkenny's rich built, natural and cultural heritage;
- Work with key partners in the education sector to develop programmes and local cultural resources for teachers, students and early school practitioners.

Kilkenny County Council, in partnership with the Kilkenny Heritage Forum and the Heritage Council, has undertaken habitat surveys and green infrastructure assessments in a number of settlements around the county including Kilkenny City, Gowran, Fiddown, Piltown, Johnstown, Urlingford, Ballyragget, Ballyhale, Mooncoin, and Knocktopher. Green infrastructure mapping in Inistioge also formed an important feature in the recent award to Inistioge in the Entente Florale competition.

### 5.5.4 Kilkenny's Natural Capital

Residents of, and visitors to, Kilkenny City and County benefit from a rich natural heritage, including its river valleys, wetlands, woodlands and uplands. These natural heritage components along with open spaces and playing fields form part of the interconnected networks of green infrastructure in the county and its urban areas.

The flora and fauna in Kilkenny City and County are vital in adapting to climate change and mitigating future impacts as they act as carbon sinks and provide flood protection:

The biodiversity of Kilkenny City and County includes:

- Wildlife and habitats linked to the Three Sisters Rivers of the Barrow, Nore and Suir and their tributaries;
- Nore Linear Park and Castle Park;
- The wetlands, marshes, fens and bogs;
- Belview Port;
- Woodlands, trees and hedgerows;
- Residential public open spaces, private gardens, walls and buildings.

### 5.5.5 Tree Management

Woodlands, trees and hedgerows are environmental, economic, amenity and landscape resources of great importance. They contribute significantly to the biodiversity and landscape character of the county and form part of a network of habitats, ecological corridors and 'stepping stones' essential for wildlife to flourish and move between and within habitats, as well as having significant potential for carbon sequestration. They are also an important part of our townscapes.

The Tree Register of Ireland (TROI) is a database of outstanding trees in Ireland compiled by the Tree Council of Ireland. The TROI identified significant trees in the county based on characteristics such as age, height, diameter and historical or folklore connections. A copy of the TROI for Kilkenny is available to view from the Parks Department of Kilkenny County Council. A Woodland Survey of Kilkenny, commissioned by Kilkenny County Council in 1997, identified the amenity potential of woodlands in the county. A copy of the survey is also available to view from the Parks Department of Kilkenny County Council.

Trees have multiple benefits in reducing the risk of climate change impacts. Through their root systems they reduce soil erosion and sequester atmospheric carbon as part of the carbon cycle, meaning that over its lifetime a single tree can absorb several tonnes of atmospheric carbon dioxide.



The right tree in the right place can provide shelter from both wind and sun and help to reduce the urban heat island effect.

Hedgerows contribute significantly to the biodiversity and landscape character of County Kilkenny. They have important ecological functions as they act as wildlife habitats and corridors between habitats, while acting as windbreakers and field boundaries for agricultural practices.

### Case Study - Tree Promotion Initiatives

Kilkenny County Council supports tree-planting activities with schools including the annual National Tree Week and National Tree Day in cooperation with the Tree Council of Ireland and Coillte. The Council also supports EasyTreesie, an environmentally-friendly community programme with the aim to plant one million trees on the island of Ireland by 2023 in a challenge called 'Plant-for-the-Planet'.



The social enterprise hopes to get every school child in the country to plant a tree and to sponsor one in the Global South in an effort to combat climate change. Kilkenny County Council along with organisations such as Coillte have donated money and native trees for planting to support EasyTreesie and their efforts to simultaneously educate the youth of today while offsetting Ireland's carbon footprint.

### 5.5.6 Water-Based Solutions

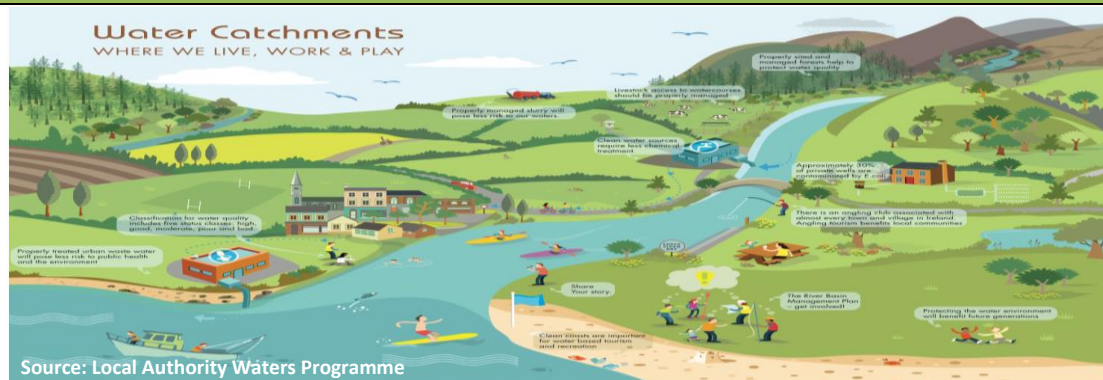
**“The rivers and streams, wetlands and groundwater in County Kilkenny are important for biodiversity and provide amenity and recreational resources, particularly angling tourism. Groundwater is important for supplying water and maintaining wetlands and river flows in dry periods. They County’s rivers and streams are also a key component of our Green Infrastructure”.** - Kilkenny County Development Plan 2014-2020

Surface water drainage systems are effective at diverting surface water quickly, but they can cause the volume of water in the receiving watercourse to increase more rapidly, thereby increasing flood risk. Sustainable Drainage Systems can play a role in reducing and managing run-off to surface water drainage systems as well and improving water quality. The Council requires new development to reduce the rate and quantity of run-off to give adequate allowance for climate change in designing surface water proposals as per the City & Environs and County Development Plans.

The Rivers Barrow, Nore and Suir (known as the “Three Sisters”) are the principle rivers flowing through County Kilkenny. They are protected heritage sites under European legislation with all being designated as Special Areas of Conservation, and with part of the River Nore designated as a Special Protection Area. The rivers of the county are susceptible to impacts from developments carried out at geographically remote areas outside of the site boundary through hydrological link, including water abstraction, discharges from wastewater treatment plants, surface water or surface water attenuation and land management.

The development of riverside walks has enabled greater access to the waterways corridors, whilst the rivers themselves are used for water-pursuits including angling, boating, canoeing, kayaking, and swimming. The rivers also provide a rich landscape setting for the towns and villages of the county and are often the primary green infrastructure network in urban settings. The economic benefits of the rivers are significant. In 2010 some 127,000 overseas visitors engaged in angling while in Ireland, resulting in a spend of €89 million<sup>[19]</sup>. Kilkenny County Council has undertaken a heritage audit of the River Nore, identifying and mapping the built, natural and cultural heritage of the River Nore corridor in County Kilkenny. The data from the audit is being used to inform an interpretative strategy for the River Nore corridor, funded by Kilkenny County Council and Trail Kilkenny.

## Case Study - Local Authorities Waters Programme



Water quality of Irish rivers, lakes, groundwater, estuarine and coastal waters is monitored under the EU Water Framework Directive (WFD). The River Basin Management Plan 2018-2021 has identified a number of our natural waters for focussed attention to improve water quality.

Kilkenny and Tipperary County Councils are the lead authorities for the national shared service that supports and co-ordinates implementation of the River Basin Management Plan for Ireland 2018-2021. This shared service has two elements – the Local Authorities Waters and Communities Office (LAWCO) which was set up in 2016, and the Catchment Assessment Team which was established in 2018. The two were then rebranded as the Local Authority Waters Programme (LAWPRO) to reflect the unified structure under which they operate. LAWPRO supports the implementation of local measures to address water quality issues. Its work involves assessing the catchment to further understand the local issues impacting on water quality and collaborates with communities, landowners and public bodies to develop and implement workable solutions.

This collaborative approach aims to encourage all stakeholders to contribute to the improvement of water quality in 190 Priority Areas for Action nationally, covering 726 water-bodies. Work has commenced on The Nore Vision Project with public engagements in County Kilkenny in the catchments of the Dinin River and the Nuenna River. A continuous awareness raising campaign about water quality is being carried out across schools in the Breagagh, Dinin, Duske, Nuenna and Pocke areas of Kilkenny.

## 5.5.7 Nature-Based & Communities Actions

**Timeframe** defined as Short term 1-3 years, Medium term 4-5 years, Long term 5+ years

| No.                         | Action  | Lead Dept(s)                 | Timeframe |
|-----------------------------|---|------------------------------|-----------|
| <b>Community</b>            |   |                              |           |
| 1                           | Continued commitment to Community Environment Action Fund through supporting the work of Tidy Towns and Amenity Grants. (Priority given to biodiversity and climate change initiatives) | Multi-departmental           | Short     |
| 2*                          | Support of litter awareness and litter clean-up through supporting the National Spring Clean with An Taisce   | Environment                  | Short     |
| 3                           | Support climate change adaption in schools with the Green Schools Flags, biodiversity and heritage initiatives, and pollinator friendly plans   | Multi-departmental           | Short     |
| 4*                          | Support the greening of businesses, festivals and agricultural practices through workshops and campaigns  | Multi-departmental           | Medium    |
| 5*                          | Develop and support programmes which encourage active participation in identifying, recording, protecting, communicating and enjoying Kilkenny's heritage.                              | Heritage                     | Medium    |
| <b>Green Infrastructure</b> |   |                              |           |
| 6                           | Continue to develop public-use amenity trails throughout Kilkenny county  | Parks Department             | Long      |
| 7*                          | Investigate the potential of implementing public open space projects  | Parks & Planning Departments | Long      |
| 8*                          | Investigate the feasibility of using a green roof concept for a Council building where appropriate  | Library                      | Short     |
| <b>Tree Management</b>      |   |                              |           |
| 9*                          | Development and implement a tree management plan for Kilkenny City  | Parks Department             | Long      |
| 10                          | Assess and encourage, where possible, pollinator friendly and native tree planting throughout Kilkenny  | Multi-departmental           | Short     |
| 11*                         | Encourage educational institutions to adopt policies in accordance with National Tree Week and National Tree Day  | Parks Department             | Medium    |
| 12*                         | Investigate the use of the DAFM NeighbourWood Planting scheme for use in suitable urban areas   | Parks Department             | Medium    |
| 13*                         | Explore the potential of tree planting in areas of hard landscaping   | Parks Department             | Medium    |



| Nature Conservation |   |                     |        |
|---------------------|---|---------------------|--------|
| 14*                 | Develop a cross-section Kilkenny County Council Invasive Alien Species Action Plan  | Multi-departmental  | Long   |
| 15*                 | Investigate the feasibility of composting on a large scale at Dunmore Recycling and Waste Disposal Centre   | Environment         | Medium |
| 16*                 | Explore the possibility of increasing the number of air monitors in the county  | Environment         | Medium |
| 17*                 | Incorporate climate adaption policies into the Kilkenny City & County Development Plan 2020-2026  | Planning Department | Medium |
| 18*                 | Explore the opportunities within County Kilkenny to create, improve and enhance ecosystems through nature-based solutions   | Multi-departmental  | Medium |
| 19*                 | <p>Build expertise, capacity and increase the knowledge base through relevant training programmes on Climate Change and its implications on the operations/functions of Kilkenny County Council. Training courses/ modules/programmes may include:</p> <ul style="list-style-type: none"> <li>• Climate Change awareness training to staff, elected members and communities</li> <li>• Invasive species awareness and management training</li> <li>• Relevant safety training</li> <li>• Service delivery training for outdoor staff in flood situations</li> </ul> | Multi-departmental  | Short  |
| 20*                 | Collaborate with the National Biodiversity Data Centre in collating biodiversity and invasive species data in Kilkenny to inform future policy decisions  | Parks               | Short  |
| 21                  | Review tree and hedgerow protection policies in the review of the City & County Development Plan to ensure they support the CCAS and are adequately implemented and enforced  | Planning            | Short  |
| 22                  | Review relevant wetland policies in the review of the City & County Development Plan to ensure they support the CCAS and are adequately implemented and enforced  | Planning            | Short  |
| 23                  | In accordance with the objective in the Climate Action Plan 2019, to establish a number of pilot 'climate action community engagement' offices in a number of Local Authorities, Kilkenny County Council will proactively seek to become one of these pilot   | Multi-departmental  | Short  |

|  |  |  |  |
|--|--|--|--|
|  | office to further develop our community engagement role. |  |  |
|--|--|--|--|

\* Action subject to funding approval

### **Relevant Plans/Legislation:**

- All-Ireland Pollinator Plan 2015-2020;
- Kilkenny County Development Plan 2014-2020;
- Kilkenny City and Environs Development Plan 2014-2020;
- EU Biodiversity Strategy;
- EU Birds Directive 2009/147/EC;
- European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 of 2011;
- EU Environmental Impact Assessment Directive 2014/52/EU;
- EU Habitats Directive 92/42/EEC;
- EU (Planning and Development (Environmental Impact Assessment) Regulations 2018 S.I 296 of 2018;
- EU Strategy on Green Infrastructure 2013;
- National Biodiversity Action Plan 2017-2021;
- National Landscape Strategy for Ireland 2015-2025;
- Water Framework Directive 2000/60/EC;
- Wildlife (and Amendment) Acts 1976-2012;
- Kilkenny County Council Cultural Strategy (Arts, Heritage, Libraries) 2018-2022.

**Chapter 6**  
**Monitoring, Implementation**  
**& Evaluation**

# 6.1 Monitoring, Implementation & Evaluation

The success of strategies laid out in this Climate Change Adaptation Strategy is relevant to the coming together of a steering group to oversee the actions and objectives laid out in the previous chapter. Given that this strategy represents all functions and operations of Kilkenny County Council, it is important that the Climate Action Steering Group brings together representatives from all key functional areas with various technical, operational and management expertise who can successfully carry out the necessary tasks and implement the actions contained within the strategy. The Management Team will nominate representatives to the Climate Action Steering Group and assign its Chair. The Climate Action Steering Group will meet quarterly.

The tasks of the group are as follows:

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

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

## 6.1.1 Prioritise Actions

The purpose of this task is to prioritise adaptation actions for delivery within the short, medium and long term timelines as defined in the strategy document. Actions are to be assigned timeframes for implementation and furthermore assigned owners for delivery. Progress reporting will be aligned to this prioritisation.

## 6.1.2 Develop an Approach and Initiate Implementation

The purpose of this task is to break down the adaptation framework into what actions will be taken, when they will be carried out and who will carry out the actions by way of an Implementation Plan. The steering group will devise a methodology for implementation of the annual action plan that includes:

- Who is responsible for implementing the adaptation actions?
- Identify funding required for the adaptation measures
- Identify/establish key indicators or targets as mechanisms for measuring outcomes
- Collaboration required with other stakeholders
- Identification of where adaptation measures could be incorporated into existing plans, policies and budgets
- Timeframe that measures will be implemented
- Identify risks to the implementation of actions

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

### 6.1.3 Liaise with other Stakeholders/Sectors

At times, the local authority will be required, as considered necessary, to liaise with other key stakeholders to provide for the delivery of actions. Conversely, the sectors, as identified in the National Adaptation Framework, will engage and liaise with Local Authorities in the delivery of sectoral adaptation actions stemming from their respective adaptation plans.

### 6.1.4 Monitor and Evaluate Implementation

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

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

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

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

### 6.1.5 Report on Progress

The Climate Action Steering Group will develop and agree appropriate and continuous timeframes and mechanisms to report on the progress of the practical implementation of actions of this strategy to the Management Team, Environmental Protection, Water Services and Energy Strategic Policy Committee (SPC 5) and the Elected Members/full council as considered appropriate.

Reporting on progress (i.e. Climate Change Adaptation Progress Report) will be prepared **annually**, (based on the initial date of the adoption of the strategy), for input by the Management Team and SPC 5 and review by the Elected Members.

The progress report will provide for, inter alia:

- Progress achieved on actions to that point (including key indicators as established);
- Extent to which actions have achieved and built new relationships with key stakeholders agencies, communities and identified new or emerging opportunities;
- Identification of funding streams used;
- Inspired or encouraged positive community engagement;
- Reports on the outcomes of efforts to change behavior.

The requirement to report on progress on an annual basis is also informed by the following:

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

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

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

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

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



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# Glossary

**Adaptation:** The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.

**Baseline:** The state against which change is measured.

**Biodiversity:** The variety of plant and animal life on Earth or in a habitat. Biodiversity generally measures variation at genetic, species and ecosystem level.

**Carbon sequestration:** The uptake of carbon containing substances, in particular CO<sub>2</sub>, in terrestrial or marine reservoirs.

**Carbon sink:** A natural or artificial reservoir that accumulates and stores some carbon containing chemical compounds for an indefinite period.

**Climate change:** A change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere and land use.

**Climate system:** The highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere and the biosphere which evolves over time due to internal dynamics and external forcings.

**CO<sub>2</sub>e:** A term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO<sub>2</sub>e signifies the amount of CO<sub>2</sub> which would have the equivalent global warming impact.

**Deforestation:** Conversion of forest to non-forest which results in an increase in greenhouse gases in the atmosphere as carbon sink sources are destroyed.

**Desertification:** Land degradation in arid, semi-arid and dry sub-humid areas which is a reduction or loss of the biological or economical productivity and complexity of land arising from human activities.

**Ecological corridor:** A conserved area of natural habitat connecting wildlife populations that would otherwise be separated due to human activities or manmade structures. They allow wildlife to move safely between segregated habitats for feeding, breeding and dispersion.

**Ecosystem:** A community of organisms in conjunction with the abiotic, or non-living, components of their environment, interacting as a system.

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

**Energy efficiency:** The ratio of useful energy output of a system, conversion process or activity to its energy input.

**Global warming:** The gradual increase in global surface temperature as one of the consequences of anthropogenic emissions.

**Green Economy:** An economy that aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment.

**Green infrastructure:** A strategically planned network of natural and semi-natural areas designed to deliver a range of ecosystem services in urban areas such as storm water management and air purification for climate adaptation and mitigation.

**Greenhouse effect:** The trapping of solar radiation in the lower atmosphere due to absorbance by greenhouse gases, clouds and aerosols.

**Greenhouse gas (GHG):** Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at different wavelengths, causing the greenhouse effect. GHG's include water vapour, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and industrial gasses such as Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF<sub>6</sub>), and Nitrogen Trifluoride (NF<sub>3</sub>).

**Integrated wetland:** An artificial wetland used to treat municipal or industrial wastewater, grey water or storm water.

**Mitigation:** Human intervention to reduce the source or enhance the sinks of greenhouse gases.

**Soft engineering:** When the natural environment is used to reduce coastal erosion or river flooding.

**Strategic Environmental Assessment (SEA):** The process by which environmental considerations are required to be fully integrated into the preparation of plans and programmes prior to their final adoption.

**Sustainable Urban Drainage Systems (SuDS):** Drainage networks consisting of pipes and culverts which divert surface water into local watercourses as their infiltration into the ground would otherwise be hindered by urban surfaces sealed by pavements and buildings.

**Urbanisation:** The increase in the proportion of people living in towns and cities.

# Appendix

## Kilkenny County Council Climate Action Team Members:

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